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Air Force Institute of Technology

Research Report 2017

Period of Report: 1 Oct 2016 to 30 Sep 2017

Graduate School of Engineering and Management

**GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE, OHIO**

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AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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This report was edited and produced by the Office of Research and Sponsored Programs, Graduate School of Engineering and Management, Air Force Institute of Technology. The Department of Defense, other federal government, and non-government agencies supported the work reported herein but have not reviewed or endorsed the contents of this report.

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research@afit.edu

or visit the AFIT website: www.afit.edu

Air Force Institute of Technology Research Report 2017 Foreword

Research programs at the Air Force Institute of Technology (AFIT) are aligned with national defense priorities and provide valuable technical and management experiences that enhance our graduates' performance throughout their careers. AFIT works closely with research sponsors from many Air Force and DOD organizations to identify high interest problems that match our faculty expertise and educational requirements to maximize value.

AFIT's Autonomy and Navigation Technology Center, Center for Cyberspace Research, Center for Directed Energy, Center for Operational Analysis, Center for Technical Intelligence Studies and Research, Center for Space Research and Assurance and other research groups serve as focal points for many of our research initiatives. Emerging research groups are addressing game-changing technologies including hypersonics, human-machine systems, data sciences, and developing defense-related additive manufacturing applications. AFIT advises over 40 major acquisition programs through the Scientific Test & Analysis Techniques Test & Evaluation Center of Excellence to achieve maximum effectiveness of test resources. New consultation efforts include exploration of multi-domain approaches to the Air Force's core missions.

AFIT has strategic partnerships with the Air Force Research Laboratory, the National Air and Space Intelligence Center, the Air Force Life Cycle Management Center, the United States Transportation Command, and many other organizations and operational communities to maximize the contributions of our research programs to national defense needs. Our faculty and students also engage in collaborations with researchers at universities throughout the nation to advance the state-of-the-art in a variety of disciplines. AFIT cooperates with commercial enterprises to ensure timely transfer of new technology to US industry through Cooperative Research and Development Agreements (CRADAs).

This Research Report is prepared annually to summarize the significant contributions of AFIT; to solicit continued involvement and support from our Air Force, DOD, and other federal partners; and to encourage new sponsors to participate in AFIT's research programs. AFIT welcomes new opportunities to engage in research projects that are of mutual interest to our customers, faculty, and students. Additional information is available at <http://www.afit.edu/ENR/>.

Heidi R. Ries, Ph.D.
Dean for Research
Graduate School of Engineering
and Management
Air Force Institute of Technology



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(INTENTIONALLY BLANK)

1. INTRODUCTION

1.1. OVERVIEW

This Research Report presents the FY17 research statistics and contributions of the Graduate School of Engineering and Management (EN) at AFIT. AFIT research interests and faculty expertise cover a broad spectrum of technical areas related to USAF needs, as reflected by the range of topics addressed in the faculty and student publications listed in this report. In most cases, the research work reported herein is directly sponsored by one or more USAF or DOD agencies.

AFIT welcomes the opportunity to conduct research on additional topics of interest to the USAF, DOD, and other federal organizations when adequate manpower and financial resources are available and/or provided by a sponsor. In addition, AFIT provides research collaboration and technology transfer benefits to the public through Cooperative Research and Development Agreements (CRADAs). Interested individuals may discuss ideas for new research collaborations, potential CRADAs, or research proposals with individual faculty using the contact information in this document or via the AFIT Directory at http://www.afit.edu/directory_search.cfm.

Additional information on the research programs at AFIT may also be found on the research web home page at <http://www.afit.edu/ENR/>. The Office of Research and Sponsored Programs, Graduate School of Engineering and Management can be reached at 937-255-3633, (DSN 785-3633) or by email: research@afit.edu. The primary points of contact are the Director of Sponsored Programs, 937-255-3636 x7104, DSN 785-3636 x7104 and Dr. Heidi R. Ries, Dean for Research, 937-255-3636 x4544, DSN 785-3636 x4544.

1.2. THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT RESEARCH COLLABORATION

As detailed in the 2015-2017 catalog at <http://www.afit.edu/docs/20152017AFITcatalog.pdf>, AFIT offers Master's and Doctoral programs in a variety of disciplines through six departments: the Department of Aeronautics and Astronautics (ENY), the Department of Electrical and Computer Engineering (ENG), the Department of Engineering Physics (ENP), the Department of Mathematics and Statistics (ENC), the Department of Operational Sciences (ENS), and the Department of Systems Engineering and Management (ENV). In all of these disciplines, research is an integral component of graduate education, developing an individual student's skills and providing new knowledge of interest to many.

A brief listing of each department's research areas of emphasis appears below. Please contact the faculty or relevant departmental office for further information, or visit the Graduate School of Engineering and Management departmental websites at <http://www.afit.edu/en/>.

The [Department of Aeronautics and Astronautics](#), as well as its resident **Center for Space Research & Assurance**, invites research topic proposals and collaborative suggestions for the Aeronautical Engineering, Astronautical Engineering, Materials Science, and Space Systems programs. The following list highlights the Department's research specialties:

Aeroelasticity and Design Optimization
Aerospace Structures and Materials
Aircraft Survivability
Autonomous Control of UAVs
Compact Combustor Development
Computational Fluid Dynamics
Control of High Performance Aircraft
Dynamic Flight Simulation
Experimental Fluid Dynamics
High Velocity Impact
Impact Dynamics
Inflatable Space Structures
Materials and Structural Analysis

Mechanics of Materials and Structures
Micro Air Vehicles
Non-Linear Dynamics
Re-entry Dynamics
Rocket & Space Propulsion
Rotocraft Aeromechanics
Satellite Cluster Dynamics, Navigation, & Control
Spacecraft Dynamics & Control
Spacecraft/Sensor Integration and Testing
Thermal Control of Spacecraft
Turbine Heat Transfer
Weapon Aerodynamic

The [Department of Electrical and Computer Engineering](#), as well as its resident the **Autonomy and Navigation Technology Center** and the **Center for Cyberspace Research**, invites research topic proposals and collaborative suggestions for the Electrical Engineering, Computer Engineering, Computer Science, Cyber Operations, and Cyber Warfare programs. The following list highlights the Department's research specialties:

Advanced Security-Focused Computing Architectures	Evolutionary Algorithms
Artificial Intelligence	Guidance, Navigation, and Control
Automatic Target Recognition	Hardware Assurance
Communications/Radar	Information Visualization
Computer Communication Networks	Micro- and Nanosystems
Cryptography	Navigation Warfare
Cyber Operations and Security	Parallel and Distributed Processing
Electromagnetics/Low Observables	Signal and Image Processing
Electro-Optics	Software Protection
Electronic Warfare	Wireless Networks
	Wireless Sensor Network

The [Department of Engineering Physics](#), as well as its resident **Center for Directed Energy** and **Center for Technical Intelligence Studies and Research**, invites research topic proposals and collaborative suggestions for the Applied Physics, Nuclear Engineering, Optical Sciences and Engineering, Materials Science (jointly operated with the Department of Aeronautics and Astronautics), and Combating Weapons of Mass Destruction programs. The following list highlights the Department's research specialties within these programs:

Adaptive Optics, Aero-Optics and Beam Control	Nanomaterials
Atmospheric Characterization and Compensation	Nanomechanics
Atmospheric Effects on Weapons Systems	Nuclear Forensics
Atmospheric Electricity	Nuclear Survivability
Aviation Weather Forecasting	Nuclear Weapons Effects
Biological and Chemical Weapon Technologies	Numerical Weather Prediction
Computational Physics	Physics-Based Scene Modeling
Defects in Crystalline Solids	Positron Spectrometry
Directed Energy Weapons Effectiveness	Radiation and Particle Detection
High Energy Density Physics	Radiation Effects on Materials and Electronics
Imaging Science	Radiation Transport
Lasers and Electro-Optics	Remote Sensing and Signature Analysis
Muon Detection	Satellite Meteorology
Materials – Bio, Nuclear and Sensor	Semiconductors
Microscopic Imaging of Surfaces	Space Physics
Modeling and Simulation of Atmospheric Effects	Tropical Cyclone Analysis and Forecasting
Molecular Reaction Dynamics	Weather Radar

The [Department of Mathematics and Statistics](#) invites research topic proposals and collaborative suggestions for the following research specialties:

Acoustic Wave Scattering	Network Analysis
Bayesian Analysis	Nonlinear Waves
Biostatistics	Numerical Analysis
Categorical Data Analysis	Optimization
Control Theory	Partial Differential Equations
Data Analytics	Rarefied Gas Dynamics
Design of Experiments	Regression Modeling
Electromagnetics	Stochastic Processes
Fluid Dynamics	Structural Health Monitoring
Functional Analysis	Wavelets
Human Performance	
Information Fusion	

The [Department of Operational Sciences](#), as well as its resident **Center for Operational Analysis**, invites research topic proposals and collaborative suggestions within the areas of Operations Research, Logistics, and Supply Chain Management programs. The following list highlights the Department's research specialties:

Agile Combat Support Prioritization
Automatic Target Recognition
Autonomous System Operations and Testing
Big Data and Analytics
Combat Modeling
Decision Analysis
Design and Analysis of Experiments
Enterprise Level Depot Sustainment
Evaluation of Autonomous Systems
Facility Location Optimization
Force Structure Analysis Tool Development
Information Modeling
Inventory Analysis
Irregular Warfare
Irregular Warfare Model Development
Lean Operations
Logistics
Machine Learning
Maintenance and Production Management
Managerial Economics
Manpower Modeling and Forecasting
Materials Research Test Planning
Mathematical Programming
Modeling and Simulation

Network Analysis
Neural Networks
Operations Management
Operations Research
Optimization
Organization Behavior
Petroleum Management
Repair Network Integration
Robust Decision Making
Robust Design
Robust Mobility Modeling
Scheduling
Service Operations Management
Social Network Modeling and Analysis
Statistical Process Monitoring
Stochastic Modeling
Strategic Sourcing
Supply Chain Management and Resource Optimization
Test and Evaluation
Test Science
Time Series Analysis
Transportation Policy and Strategic Modeling

The [Department of Systems Engineering and Management](#) is a multidisciplinary department offering graduate degrees in seven different majors and conducting research in collaboration with the wide spectrum of programs throughout AFIT. The mission of the Department is to provide defense-focused graduate education and engage in interdisciplinary research to achieve integrated solutions to current and future Air Force challenges and enhance the interface between technology and human resources by focusing on systems, processes, and management. The following list highlights the Department's research specialties:

Acquisition Learning Curves
Applied Environmental Sciences
Built Environment Microbiome
Cognitive Mentorship and Performance
Computer and Network Security
Construction Management
Cost Analysis
Cyber Attack on UAS
Data Analytics
Design and Analysis of Experiments
Ecological Engineering
Emergency Management
Facility and Infrastructure Management
Fuels Microbiology
Geographical Information Science
Human Systems Integration
Human-Agent Interaction
Indoor Air Quality
Image and Display Science
Information Assurance and Security

Infrastructure Asset Management
Knowledge Management
Model-Based Systems Engineering
Modeling and Simulation
Occupational/Environmental Exposures
Neck Injury Biomechanics
Operations Research
Organizational Change
Permafrost
Photovoltaics
Physiologically-Based Pharmacokinetic Modeling Analysis
Product Design and Development
Project Management
Project Delivery
Reliability Engineering
Strategic Decision Support
Structural Health Monitoring
Structural Performance

**Surface Science
Sustainability and Life Cycle
Assessment
Systems Engineering**

**Unmanned Air System Design and Test
Vigilance
Water Quality
Waste-to-Energy Conversion Modeling**

Another avenue for educational and research collaboration with the Graduate School of Engineering and Management is through association with one or more of **AFIT's Research Centers**. A brief listing of each Center's research or educational areas of emphasis appears below. Please contact the Centers directly (see Chapter 6) or visit <http://www.afit.edu/ENR/page.cfm> for further information.

The [Autonomy and Navigation Technology \(ANT\) Center](#) is a forward-looking research center seeking to identify and solve tomorrow's most challenging navigation and autonomous and cooperative control problems by focusing on three research thrusts: autonomous and cooperative systems, non-GPS precision navigation, and robust GPS navigation/NAVWAR.

The [Center for Cyberspace Research \(CCR\)](#) conducts cyber security and cyber operations research at the Master's and PhD levels. CCR affiliated faculty teach and direct graduate research focusing on understanding and developing advanced cyber-related theories and technologies, such as critical infrastructure protection, cyber-physical systems, network intrusion detection and avoidance, insider threat mitigation, cyberspace situational awareness, malicious software detection and analysis, software protection, and anti-tamper technologies. The CCR is forward-looking and responsive to the changing educational and research needs of the Air Force, Department of Defense, and the federal government. CCR faculty's research and teaching establishes AFIT as a national Center of Academic Excellence in Research (CAE-R) and Center of Academic Excellence in Cyber Operations (CAE-CO), designated by the Department of Homeland Security (DHS) and the National Security Agency (NSA).

The [Center for Directed Energy \(CDE\)](#) is dedicated to Air Force and DOD research in high energy lasers (HELs), high power microwaves (HPMs), and their enabling technologies. The Center is an advocate for transitioning these systems to the battlefield through vigorous scientific and engineering research, graduate education programs and diverse consulting activities.

The [Center for Operational Analysis \(COA\)](#) conducts defense-focused research which directly supports DOD strategic objectives. The COA applies rigorous quantitative and qualitative tools, methodologies and approaches to identify, analyze and solve complex operations and supply chain problems while developing critical and forward-thinking analysts, managers, and leaders.

The [Center for Space Research and Assurance \(CSRA\)](#) is focused on delivering highly-valued resilient, responsive and reliable space capabilities to the DOD and Intelligence Community through executing cutting-edge space technology development, science and space experiments in collaboration with government organizations, to meet the challenges of tomorrow by developing the technical space cadre through world-class research and immersive hands-on graduate education.

The [Center for Technical Intelligence Studies and Research \(CTISR\)](#) is focused on Air Force, DOD and Intelligence Community's scientific, technical and operational activities through graduate research programs. Activities are directed on improving technical intelligence gathering via remote sensing. Current research is focused on signature measurement, phenomenological understanding, and algorithm development for target detection and tracking, battle space combustion characterization, event classification, and material identification.

The [Center of Excellence \(COE\) for Scientific Test and Analysis Techniques \(STAT\) in Test & Evaluation \(T&E\)](#) is a reach-back T&E capability that provides advice and assistance in the application of scientific test and analysis techniques in the development of Test & Evaluation Master Plans (TEMP). The COE provides value to the PEOs/PMs across the DOD through assistance provided to the Chief Developmental Tester (T&E Program Leads) during the T&E planning, execution and assessment. The COE provides an additional resource of subject matter expertise for the program managers and chief developmental testers of Major Defense Acquisition Programs (MDAP) and Major Automated Information Systems (MAIS) during the T&E planning, execution, and assessment process.

2. SPECIAL RECOGNITIONS

2.1 FACULTY FELLOWS

BADIRU, ADEDEJI B., Dean, Graduate School of Engineering and Management, Fellow of the Institute of Industrial Engineers, Fellow of the Nigerian Academy of Engineering.

COLLINS, PETER J., Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of AMPTA.

DECKRO, RICHARD F., Professor of Operations Research, Department of Operational Sciences, Fellow of the Military Operations Research Society.

***ELROD, WILLIAM E.**, Distinguished Professor Emeritus of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of American Society of Mechanical Engineers International.

***FRANKE, MILTON E.**, Professor Emeritus of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers.

***GOLTZ, MARK N.**, Professor Emeritus of Engineering and Environmental Management, Department of Systems Engineering and Management, Fellow of the Society of American Military Engineers.

GRMAILA, MICHAEL R., Professor and Head, Department of Systems Engineering and Management, Fellow of the Information System Security Association.

***HENGEHOLD, ROBERT L.**, Professor Emeritus of Physics, Department of Engineering Physics, Fellow of the American Physical Society.

***HOUPIS, CONSTANTINE H.**, Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

MALL, SHANKAR, Distinguished Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

***MAYBECK, PETER S.**, Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

PACHTER, MEIR, Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

PALAZOTTO, ANTHONY N., Distinguished Professor, Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of American Institute of Aeronautics and Astronautics, Fellow of the American Academy of Mechanics, Fellow of the American Society of Civil Engineers, Fellow of the Engineering Mechanics Institute.

PERRAM, GLEN P., Professor of Physics, Department of Engineering Physics, Fellow of the Directed Energy Professional Society.

PIGNATIELLO, JOSEPH J., Professor of Operations Research; Head, Department of Operational Sciences, Fellow of the Institute of Industrial and Systems Engineers; Fellow of the American Society for Quality.

POLANKA, MARC D., Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

RAQUET, JOHN F., Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Navigation.

RUGGLES-WRENN, MARINA B., Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

TERZUOLI, ANDREW J., Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Electromagnetics Academy.

***TORVIK, PETER J.**, Professor Emeritus of Aerospace Engineering and Engineering Mechanics, Department of Aeronautics and Astronautics, Fellow of the American Institute of Aeronautics and Astronautics, Life Fellow of American Society of Mechanical Engineers International, Fellow of the Ohio Academy of Science.

WEIR, JEFFERY W., Professor and Associate Department Head, Department of Operational Sciences, Fellow of the Southwestern Ohio Council for Higher Education.

*Emeritus faculty

2.2 PROFESSIONAL CERTIFICATIONS

AHNER, DARRYL K., Professional Engineer (Commonwealth of Virginia)

BADIRU, ADEDEJI B., Certified Project Management Professional (PMP), Leadership Certificate (University of Tennessee Leadership Institute), Professional Engineer (State of Oklahoma)

CHRISSIS, JAMES W., Professional Engineer (Florida #37247)

CUNNINGHAM, WILLIAM A., Certified in Transportation and Logistics (CTL)

ENINGER, ROBERT M., Lt Col, Certified Industrial Hygienist

FASS, ROBERT D., Certified Cost Estimator/Analyst (International Cost Estimating and Analysis Association)

FEE, JAMES R., Lt Col, Nuclear Weapons Effects, Policy, and Proliferations Graduate Certificate

FREELS, JASON K., Maj, Systems Planning, Research, Development and Engineering (SPRDE) Certification, Level III

GOLTZ, MARK N., Board Certified Environmental Engineer (American Academy of Environmental Engineers), Professional Engineer (State of Minnesota)

GREENDYKE, ROBERT B., Professional Engineer (State of Texas)

GRMAILA, MICHAEL R., Certified Information Security Manager (CISM); Information Systems Audit and Control Association (ISACA); Certified Information System Security Professional (CISSP); International Information Systems Security Certification Consortium, Inc. (ISC)2; National Security Agency INFOSEC Assessment Methodology (IAM) Certification; National Security Agency INFOSEC Evaluation Methodology (IEM) Certification; National Security Agency 4011/4012/4013 Certification.

HARPER WILLIE F., Jr., Professional Engineer (State of Arizona)

HAZEN, BENJAMIN T., Maj, Certified Lean Six Sigma Black Belt, Certified Six Sigma Green Belt, Certificate in Transportation and Logistics Regulation, Certification in Transportation and Logistics (CTL)

HOISINGTON, ANDREW, J., Professional Engineer (State of Michigan)

HOUPIS, CONSTANTINE H., Professional Engineer (State of Ohio)

KUNZ, DONALD L., Professional Engineer (Commonwealth of Virginia)

LAKE, ROBERT A., Capt, APDP – Engineering III, Science and Technology Management Level III, Program Management I.

LIN, ALAN C., Maj, APDP – SPRDE III, Science and Technology Management Level II, Program Management I.

LOPER, ROBERT D., APDP Level II Certification – SPRDE, APDP Level II Certification – S&T Management, APDP Level I Certification – Program Management

LUCAS, BRANDON, M., Certified Cost Estimator/Analyst (ICEAA), DOD Financial Management Level 3

MAILLOUX, LOGAN O., Maj, Certified Information System Security Professional (CISSP), Certified Systems Engineering Professional (CSEP)

MARCINIAK, MICHAEL A., APDP Level II Certification – SPRDE, APDP Level II Certification – Program Management, APDP Level I Certification – Test and Evaluation, Certified Laser Safety Officer (Board of Laser Safety, Orlando, FL)

MBONIMPA, ERIC G., Professional Engineer (State of Michigan)

MERKLE, LAURENCE D., Acquisition Professionals Development Program Level 2

MULLINS, BARRY E., Professional Engineer (State of Colorado)

OVERSTREET, ROBERT E., Lt Col, Certified in Transportation & Logistics (CTL)

PALAZOTTO, ANTHONY N., Professional Engineer (State of Ohio)

PARR, JEFFREY C., Lt Col, Systems Planning, Research, Development and Engineering (SPRDE) Certification, Level III

PERRAM, GLEN P., Professional Engineer (State of Ohio)

REEDER, MARK F., Professional Engineer (State of Ohio)

RITSCHER, JONATHAN, Lt Col, APDP Business-Cost Estimation Certification, Level II

RUTLEDGE, JAMES L., Maj, Professional Engineer (State of Texas)

SLAGLEY, JEREMY M., Board Certified Industrial Hygienist, Board Certified Safety Professional

STONE, BRIAN B., Maj, Six Sigma Black Belt Certification (Arizona State University), Certificate in Statistics (Arizona State University)

THOMAS, LEVI, M., Maj, Professional Engineer (State of Colorado)

TUTTLE, RONALD F., APDP Level III Certification – Program Management, APDP Level III Certification – SPRDE

2.3 RESEARCH AND TEACHING AWARDS

2.3.1 FACULTY

BINDEWALD, JASON M., Maj,

2017 Air Force Research and Development Award

BOEHMKE, BRADLEY C.,

ASCE Engineering Economy Division Eugene L. Grant Award for Best Publication

CANCIANI, AARON J., Capt,

2017 John L. McLucas Basic Research Award

CARBINO, TIMOTHY J., Maj,

2017 Air Force Science & Engineering Award- Advance Technology Development

FEE, JAMES R., Lt Col,

Winner of the 2016 AFIT Volunteer of the Year Award

FICKUS, MATTHEW C.,

ENC Instructor of the Quarter, 2016 Fall Quarter

ENC Instructor of the Quarter, 2017 Summer Quarter

ENC Instructor of the Year, 2016-2017

FRANZ, ANTHONY L., Lt Col,

2017 Southwestern Ohio Council for Higher Education (SOCHE) Faculty Excellence Award.

HARPER, WILLIE F. Jr,

2016 John L. McLucas Basic Research Award

2017-2018 Embassy Science Fellow

HAZEN, BENJAMIN T., Maj,

SOCHE 2016 Faculty Excellence Award

LAKE, ROBERT A., Capt,

Air Force Outstanding Scientist & Engineer Award

LUNDAY, BRIAN J.,

Outstanding Young Member OR/MS Award, INFORMS Cincinnati-Dayton Chapter

MAILLOUX, LOGAN, O. Maj,

2016 AFIT Outstanding Military Instructor of the Year

PRIGGE, DIEDRICH, V.,

2016-2017 Sigma Iota Epsilon - Instructor of the year award

REEGER, JONAH A., Maj,

ENC Instructor of the Quarter, 2017 Winter Quarter

RUGGLES-WRENN, MARINA B.,

2017 ASME Dedicated Service Award

2017 ASME Board of Governors Award

2017 ASME Pressure Vessel and Piping Division Certificate of Appreciation.

WHITE, EDWARD D. III,

SOCHE Faculty Excellence Award, November 2016

Dr. Leslie M. Norton Teaching Excellence Award, March 2017

ENC Instructor of the Quarter, 2017 Spring Quarter

2.3.2 STUDENTS

BARNES, DANIEL R.,

2017 Space Best Presentation Award – 42nd AIAA Dayton Cincinnati Aerospace Sciences Symposium

CARLSON, NATHAN J.,

2017 Secretary James G. Roche Award honoring the enlisted student who best demonstrates academic, leadership, research, and service achievements.

CHALAOPAK, KASIDIT V.,

2017 AFIT Chapter of the American Nuclear Society Best Thesis Award

COLLIS, SCHUYLER L.,

Navigation Research Excellence Award

DUNKEL, MELISSA A.,

2017 Optimization Best Presentation Award – 42nd AIAA Dayton Cincinnati Aerospace Sciences Symposium

FAIN, BENJAMIN M.,

2017 Dean's Award for the most exceptional master's thesis by a graduating student in the Electrical and Computer Engineering. Thesis title: "Small Fixed-wing Aerial Positioning using Inter-vehicle Ranging Combined with Visual Odometry."

FERGUSON, MATTHEW D.,

Military Operations Research Society (MORS) Dr. James T. Moore Graduate Research Prize

HALLADA, FRANCIS D.,

2017 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Engineering Physics. Thesis title: "The Fresnel Zone Light Field Spectral Imager."

2017 Chancellor's Award for the most exceptional master's thesis by a graduating student. Thesis title: "The Fresnel Zone Light Field Spectral Imager."

2017 International Society for Optics and Photonics (SPIE) Excellence in Optics and Photonics Research Award

2017 Advanced Technical Intelligence Association (ATIA) Outstanding Student Award

HAWS, DEREK W.,

2017 Air Force Historical Foundation General Bryce Poe II Award

HOEFFNER, ZACHARY W.,

2017 Mervin E. Gross Award, that recognizes a graduating master's student who has demonstrated the most exceptional academic achievement and high qualities of character, initiative and leadership.

KNAPP, KEVIN R.,

2017 Lockheed-Martin Best Student Paper Award – 2017 AIAA SciTech Conference

2017 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Aeronautics and Astronautics. Thesis title: "Time-Dependent Validation of Finite Element Strain Distribution of a Plastically-Deformed Plate via Digital Image Correlation."

LEFGREN, SCOTT J.,

AOC Academic Research Excellence Award

LENKER, RONALD J.,

2017 Edwin E. Aldrin, Sr. Award which is given for displaying the most exceptional leadership characteristics while in the graduate program.

LIM, GAYLEEN S.A.,

March 2017 Jerome G. Peppers Jr., Outstanding Student Award which is given to a member of each graduating class whose academic record and research significantly contributes to the field of logistics.

LIU, KAN,

2017 Jefferson Goblet Best Student Paper – 2017 AIAA SciTech Conference

PITMAN, BRIAN W.,

2017 MASINT Committee Award of Academic Excellence

PORTANTE, ANTHONY A.,

2017 Best Masters Paper and Presentation at the 12th International Conference on Cyber Warfare and Security

RIGOLET, TAYLOR S.,

June 2017 Jerome G. Peppers Jr., Outstanding Student Award which is given to a member of each graduating class whose academic record and research significantly contributes to the field of logistics.

ROSE, ANTHONY J.,

2017 Louis F. Polk Award which is given for exhibiting the highest standards of academic and professional accomplishment and through their research made a significant contribution toward strengthening the nation's industrial defense base.

SCHWEMMER, JOSEPH R.,

2017 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Operational Sciences. Thesis title: "Optimal Design of a Hexakis Icosahedron Vacuum Based Lighter than Air Vehicle."

STELZER, DYLAN,

2017 Jefferson Goblet Best Student Paper – 2017 AIAA SciTech Conference, Jan 2017

STERN, JORDAN L.,

2017 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Systems Engineering and Management. Thesis title: "Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures."

WATCHEL, STEVEN T.,

2017 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Systems Engineering and Management. Thesis title: "Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures."

3. RESEARCH STATISTICS

3.1 RESEARCH AND CONSULTING OUTPUT MEASURES

There are measurable indicators of AFIT's contribution to the engineering and scientific community and AFIT's success in staying well informed of technical possibilities and scientific opportunities. These indicators include the number and quality of technical publications accepted by the editors of journals; the number of presentations accepted for regional, national and international conferences; the number of sponsor funded research projects conducted; and finally, the number of student Graduate Research Papers, MS theses, and PhD dissertations completed and submitted to the Defense Technical Information Center. For FY17, these output measures are shown in Tables 3.1a and 3.1b for the Departments and Centers, respectively.

Table 3.1a Faculty Research and Sponsored Programs Output, by Department

	Graduate School, by Department						
	Graduate School (EN) Total	Math & Stats (ENC)	Electrical & Comp Eng (ENG)	Engineering Physics (ENP)	Operational Sciences (ENS)	Sys Eng & Management (ENV)	Aeronautics & Astro (ENY)
Number of Faculty (FTE)*	133	17	33	26	20	18	19
Number of Research Faculty (FTE)	11	-	2	8	1	-	-
Refereed Publication Authorships**	277	30	43	60	58	52	34
Refereed Conferences on the Basis of Full Paper Review**	152	3	77	21	18	23	10
Refereed Conferences on the Basis of Abstract Review**	205	10	33	51	42	27	42
Sponsor Funded Projects***	227	5	59	55	39	18	50
Books & Chapters in Books**	19	2	5	2	2	1	7
Patents****	24	1	8	5	1	5	4
Doctoral Dissertations Advised	40	-	12	14	7	2	5
Master's Theses Advised	270	5	77	19	51	66	52
Graduate Research Papers Advised	28	-	-	-	28	-	-

*FTE: Full-time equivalent military and permanent civilian faculty

**Publications/Presentations are counted by faculty authorships.

***One project associated with the Office of Research and Sponsored Programs (ENR) is reflected in Graduate School (EN) Total.

****Includes: Patents awarded, patent applications, and invention disclosures counted by faculty authorships.

Table 3.1b Faculty Research and Sponsored Programs Output, by Center

	Center Total	Graduate School, by Center					
		ANT	CCR	CDE	COA	CSRA	CTISR
Number of Affiliated Faculty*	143	25	26	16	16	40	20
Refereed Publication Authorships**	71	22	6	29	4	6	4
Refereed Conferences on the Basis of Full Paper Review**	84	33	18	23	-	9	1
Refereed Conferences on the Basis of Abstract Review**	77	21	2	26	3	14	11
Sponsor Funded Projects	129	30	12	20	26	26	15
Books & Chapters in Books**	3	1	-	2	-	-	-
Patents***	7	1	2	4	-	-	-
Doctoral Dissertations Advised	18	2	6	4	2	2	2
Master's Theses Advised	111	26	33	3	11	37	1
Graduate Research Papers Advised	8	-	-	-	8	-	-

*Some faculty are affiliated with multiple centers.

**Publications/Presentations are counted by faculty authorships.

****Includes: Patents awarded, patent applications, and invention disclosures counted by faculty authorships.

3.2 RESEARCH AND CONSULTING SPONSORSHIP

As part of an Air Force institution, the faculty members of the Air Force Institute of Technology focus their research on current problems as well as future systems of the Air Force and other DOD organizations. Evidence of this focus is that 95% of all theses, dissertations, and graduate research papers listed in Table 3.1a are externally sponsored by Air Force, DOD and government agencies. In addition, most of the research projects and consultations are carried out for Air Force and DOD units. The data are summarized in Figure 3.1 and Table 3.2.

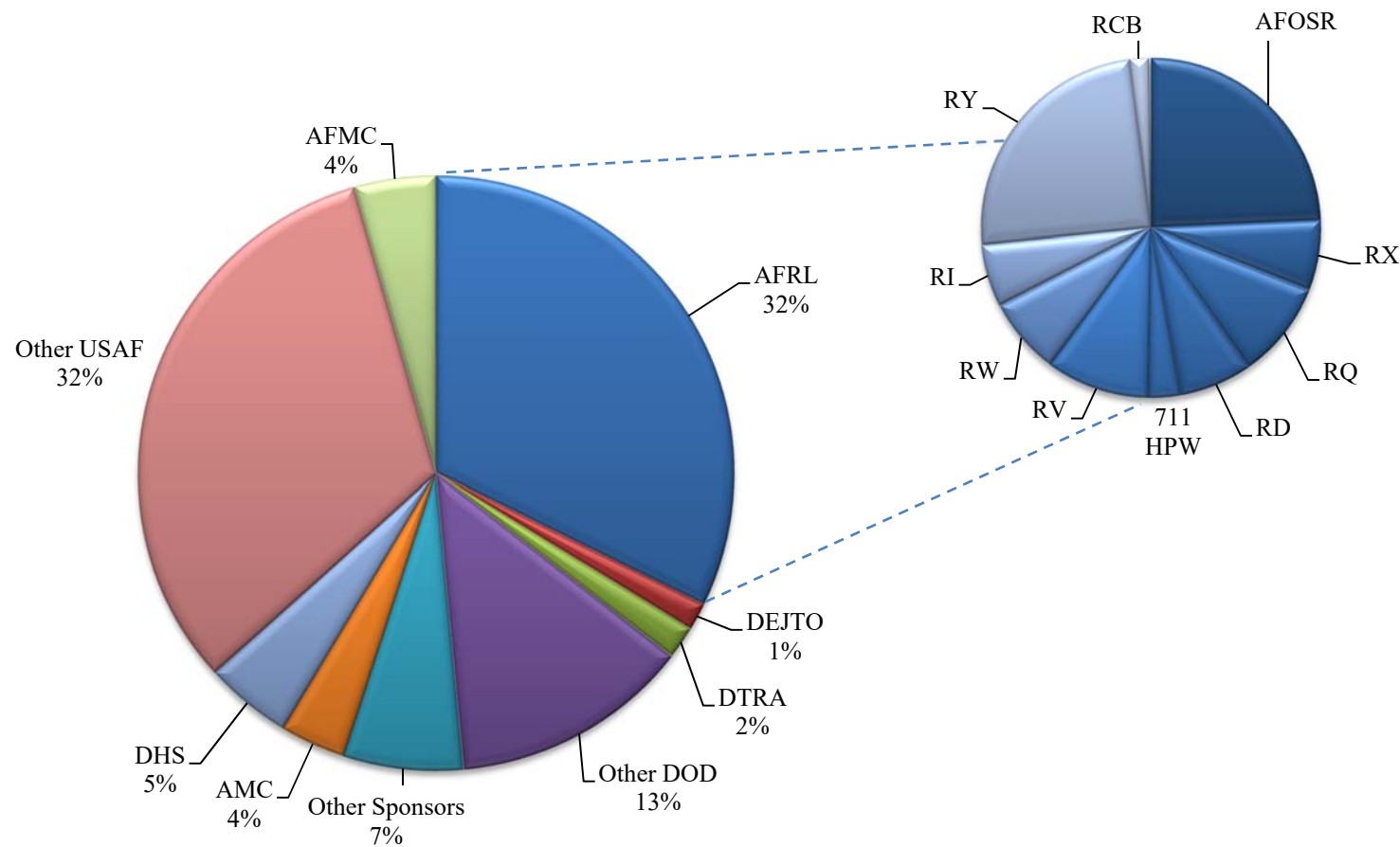


Figure 3.1 Sponsors of AFIT Theses, Dissertations, and Graduate Research Papers

Table 3.2 AFIT External Sponsorship by Organization

SPONSOR ORGANIZATION	PhD Dissertations	Master's Theses	Graduate Research Papers	Funded Projects
OFFICE OF THE SECRETARY OF THE AIR FORCE		1	1	
HQ UNITED STATES AIR FORCE	1	9	2	7
AIR COMBAT COMMAND		4	1	
AIR FORCE MATERIEL COMMAND		5		5
412 th Test Wing				1
46 th Test Group				1
704 th Test Group		2		1
746 th Test Squadron				1
812 th Test Squadron				1
Air Force Life Cycle Management Center		4		6
Air Force Nuclear Weapons Center				1
Air Force Research Laboratory (AFRL)				2
711 Human Performance Wing (RH)		7		8
Air Force Office of Scientific Research (AFOSR)	1	16		26
Aerospace Systems Directorate (RQ)	3	23		16
Directed Energy Directorate (RD)		2		6
Information Directorate (RI)	1	6		3
Materials & Manufacturing Directorate (RX)		5		11
Munitions Directorate (RW)		7		9
Sensors Directorate (RY)	4	18		16
Space Vehicles Directorate (RV)	2	14		10
Air Force Installation and Mission Support Center		1		
Air Force Sustainment Center	1	2		2
Air Force Test Pilot School				1
Wright-Patterson AFB Fire Emergency Services		1		
AIR MOBILITY COMMAND	1	1	10	
AIR FORCE SPACE COMMAND		2		
AIR FORCE SPECIAL OPERATIONS COMMAND			1	
USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS				
Air Force Civil Engineer Center		16		2
Air Force Cost Analysis Agency		3		
Air Force Inspection Agency				1
Air Force Medical Operations Agency		1		
Air Force Rapid Capability Office		1		
Air Force Technical Applications Center	1	2		3
National Air and Space Intelligence Center		7		7
US Air Force Academy			1	
OTHER DEPARTMENT OF DEFENSE	1	13	2	27
Defense Advanced Research Projects Agency				1
Defense Threat Reduction Agency	2	4		2
DOD Cyber Crime Center		1		
Directed Energy Joint Technology Office	5			5
Joint Aircraft Survivability Program Office				1
Joint Chief of Staff		1	1	
Joint Warfare Analysis Center		4		2
Missile Defense Agency		1		1

National Geospatial-Intelligence Agency				1
National Guard Bureau				1
National Security Agency				1
Office of the Secretary of Defense	2	3		4
United States Army	1	4		7
United States Navy		3		8
US European Command			2	
US Special Operations Command		2		
US Transportation Command	1	2		1
OTHER FEDERAL AGENCIES				
Department of Energy				2
Department of Homeland Security	1	13		3
Domestic Nuclear Detection Office	1	1		
Environmental Protection Agency	1	5		2
Federal Emergency Management Agency			1	
National Aeronautics and Space Administration		1		1
National Nuclear Security Administration		1		
National Science Foundation				1
NON-FEDERAL AGENCIES				
Argentine Air Force Materiel General Directorate		1		
Booz Allen Hamilton Inc.		1		
Creare, Inc				1
Cummons Inc		1		
Innovative Scientific Solutions Inc.		1		
Lincoln Laboratory - MIT		1		
Lockheed Martin		3		2
Ohio Federal Research Network				2
Raytheon Space and Airborne Systems		1		1
Sandia National Laboratories		1		
Spectral Sciences, Inc				1
The Optical Sciences Company				1
The Charles Stark Draper Laboratory, Inc		1		1
Turkish Air Force		1		
UK Ministry of Defense			1	
*TOTALS	30	231	23	227

3.3 EXTERNAL SPONSOR FUNDING FOR THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT

Many of the Graduate School of Engineering and Management's theses and research projects completed under faculty supervision are funded in part by other Air Force, DOD and government units and agencies. Often, this funding results from collaboration between faculty and thesis sponsors and occurs when the research project can be leveraged by the purchase of equipment or services not otherwise available. Figure 3.2 summarizes the past ten fiscal years of sponsored funding. Tables 3.3 and 3.4, and Figure 3.3, summarize external funding for FY17.

Figure 3.2 New Award History FY08-FY17

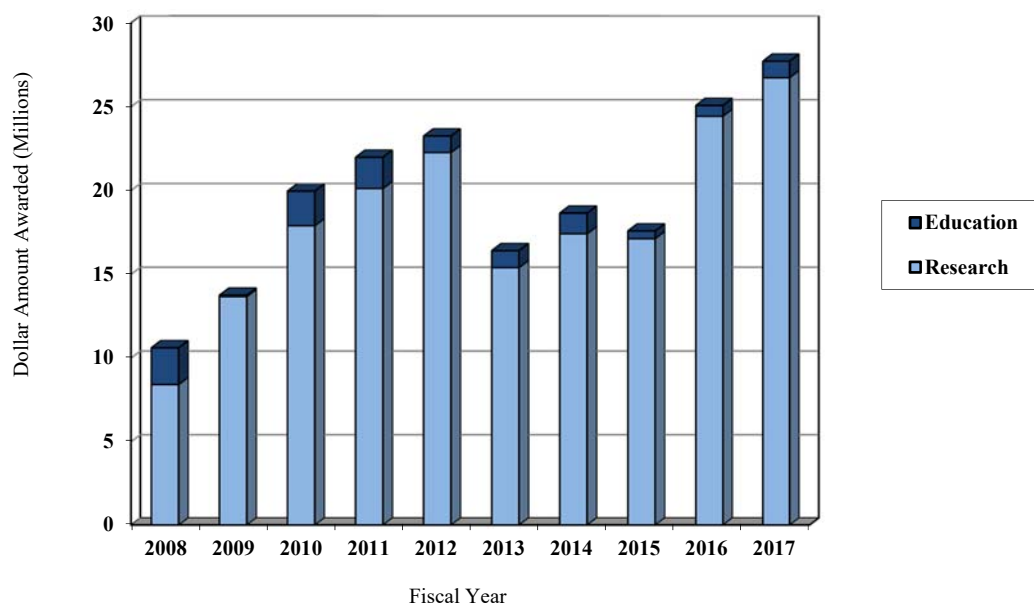


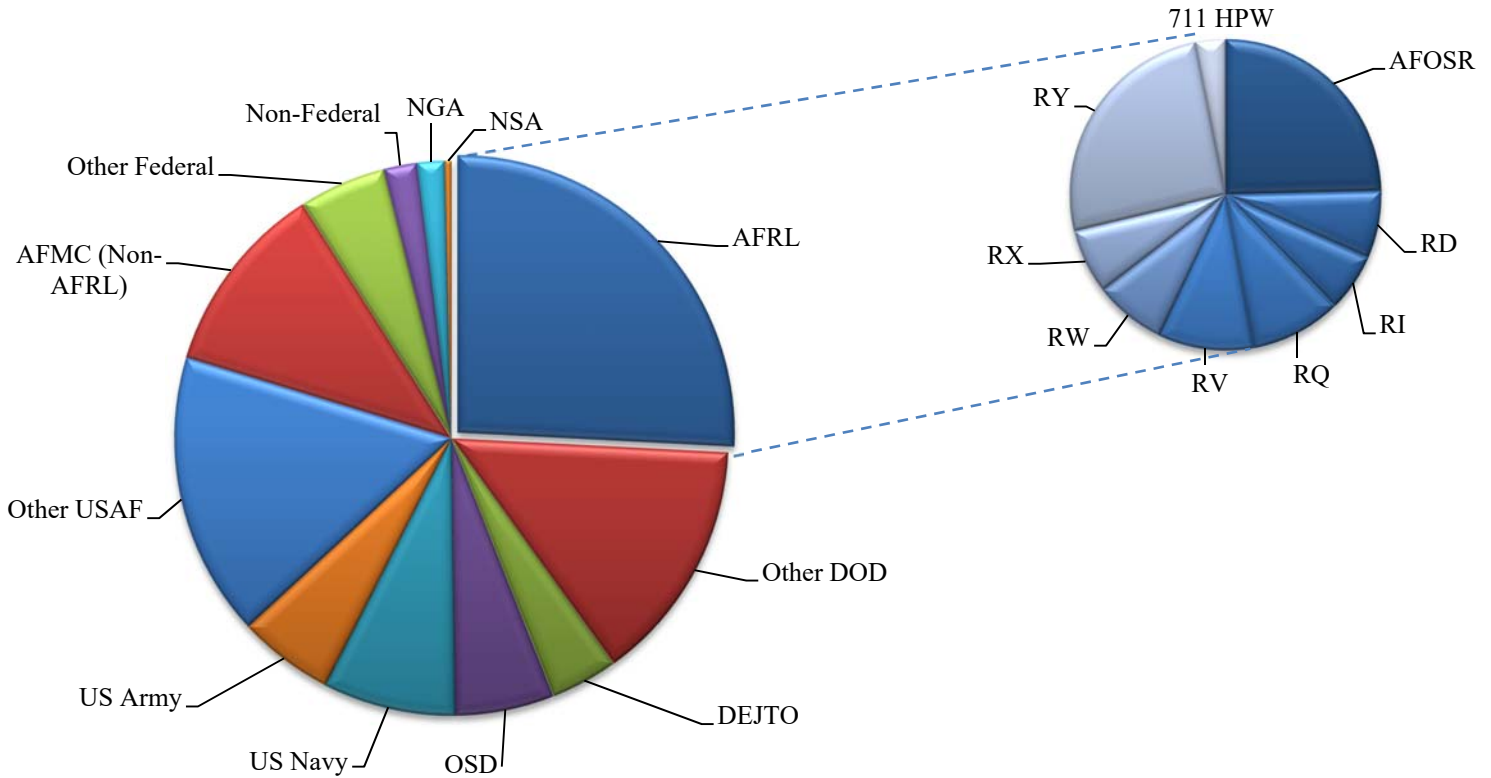
Table 3.3 FY17 External Funding & Research Expenditures for Academic Departments & Research Centers (\$1,000's)

Department	Newly Awarded Research Projects		Newly Awarded Education Projects		Total FY17 Newly Awarded Projects		Total FY17 Research Expenditures
	#	\$k	#	\$k	#	\$k	\$k
Mathematics & Statistics (ENC)	5	288	-	-	5	288	539
Electrical & Computer Eng (ENG)	57	5,950	2	228	59	6,178	7,871
Engineering Physics (ENP)	54	5,719	1	9	55	5,728	7,066
Research & Sponsored Programs (ENR)	1	280	-	-	1	280	-
Operational Sciences (ENS)	35	9,976	4	286	39	10,262	11,534
Systems Eng & Management (ENV)	17	1,249	1	400	18	1,649	1,863
Aeronautical & Astronautical Eng (ENY)	48	3,275	2	59	50	3,334	6,320
TOTAL	217	26,737	10	982	227	27,719	35,193

Center							
Autonomy and Navigation Technology (ANT)	30	3,792	-	-	30	3,792	5,101
Center for Cyberspace Research (CCR)	10	668	2	228	12	896	1,161
Center for Directed Energy (CDE)	19	3,025	1	9	20	3,034	3,186
Center for Operational Analysis (COA)	24	7,516	2	180	26	7,696	9,640
Center for Space Research and Assurance (CSRA)	26	2,484	-	-	26	2,484	3,549
Center for Tech Intel Studies & Research (CTISR)	15	1,552	-	-	15	1,552	1,836
TOTAL	124	19,037	5	417	129	19,454	24,473

Notes: Total research expenditures reported include institutional cost sharing, which is not included in newly awarded projects. Numbers reported to the ASEE and NSF research expenditure surveys vary somewhat due to differences in definitions. All Center funds are also included in departmental funding.

Figure 3.3 New FY17 Awards by Sponsor



*Pie Chart on the right shows breakdown by AFRL Technology Directorates

Table 3.4 New FY17 Awards to Academic Departments & Research Centers by Sponsor

Dept.	AFRL \$k	AFMC (Non-AFRL) \$k	Other USAF \$k	Other DOD \$k	Other Federal \$k	Non- Federal \$k	Total \$k
ENC	284	-	-	-	4	-	288
ENG	3,102	-	589	1,950	195	341	6,178
ENP	1,552	-	521	3,172	359	124	5,728
ENR	280	-	-	-	-	-	280
ENS	617	2,722	2,978	3,320	625	-	10,262
ENV	286	400	512	229	223	-	1,649
ENY	1,031	-	-	2,223	-	80	3,334
TOTAL	7,152	3,122	4,600	10,894	1,406	545	27,719

Note: "Other DOD" in this table includes the DEJTO, OSD, NGA, NSA, US Army, and US Navy pie slices from Figure 3.3, plus funding from other DOD organizations.

Center	AFRL \$k	AFMC (Non-AFRL) \$k	Other USAF \$k	Other DOD \$k	Other Federal \$k	Non- Federal \$k	Total \$k
ANT	1,892	-	350	1,400	30	120	3,792
CCR	349	-	59	293	195	-	896
CDE	770	-	9	1,816	119	320	3,034
COA	445	2,699	2,602	1,840	110	-	7,696
CSRA	445	-	35	2,004	-	-	2,484
CTISR	259	-	318	951	-	24	1,552
TOTAL	4,160	2,699	3,373	8,304	454	464	19,454

Note: All Center funds are also included in departmental funding

4. SPONSORSHIP OF STUDENT RESEARCH

4.1. OFFICE OF THE SECRETARY OF THE AIR FORCE

MASTER'S THESES

DWYER, KEVIN M., *Forecasting Traditional vs Blended Retirement System for Individual Service Members*. AFIT/ENV/MS/17M-185. Faculty Advisor: Dr. Robert D. Fass. Sponsor: SAF.

GRADUATE RESEARCH PAPERS

NOLAN, STEVEN T., *An Intrinsic Case Study Analysis of Air Force Company Grade Officers as High-Potential Officers*. AFIT/ENS/MS/17J-039. Faculty Advisor: Lt Col Robert E. Overstreet Sponsor: SAF.

4.2. HEADQUARTERS UNITED STATES AIR FORCE

DOCTORAL DISSERTATIONS

MESSER, ADAM J., *On the Development of Robust Anomaly Detection Algorithms with Limited Labeled Data*. AFIT/ENS/DS/17S-040. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: HQ USAF/A9.

MASTER'S THESES

BARKALOW, ALLISON M., *Identifying Factors that Affect the Retention Behaviors of Aircraft Maintenance (21A) and Munitions and Missile Maintenance (21M) Officers*. AFIT/ENS/MS/17J-016. Faculty Advisor: Lt Col Robert E. Overstreet Sponsor: HQ USAF/A4. [COA]

DEFRANK, JOSHUA D., *A Condition Based Maintenance Approach to Forecasting B-1 Aircraft Parts*. AFIT/ENS/MS/17M-123. Faculty Advisor: Capt Michael P. Kretser. Sponsor: HQ USAF/A4.

FRANZEN, COURTNEY N., *Survival Analysis of US Air Force Rated Officer Retention*. AFIT/ENS/MS/17M-129. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

GOODEN, DUSTIN L., *United States Air Force Unaccompanied Housing Divestiture: An Economic Analysis*. AFIT/ENV/MS/17M-188. Faculty Advisor: Dr. Jared A. Astin. Sponsor: HQ USAF/A4.

GRIFFITH, JOHN R., *The Air Force Fitness Test: Creating New Fitness Assessment Charts using Waist to Height Ratios*. AFIT/ENC/MS/17M-191. Faculty Advisor: Dr. Edward D. White. Sponsor: HQ USAF/A1.

HUSTON, RYAN W., *Blended Military Retirement and the Potential Impacts on Retention and Recruiting*. AFIT/ENS/MS/17M-135. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

SMITH, JESSICA A., *Supply Chain Transformation: An Information Technology Perspective*. AFIT/ENS/MS/17S-065. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: HQ USAF/A4. [COA]

WEST, KIMBERLY S., *Approximate Dynamic Programming for the United State Air Force Officer Manpower Planning Problem*. AFIT/ENS/MS/17M-162. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: HQ USAF/A1.

ZIMMERMAN, JAMIE T., *Application of Enlisted Force Retention Levels and Career Field Stability*. AFIT/ENS/MS/17M-167. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

GRADUATE RESEARCH PAPERS

PARRISH, JEFFREY M., *United States Nuclear Deterrence Policy: Past, Present, and Future*. AFIT/ENS/MS/17J-043. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: HQ USAF/A3. [COA]

VANN, RAYMUNDO M., *Developing a Process for Determining the Optimal Nuclear Weapons Posture*. AFIT/ENS/MS/17J-050. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: HQ USAF/A10.

4.3. AIR COMBAT COMMAND

MASTER'S THESES

CROUCH, DANIEL W., *Improving Minuteman III Maintenance Concepts*. AFIT/ENS/MS/17M-122. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFGSC. [COA]

ROBERTS, ANDREW J., *A Systems Engineering Approach to Measuring Live, Virtual, Constructive Training Effectiveness and Performance*. AFIT/ENV/MS/17M-217. Faculty Advisor: Maj Logan O. Mailloux. Sponsor: 705 CTS.

VINCENT, AARON T., *Maintenance Officer Initial Skills Training Timeline*. AFIT/ENS/MS/17M-160. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: HQ ACC/A4. [COA]

WILLIAMS, RUSSELL H., *Predicting Failure Rates for the B-1B Bomber*. AFIT/ENS/MS/17M-163. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFGSC. [COA]

GRADUATE RESEARCH PAPERS

JONES, ELIZABETH M., *The Culture of Deterrence*. AFIT/ENS/MS/17J-032. Faculty Advisor: Col Adam D. Reiman. Sponsor: AFGSC.

4.4. AIR EDUCATION AND TRAINING COMMAND

AIR FORCE INSTITUTE OF TECHNOLOGY

DOCTORAL DISSERTATIONS

BURGI, KENNETH W., *Reflection Matrix Method for Controlling Light after Reflection from a Diffuse Scattering Surface*. AFIT/ENP/DS/16D-011. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A.

CADY, CAMDON J., *A Tree Locality-Sensitive Hash for Secure Software Testing*. AFIT/ENG/DS/17S-005. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

CLIMER, JONATHON R., *Dynamic Prototype Addition in Generalized Learning Vector Quantizers*. AFIT/ENG/DS/17S-009. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

COMPTON, ANDREW JM., *A Location-Aware Middleware Framework for Collaborative Visual Information Discovery and Retrieval*. AFIT/ENG/DS/17S-010. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: N/A. [ANT/CCR]

DAILEY, WHITMAN T., *Special Features of the Air-to-Space Neutron Transport Problem*. AFIT/ENP/DS/17S-022. Faculty Advisor: Dr. Kirk A. Mathews. Sponsor: N/A.

LAURVICK, TOD V., *Improvements to Micro-Contact Performance and Reliability*. AFIT/ENG/DS/16D-003. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

LIEFER, NATHANIEL C., *Application of Radio Frequency Distinct Native Attribute Fingerprinting to Commercial Push-to-Talk (PTT) Radios*. AFIT/ENG/DS/17S-013. Faculty Advisor: Dr. Michael A. Temple. Sponsor: N/A. [CCR]

MILLAR, JEREMY R., *A Stochastic Model of Plausibility in Live-Virtual-Constructive Environments*. AFIT/ENG/DS/17S-015. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A. [CCR]

OWENS, CHRISTOPHER T., *Effects of Mechanical Load History on Lamb Wave Interactions with Fatigue Cracks in Aluminum Plates*. AFIT/ENV/DS/17S-061. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

RODEWALD, JOSHUA V., *An Information Theoretic Investigation Of Complex Adaptive Supply Networks With Organizational Topologies*. AFIT/ENV/DS/16D-029. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

SATTLER, JAMES, *Engineered Surfaces to Control Secondary Electron Yield for Multipactor Suppression*. AFIT/ENG/DS/17S-018. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A. [CSRA]

MASTER'S THESES

ALATAWI, NAIF H., *RSAF F-15 Reparable Items Capacity Planning & Execution*. AFIT/ENS/MS/17S-033. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

ALF, CHRISTIAN N., *Image Processing for Space Situational Awareness using Commercial-off-the-Shelf Imagery*. AFIT/ENV/MS/17M-238. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

ALZAHIRANY, RIYADH A., *Corrosion Fatigue Behavior of AISI 4340 Steel Coated With Cadmium and Zinc-Nickel with and Without Scribed Damage in Saltwater Environment*. AFIT/ENV/MS/17S-001. Faculty Advisor: Dr. Shankar Mall. Sponsor: N/A.

ANDERSON, RYAN J., *Using a Plenoptic Camera for Real-Time Depth Estimation*. AFIT/ENV/MS/17M-002. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

ATKINSON, JOHN D., *Diffusion of Autonomous Vehicles as an Organizational Innovation*. AFIT/ENS/MS/17M-112. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: N/A. [COA]

AUST, MATTHEW E., *Proactive Host Mutation in Software-Defined Networking*. AFIT/ENG/MS/17M-003. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

BLACH, NOAH T., *Energy Harvesting with Micro Machines*. AFIT/ENG/MS/17M-007. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

BURNETT, JONATHON M., *Building Character: Positive Psychology & the Air Force Core Values*. AFIT/ENS/MS/17M-116. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: N/A.

CABERTO, EDDIE K., *Securing Controller Area Networks in Vehicles via Packet Switched Network Segregation*. AFIT/ENG/MS/17M-009. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]

CALLAHAM, ANTHONY M., *Two-Dimensional Modeling of Self-Healing Shock Waves in Porous Explosives*. AFIT/ENV/MS/17M-249. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: N/A.

CARLSON, NATHAN J., *Multiple Criteria Decision Making on the Load Planning Process to Enhance Cargo Compartment Utilization*. AFIT/ENS/MS/17M-118. Faculty Advisor: Col Adam D. Reiman. Sponsor: N/A.

CHAMBERLAIN, CHAD N., *Genetic Algorithm Receiver Optimization for Passive, Bi-static Synthetic Aperture Radar*. AFIT/ENG/MS/17S-007. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: N/A.

COLLIS, SCHUYLER, *GPS Spoofers Detection via Receiver Statistical Signal Processing*. AFIT/ENG/MS/17M-016. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT]

COOPER, KEVIN S., *Process Categorization using Tree Edit Distance*. AFIT/ENG/MS/17M-018. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

COUCH, BRIAN D., *Busek ICM Micro Radio-Frequency Ion Thruster Empirical Performance Determination*. AFIT/ENY/MS/17M-253. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

CUNNINGHAM, CAMERON R., *Evaluation of Networked Satellite Command & Control via Internet Conduit*. AFIT/ENY/MS/17M-254. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

DAZZIO, ELAINE L., *Statistically Modeling Fuel Consumption with Heteroscedastic Data*. AFIT/ENG/MS/17J-075. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]

DUNKEL, MELISSA A., *The Impact of Atmospheric Fluctuations on Optimal Boost Glide Hypersonic Vehicle Dynamics*. AFIT/ENY/MS/17M-257. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

DUNKEL, PATRICK N., *Application of RF-DNA Fingerprinting Techniques to ICOM Radio Satellite Communication*. AFIT/ENY/MS/17M-258. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

GOODGION, JONATHAN S., *Active Response using Host-Based Intrusion Detection System and Software-Defined Networking*. AFIT/ENG/MS/17M-032. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

GRABOSKI, ALEXANDER J., *The Impacts of Climate Change and Anthropogenic Processes on Permafrost Soils and USAF Infrastructure within Northern Tier Bases*. AFIT/ENY/MS/17M-189. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: N/A.

GUERRERO, JUSTIN, *GNSS Receiver Front-End Component Characterization for High Fidelity Signal Deformation Monitoring Applications*. AFIT/ENG/MS/17M-033. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: N/A. [ANT]

HALLADA, FRANCIS D., *The Fresnel Zone Light Field Spectral Imager*. AFIT/ENP/MS/17M-095. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: N/A. [CDE/CTISR]

HOYT, GREG E., *An Investigation Into the Indicators of a Successful Total Force Association*. AFIT/ENS/MS/17M-133. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: N/A. [COA]

JONES, ANDREW M., *Investigations Into Near Infrared Sensitive Solar Cells*. AFIT/ENG/MS/17M-037. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

KACZMAREK, JEREMY J., *Analysis of Image Processing and Data Reduction for Space Situational Awareness Applications in CubeSats*. AFIT/ENY/MS/17M-268. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

KIRK, JORDAN T., *Multi-Hypothesis Test Detection for Star Tracking Systems*. AFIT/ENG/MS/17M-041. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A. [CSRA]

LANZO, DANIEL T., *Additively Manufactured Spacecraft Thermal Control System*. AFIT/ENY/MS/17M-271. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

LEFGREN, SCOTT, *Classification of Matched Filtered Replicated Signals in Interference using Radio Frequency Distinct Native Attributes*. AFIT/ENG/MS/17M-044. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT]

LUGO, DANIEL, *A Sandbox in Which to Learn and Develop Soar Agents*. AFIT/ENG/MS/17M-047. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A. [CCR]

MASON, MICHAEL P., *Cost Versus Risk: The Policy of Nuclear Weapon Maintenance of Tritium Based Limited Life Components*. AFIT/ENS/MS/17M-143. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

MCMURRY, RICHARD R., *Improving Space Object Detection for Ground Telescopes with Poisson Distribution Statistics*. AFIT/ENG/MS/17M-052. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A. [CSRA]

NUSSBAUM, JOHN H., *Analyzing the Viability of Photovoltaic Pavement Systems: Quantifying Climate Impacts on Potential Power and the Risks of Implementation*. AFIT/ENV/MS/17M-206. Faculty Advisor: Capt John H. Nussbaum. Sponsor: N/A.

ORTIZ, ROSEMBERG, *Scouting in Real-Time Strategy Games: Theory, Methods and Implementation*. AFIT/ENG/MS/17M-056. Faculty Advisor: Dr. Gary. B. Lamont. Sponsor: N/A.

PETREE, OLIVER W., *On the Application of FLO_K and PPTE to Extract the Permittivity and Permeability Tensors of Split Ring Resonator Structures*. AFIT/ENG/MS/17M-058. Faculty Advisor: Maj Michael D. Seal. Sponsor: N/A.

PHILLIPS, MARIA S., *A System Dynamics Model Investigating the Efficacy of Non-Kinetic Policy Strategies on the Diffusion of Democratic Ideologies in China*. AFIT/ENS/MS/17M-153. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

PORTANTE, ANTHONY A., *Analysis of Denial-of-Service Attack Vectors in Software-Defined Networks*. AFIT/ENG/MS/17M-060. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

PROVCHY, ZACHARIAH A., *Topology Optimized Perforator for Multi-Layered Target*. AFIT/ENY/MS/17M-283. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: N/A.

REABE, MARISSA C., *Formation Flight of Earth Satellites on Kamtorus using Classical Orbital Elements*. AFIT/ENY/MS/17M-285. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A. [CSRA]

REBOULET, AMANDA M., *Organizational Strategic Basing Framework with Infusion of Multi-Dimensional Uncertainty*. AFIT/ENS/MS/17S-068. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: N/A. [COA]

ROSS, JOHN S., *Total Electron Count Variability and Stratospheric Ozone Effects on Solar Backscatter and LWIR Emissions*. AFIT/ENP/MS/17M-103. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: N/A. [CDE/CSRA]

ROTH, KRISTA, *Analysis of an Experimental Space Debris Removal Mission*. AFIT/ENY/MS/17J-071. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

SADOWSKI, JUSTIN A., *Dynamic Logical Mission Modeling Tool*. AFIT/ENY/MS/17M-290. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

SCHUH, ERIK B., *Examining Regionalization Efforts to Develop Lessons Learned and Consideration for Department of Defense Medical Facilities*. AFIT/ENS/MS/17M-156. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: N/A.

SCIACCA, JOSEPH R., *AFIT's Random Noise Radar Characterization*. AFIT/ENG/MS/17M-068. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A.

STUART, KENNETH J., *KAM Tori from Two-Line Element Sets: A Comparison to SGP4*. AFIT/ENY/MS/17M-293. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A. [CSRA]

TOMMILA, CHRISTOPHER D., *Performance Losses in Additively Manufactured Low Thrust Nozzles*. AFIT/ENY/MS/17M-295. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

UMODU, KEBIN, *Hypergame Analysis of Cyber Systems*. AFIT/ENG/MS/17M-075. Faculty Advisor: Dr. Gary. B. Lamont. Sponsor: N/A.

VAHLE, MARK W., *Application and Validation of Off-Nominal Aircraft Performance Models*. AFIT/ENY/MS/17M-297. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

WITHAM, BRET N., *2018 Military Retirement Options: An Expected Net Present Value Decision Analysis Model*. AFIT/ENS/MS/17M-164. Faculty Advisor: Maj Heidi M. Tucholski. Sponsor: N/A

YIELDING, NICHOLAS J., *Statistically Applied Non-Uniformity Correction*. AFIT/ENG/MS/17M-084. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

GRADUATE RESEARCH PAPERS

DAWSON, JEREMY D., *Deterring the Russian Tactical Nuclear Arsenal*. AFIT/ENS/MS/17J-020. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: N/A. [COA]

DIAZ, CHRISTOPHER J., *Using Social Media to Measure Deterrence*. AFIT/ENS/MS/17J-021. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

GAMEL, JUSTIN L., *Modernizing USAF Escalation Control*. AFIT/ENS/MS/17J-027. Faculty Advisor: Maj Heidi M. Tucholski. Sponsor: N/A.

LOUIE, ALAN K., *Nuclear Weapons Capabilities Required for the 21st Century*. AFIT/ENS/MS/17J-033. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

MORRIS, BRODERICK S., *An Analysis of the Defense Logistics Agency's Forward Stocking Initiatives at Albany and Barstow Distribution Depots and the Impact on Logistics Response Time*. AFIT/ENS/MS/16D-047. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: N/A.

OWENS, JOHN D., *The Nuclear Bomber Force in the 21st Century*. AFIT/ENS/MS/17J-040. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

4.5. AIR FORCE MATERIEL COMMAND

MASTER'S THESES

CREAN, RYAN C., *Benchmarking DOD use of Additive Manufacturing and Quantifying Costs*. AFIT/ENS/MS/17M-121. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC. [COA]

LEIGHTON, JASON M., *Common Support Equipment and its Impact on Aircraft Availability*. AFIT/ENS/MS/17M-141. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC.

LIM, GAYLEEN A., *Quantifying Aircraft Maintenance Personnel Time use, Management Perspective, and the Impact of Personnel Availability on Time Distribution*. AFIT/ENS/MS/17M-142. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AFMC.

O'NEAL, BRENDAN M., *Aircraft Availability Metric Refinement Based on a 9-Tiered Sub-metric Indication*. AFIT/ENS/MS/17M-151. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: AFMC.

POTTS, GREGORY D., *Simulation Modeling and Analysis of Deployed F-16 Operations and Logistics Support*. AFIT/ENS/MS/17M-154. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC. [COA]

704TH TEST GROUP

MASTER'S THESES

DAY, JOSHUA A., *Signature Analysis, Basis Editing, and Reconstruction (SABER) Tool Study*. AFIT/ENG/MS/17M-022. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 704 TG.

KNISELY, ANDREW J., *Design and Development of a Unique Two-Way Field Probe System using a Shielded Octocopter*. AFIT/ENG/MS/17M-042. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 704 TG.

AIR FORCE LIFE CYCLE MANAGEMENT CENTER

MASTER'S THESES

CORDELL, IAN S., *Engineering Change Orders and their Impact on DOD Acquisition Contracts*. AFIT/ENC/MS/17M-180. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

GALBRAITH, VIRGINIA L., *Analysis of Factors Related to Turnover Intentions Among the Financial Management (65Fx/65Wx) Career Field*. AFIT/ENV/MS/17M-187. Faculty Advisor: Dr. Brandon M. Lucas. Sponsor: AFLCMC.

RHEA, AARON M., *Comparison of Profit Margin Percentages Between Prime Contractors and Subcontractors for Aircraft, Missiles, and Unmanned Aerial Vehicles*. AFIT/ENV/MS/17M-215. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

TRUDELL, RYAN C., *Using Multiple and Logistic Regression to Estimate the Median Will-Cost and Probability of Cost and Schedule Overrun for Program Managers*. AFIT/ENC/MS/17M-231. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

AFRL: 711th HUMAN PERFORMANCE WING

MASTER'S THESES

CANTU, GABRIEL A., *Toxicological Differences Between Perfluoroalkyl Substances (PFAS) Isomers using Developmental Biomarkers*. AFIT/ENV/MS/17M-178. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: 711 HPW/USAFSAM.

MCKINION, ERIC M., *Evaluation of Security Flaws in the Current Probe Request Design and Proposed Solutions*. AFIT/ENG/MS/17M-051. Faculty Advisor: Maj Alan C. Lin. Sponsor: 711 HPW/RH. [CCR]

NOWOCZYNSKI, MATTHEW P., *Method Development for the Characterization of Organic Chemical Emission Hazards from the Combustion of Advanced Aircraft Composite Materials*. AFIT/ENV/MS/17M-205. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: 711 HPW/USAFSAM.

OVIATT, CAITLIN M., *Perception vs. Reality: Improving Mission Commander Decision-Making Capabilities by use of Heart Rate Zone Feedback in Training Environments*. AFIT/ENC/MS/17M-152. Faculty Advisor: Dr. Edward D. White. Sponsor: 711 HPW/RH.

PAGE, MICHELLE L., *Characterization of Jet Fuel Combustion Emissions During a C-130 Aeromedical Evacuation Engines Running Onload*. AFIT/ENV/MS/17S-050. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: 711 HPW/USAFSAM.

SATAVA, STEPHEN J., *Neck Injury Criteria Development for use in System Level Ejection Testing; Characterization of ATD to Human Response Correlation under Gy Accelerative Input*. AFIT/ENV/MS/17M-221. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: 711 HPW/RH.

SWIFT, CHRISTOPHER A., *M1A1 Abrams Main Battle Tank Crew Member Occupational Health Hazard Analysis during Live-Fire Operations*. AFIT/ENV/MS/17M-228. Faculty Advisor: Dr. Eric G. Mbonimpa. Sponsor: 711 HPW/USAFSAM.

AFRL: AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

DOCTORAL DISSERTATIONS

COTTLE, ANDREW E., *Flow Field Dynamics in a High-g Ultra-Compact Combustor*. AFIT/ENY/DS/16D-037. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFOSR.

MASTER'S THESES

BOWEN, THOMAS A., *Stressed Oxidation of Hafnium Diboride in Air at 1500°C*. AFIT/ENY/MS/17M-243. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

CHAVEZ, INNA D., *Optimal Configurations for Aerosol Monitoring With Multi-Rotor Small Unmanned Aerial Systems*. AFIT/ENV/MS/17M-179. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: AFOSR.

GARNICK, CHRISTOPHER J., *A Study of Human Reliance on Imperfect Automation*. AFIT/ENG/MS/17M-030. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: AFOSR. [ANT]

HARRIS, MARK A., *Variable Timing Effects on Performance and Behavior within Human-Machine Teams*. AFIT/ENV/MS/17J-056. Faculty Advisor: Dr. Michael E. Miller. Sponsor: AFOSR.

HILLESHEIM, ANTHONY J., *Analysis of Human and Agent Characteristics on Human-Agent Team Performance and Trust*. AFIT/ENV/MS/17M-194. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: AFOSR. [ANT]

HYATT, NICHOLAS L., *Hall Effect Thruster Characterization through Potential, Magnetic, and Optical Measurements*. AFIT/ENY/MS/17M-267. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR. [CSRA]

JOHNSON, CLIFFORD D., *A Framework for Analyzing and Discussing Level of Human Control Abstraction*. AFIT/ENV/MS/17M-197. Faculty Advisor: Dr. Michael E. Miller. Sponsor: AFOSR. [ANT]

LANARI, ANN M., *Numerical Wave Optics Investigation of Optical Scatter from Statistically Rough Surface*. AFIT/ENP/MS/17M-099. Faculty Advisor: Maj Samuel D. Butler. Sponsor: AFOSR.

LENKER, RONALD C., *Characterization of Neutron and Proton Exposure on the Radiation Resistant Bacterium, deinococcus radiodurans*. AFIT/ENP/MS/17M-100. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: AFOSR.

MEYER, TIMOTHY R., *Small-muscle Movement and Its Effect on Cognitive Functions*. AFIT/ENG/MS/17M-053. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: AFOSR.

SCHWEMMER, JOSEPH R., *Optimal Design of a Hexakis Icosahedron Vacuum Based Lighter than Air Vehicle*. AFIT/ENS/MS/17M-158. Faculty Advisor: Dr. James W. Chrissis. Sponsor: AFOSR.

SNYDER, JORDAN W., *A Study of Quasi-Static and Dynamic Analyses of a Hexakis Icosahedron Frame for use in a Vacuum Lighter Than Air Vehicle*. AFIT/ENY/MS/17M-291. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

SPULLER, JAKE M., *Analysis of How Communication Affects Human Teams in a Dynamic Game*. AFIT/ENG/MS/17M-071. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: AFOSR. [ANT]

THOMAS, SARAHKATIE, *Transient Nonlinear Optical Properties of Thin Film Titanium Nitride*. AFIT/ENP/MS/17M-106. Faculty Advisor: Maj Manuel R. Ferdinandus. Sponsor: AFOSR.

VORGERT, CHRISTOPHER J., *Relating Film Cooling Performance Between Ambient and Near Engine Temperatures*. AFIT/ENY/MS/17M-298. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFOSR.

YANTERI, ERHAN E., *Analysis of Small Muscle Movement Effects on EEG Signals*. AFIT/ENG/MS/16D-051. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: AFOSR.

AFRL: AEROSPACE SYSTEMS DIRECTORATE

DOCTORAL DISSERTATIONS

CARR, RYAN W., *Optimal Control Methods for Missile Evasion*. AFIT/ENY/DS/17S-055. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

GREENE, KARA M., *Toward a Flying Qualities Standard for Unmanned Aircraft*. AFIT/ENY/DS/17M-260. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

WHEELER, PAMELA L., *Satellite Propulsion Spectral Signature Detection and Analysis for Space Situational Awareness using Small Telescopes*. AFIT/ENY/DS/17S-063. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [CSRA]

MASTER'S THESES

BECHERER, NICHOLAS C., *Transfer Learning in Convolutional Neural Networks for Fine-Grained Image Classification*. AFIT/ENG/MS/17M-005. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RQ. [ANT]

BENTZ, BRYAN R., *Reliability and Cost Impacts for Attritable Systems*. AFIT/ENV/MS/17M-172. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ.

BLANTIN, JASON R., *Characterization and Scaling Study of Energy Pathways in Small Four-stroke Internal Combustion Engines*. AFIT/ENY/MS/17S-054. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

BRYANT, CAROL E., *Relative Contributions to Overall Effectiveness in Gas Turbine Cooling*. AFIT/ENY/MS/17M-248. Faculty Advisor: Maj James L. Rutledge. Sponsor: AFRL/RQ.

CHOATE, JEFFREY L., *Extending AFSIM with Behavioral Emergence*. AFIT/ENG/MS/17M-014. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/RQ.

EISENSMITH, DAVID L., *Fatigue Effects of Laser Shock Peening Minimally Detectable Partial-through Thickness Surface Cracks*. AFIT/ENY/MS/17M-259. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

HAMIDANI, ALI M., *Evaluating the Autonomous Flying Qualities of a Simulated Variable Stability Aircraft*. AFIT/ENY/MS/17M-261. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

HEIDLAF, PETER, *Optimal UAV Path Planning with Dynamic No-Fly-Zones for Target Geolocation using Line-of-Bearing Measurements and Kalman Filtering*. AFIT/ENY/MS/17M-262. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

HOSKINS, CHRISTOPHER R., *An Analysis of Two Geometries at Mach 3 using Cleanly Seeded PIV Techniques*. AFIT/ENY/MS/17M-265. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RQ.

JOHNSON, DANIEL T., *Combined Stereo Vision and Inertial Navigation for Automated Aerial Refueling*. AFIT/ENG/MS/17M-036. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

KNAPP, KEVIN R., *Time-dependent Validation of Finite Element Strain Distribution of a Plastically-deformed Plate via Digital Image Correlation*. AFIT/ENY/MS/17M-269. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

LUCAS, LAURA L., *Enhanced Cost Minimization Algorithm for Control Architectures*. AFIT/ENV/MS/17M-200. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]

LUM, ERIC W., *Mechanical Properties of Additively Manufactured Stainless Steel*. AFIT/ENY/MS/17M-273. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

MASH, ROBERT L., *Toward Automated Aerial Refueling: Automated Visual Aircraft Identification with Convolutional Neural Networks*. AFIT/ENG/MS/17M-048. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RQ. [ANT]

MCCLANAHAN, ROBERT L., *Improving Unmanned Aerial Vehicle Formation Flight and Swarm Cohesion by using Commercial off the Shelf Sonar Sensors*. AFIT/ENV/MS/17M-202. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]

MCCOLLUM, BLAKE T., *Analyzing GPS Accuracy Through the Implementation of Low-cost COTS Real-time Kinematic GPS Receivers in Unmanned Aerial Systems*. AFIT/ENV/MS/17M-203. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]

PARSONS, CHRISTOPHER A., *Improving Automated Aerial Refueling Stereo Vision Pose Estimation using a Shelled Reference Model*. AFIT/ENG/MS/17M-057. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

PETRIE, RYAN C., *Characterization of the Variable Camber Compliant Wing using a Vortex Panel Method*. AFIT/ENY/MS/17M-281. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

RECKER, RYAN P., *Determining the Operation and Support Cost for Low Cost Attritable Aircraft*. AFIT/ENV/MS/17M-214. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ.

ROBINSON, CHRISTINE, *Evaluating the Viability of Planar Laser-Induced Fluorescence to Determine the Constituents of AF-M315E Exhaust Plume*. AFIT/ENY/MS/17M-287. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

STEGEMANN, BEAU J., *Fuel Injection Requirements of the Rotating Detonation Engine*. AFIT/ENY/MS/17M-292. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

TOSCANO, LIDIA, *Effectiveness of Inter-Vehicle Communications and On-Board Processing for Close Unmanned Autonomous Vehicle (UAV) Flight Formations*. AFIT/ENV/MS/17M-230. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ. [ANT]

WELCH, LUKE A., *Computational Optimization under Uncertainty of an Active Flow Control Jet*. AFIT/ENY/MS/17M-299. Faculty Advisor: Lt Col Jacob A. Freeman. Sponsor: AFRL/RQ.

AFRL: DIRECTED ENERGY DIRECTORATE

MASTER'S THESES

GOUGH, BRADY M., *Characterization of Instantaneous Nonlinear Optical Refraction and Absorption in a Platinum Acetylide Organic Chromophore, E1-BTFOH*. AFIT/ENP/MS/17M-094. Faculty Advisor: Maj Manuel R. Ferdinandus. Sponsor: AFRL/RD.

SUMMERS, DANIEL S., *An Approximate Dynamic Programming Approach for Comparing Firing Solutions in a Networked Air Defense Environment*. AFIT/ENS/MS/17M-159. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: AFRL/RD.

AFRL: INFORMATION DIRECTORATE

DOCTORAL DISSERTATIONS

LEWIS, TYRONE A.L., *Biologically Inspired Network (BiONet) Authentication using Logical and Pathological RF-DNA Credential Pairs*. AFIT/ENG/DS/17S-012. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]

MASTER'S THESES

CHAPPELL, RICHARD E., *A Game Theory Model for Allocating Scarce Resources in Critical Infrastructure Protection*. AFIT/ENG/MS/17M-012. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]

COON, CAMERON W., *Comparative Analysis of RF Emission Based Fingerprinting Techniques for ZigBee Device Classification*. AFIT/ENG/MS/17M-017. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]

KHOU, STEPHEN, *A Framework for Understanding, Prioritizing, and Applying Systems Security Engineering Processes, Activities, and Tasks*. AFIT/ENG/MS/17M-039. Faculty Advisor: Maj Logan O. Mailloux. Sponsor: AFRL/RI. [CCR]

LESCH, NOAH C., *A Software Framework for Image Retrieval and Visual Understanding in Dynamic and Sensor Rich Environments*. AFIT/ENG/MS/17M-045. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RI.

RICHARDSON, DANIEL P., *Cloud Benchmark Testing of Cassandra on Raspberry Pi for Internet of Things Capability*. AFIT/ENG/MS/17M-065. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RI.

SMITH, DAVID A., *Satellite Communications in the V and W Band: Natural and Artificial Scintillation Effects*. AFIT/ENG/MS/17M-070. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFRL/RI. [CSRA]

AFRL: MATERIALS AND MANUFACTURING DIRECTORATE

MASTER'S THESES

ARIDA, MARVIN-RAY., *Cavity Perturbation Technique of 10 GHz Cylindrical Resonator for Measuring Dielectric Properties of Materials at Very High Temperatures*. AFIT/ENP/MS/17M-086. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RX.

BOUCHER, NICHOLAS J., *Fatigue Behavior of an Advanced Melt-Infiltrated SiC/SiC Composite at 1200°C in Air and in Steam*. AFIT/ENY/MS/17M-242. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

KLAUS, AUSTIN M., *Process Design and Economics for the Production of Algal Biomass: Algal Biomass Production in Closed Bioreactor Systems and Processing through Dewatering for Downstream Conversion*. AFIT/ENS/MS/17M-138. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFRL/RX.

MITCHELL, RONALD K., *Creep of Hi-Nicalon™ S Ceramic Fiber Tows at 900°C In Air and In Silicic Acid-Saturated Steam*. AFIT/ENY/MS/17M-277. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

VIENS, MADILYNN E., *Liquid Crystal Performance Limitations due to Thermal Loading and Oblique Incident Angles*. AFIT/ENP/MS/17M-108. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RX.

AFRL: MUNITIONS DIRECTORATE

MASTER'S THESES

BOWER, ANDREW D., *Investigation of Dynamic Store Separation out of a Weapons Bay Cavity Utilizing a Low Speed Wind Tunnel*. AFIT/ENY/MS/17M-244. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RW.

BOX, CHRISTOPHER A., *Analysis of Additively Manufactured Lattice Structures using Finite Element Methods*. AFIT/ENY/MS/17M-245. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: AFRL/RW. [CSRA]

COATES, SEAN, *An Investigation of the Homicidal Chauffeur Differential Game*. AFIT/ENG/MS/17M-015. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/RW. [ANT]

COOPER, MATTHEW A., *Converting a 2D Scanning LiDAR to a 3D System for use on Quad-Rotor UAVs in Autonomous Navigation*. AFIT/ENG/MS/17M-019. Faculty Advisor: Dr. John. F. Raquet. Sponsor: AFRL/RW. [ANT]

FAIN, BENJAMIN M., *Small Fixed-wing Aerial Positioning using Inter-vehicle Ranging Combined with Visual Odometry*. AFIT/ENG/MS/17M-027. Faculty Advisor: Dr. John. F. Raquet. Sponsor: AFRL/RW. [ANT]

KIM, MARK S., *Celestial Aided Inertial Navigation by Tracking High Altitude Vehicles*. AFIT/ENG/MS/17M-040. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: AFRL/RW. [ANT]

LEE, JOSHUA J., *Study of Chaotic Behavior in the Nonlinear Dynamic Response of an Airfoil with a Trailing Edge Flap*. AFIT/ENY/MS/17M-272. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RW.

AFRL: SENSORS DIRECTORATE

DOCTORAL DISSERTATIONS

BADENHOP, CHRISTOPHER W., *A Multifaceted Security Evaluation of Z-Wave, a Proprietary Implementation of the Internet of Things*. AFIT/ENG/DS/17J-074. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RW. [CCR]

DEPPENSMITH, RANDALL D., *Integrated Circuit Wear-out Prediction and Recycling Detection using Radio-Frequency Distinct Native Attribute Features*. AFIT/ENG/DS/16D-002. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RW.

O'KEEFE, DANIEL S., *Oblique Longwave Infrared Atmospheric Compensation*. AFIT/ENP/DS/17S-030. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFRL/RW. [CTISR]

RICE, JOHN C., *RF-DNA Aided Ambiguity Resolution in a Dual Process Electronic Warfare Receiver*. AFIT/ENG/DS/16D-001. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RW. [CCR]

MASTER'S THESES

BRICKEY, JAMES F., *Radiation Effects in Graphene Field Effect Transistors (GFET) on Hexagonal Boron Nitride (hBN)*. AFIT/ENP/MS/17J-009. Faculty Advisor: Lt Col Michael R. Hogsed. Sponsor: AFRL/RW. [CSRA]

BUSHO, COLIN R., *Tactical Targeting Network Technology (TTNT) Device Discrimination using Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting*. AFIT/ENG/MS/17M-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RW. [CCR]

EMMONS, STEPHEN T., *Application of the Modal Method and Response Surface Analysis to X-Band and Ka-Band Cavity Scattering Problems*. AFIT/ENG/MS/17M-025. Faculty Advisor: Maj Michael D. Seal. Sponsor: AFRL/RW.

ERSTEIN, ELLIOT R., *Experimental Validation of a Heterogeneous Radar Clutter Statistical Estimation Method*. AFIT/ENG/MS/17M-026. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/R.Y.

FOGARTY, BENJAMIN I., *Single Layer Permittivity Extraction from Multilayered Biaxial Anisotropic Media using a Rectangular Waveguide*. AFIT/ENG/MS/17M-028. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/R.Y.

KAVAL, WILLIAM G., *Electrostrictive Polymers for Mechanical to Electrical Energy Harvesting*. AFIT/ENG/MS/17M-038. Faculty Advisor: Capt Robert A. Lake. Sponsor: AFRL/R.Y.

O'NEILL, SEAN P., *Radio Frequency-Based Device Discrimination of Mixed-Signal Integrated Circuits and Counterfeit Detection*. AFIT/ENG/MS/17M-055. Faculty Advisor: Maj Joan A. Betances. Sponsor: AFRL/R.Y. [CCR]

POTTHOFF, TRAVIS S., *A Proof-Of-Concept for Software-Only Attestation on Real-Time Systems using Von Neumann Architecture and Dynamic Memory Allocation*. AFIT/ENG/MS/17M-062. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/R.Y. [CCR]

REBER, PATRICK A., *A Comprehensive Security Analysis of and an Implementation Framework for Embedded Software Attestation Methods Leveraging FPGA-Based System-On-A-Chip Architectures*. AFIT/ENG/MS/17M-063. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/R.Y. [CCR]

RENNICH, TRAVIS B., *Low Probability of Detection Communication using Inverse Beamforming in GNU Radio using Code Division Multiple Access*. AFIT/ENG/MS/17M-064. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/R.Y.

ROSS, BRADY P., *Physical-Layer Identification of Power Line Communications using WS-DNA Fingerprinting*. AFIT/ENG/MS/17M-067. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/R.Y. [CCR]

TALBOT, CHRISTOPHER M., *Securing Insteon Home Automation Networks using Slope-Based FSK (SB-FSK) Fingerprinting*. AFIT/ENG/MS/17M-074. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y. [CCR]

VAN PATTEN, DONALD A., *Prototyping Modern Web Technologies and Lambda Architecture Concepts to Facilitate Collection, Analysis, and Presentation of UAS Log Data*. AFIT/ENG/MS/17M-076. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/R.Y. [CCR]

VAUGHN, ALTON M., *MIL-STD-1553 Fingerprinting using Wired Signal Distinct Native Attributes*. AFIT/ENG/MS/17M-077. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/R.Y. [CCR]

WEATHERS, DAVID L., *Sound Based Positioning*. AFIT/ENG/MS/17M-081. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/R.Y. [ANT]

WIREMAN, MARK J., *Signal Deformation Analysis of the GLONASS Constellation using Chip Shape Processing*. AFIT/ENG/MS/17M-082. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: AFRL/R.Y. [ANT]

WURST, NATHAN P., *Improved Atmospheric Characterization for Hyperspectral Exploitation*. AFIT/ENP/MS/17J-014. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/R.Y. [CDE]

ZIMMERMAN, NICOLAS H., *The Effects of Multi-static Processing and Autofocusing on an Experimental Passive Synthetic Aperture Radar Imaging System*. AFIT/ENG/MS/17M-085. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/R.Y.

AFRL: SPACE VEHICLES DIRECTORATE

DOCTORAL DISSERTATIONS

IMHOF, ERIC A., *Development of Compact, Deployable Sensors using Cold Atom Interference*. AFIT/ENP/DS/17J-073. Faculty Advisor: Dr. Glen P. Perram. Sponsor: AFRL/RV.

LOTT, GORDON E., *Three-Dimensional Imaging of Cold Atoms in a Magneto-Optical Trap with a Light Field Microscope*. AFIT/ENP/DS/17S-029. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RV.

MASTER'S THESES

BARNES, DANIEL R., *An Analysis of Radio-Frequency Geolocation Techniques for Satellite Systems Design*. AFIT/ENY/MS/17M-241. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

BRICK, JOHN N., *Military Space Mission Design and Analysis in a Multi-Body Environment: An Investigation of High-Altitude Orbits as Alternative Transfer Paths, Parking Orbits for Reconstitution, and Unconventional Mission Orbits*. AFIT/ENY/MS/17M-246. Faculty Advisor: Lt Col Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

CHILDRESS, JONATHON M., *Control Allocation Methods for Constrained and Over Actuated Satellite Attitude Control Systems*. AFIT/ENY/MS/17M-215. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

DOWNEY, JACOB J., *Structural Analysis of a 3D Printed Composite Truss*. AFIT/ENY/MS/17M-256. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

LEDFORD, MICHAEL J., *Development of a Software-Defined GNSS Simulation Prototype for Advanced Signals Research*. AFIT/ENG/MS/17M-043. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV. [ANT]

LOWERY, JASON P., *Measuring Light Curve Uncertainty for Surrogate Geostationary Satellite Models*. AFIT/ENY/MS/17S-060. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

NGUYEN, HAI-DANG, *Use of Artificial Neural Networks to Classify CB-DNA Fingerprints by Radio of Origin*. AFIT/ENS/MS/17M-150. Faculty Advisor: Dr. John O. Miller. Sponsor: AFRL/RV.

OLIVER, RACHEL, *Model Fidelity Analysis for Production of Accurate Theoretical Light Curves*. AFIT/ENY/MS/17M-279. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

PITMAN, BRIAN W., *Maneuver Detection and Characterization using Wavelets for Geosynchronous Spacecraft*. AFIT/ENY/MS/17M-282. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

RICH, ADAM T., *Investigating Analytical and Numerical Methods to Predict Satellite Orbits using Two-Line Element Sets*. AFIT/ENY/MS/17M-286. Faculty Advisor: Dr. William E. Wiesel. Sponsor: AFRL/RV. [CSRA]

STERN, JORDAN L., & WATCHEL, STEVEN T., *Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures*. AFIT/ENV/MS/17M-277. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RV. [CSRA]

STROM, ALEX R., *Correction of Stair Mode for an Optical Phased Array using an ArrayTilt Estimator*. AFIT/ENG/MS/17M-073. Faculty Advisor: Lt Col Milo W. Hyde. Sponsor: AFRL/RV.

TULLINO, STEPHEN K., *Testing and Evaluating Deployment Profiles of the Canisterized Satellite Dispenser (CSD)*. AFIT/ENY/MS/17M-296. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

WATCHEL, STEVEN T., See STERN, JORDAN L. [CSRA]

AIR FORCE INSTALLATION AND MISSION SUPPORT CENTER

MASTER'S THESES

FREEBORN, CODY S., *An Analysis of Forecasting Methods on Supply Discrepancy Reporting*. AFIT/ENS/MS/17M-130. Faculty Advisor: Capt Michael P. Kretser. Sponsor: AFIMSC.

AIR FORCE SUSTAINMENT CENTER

DOCTORAL DISSERTATIONS

WHITE, ANTHONELLI, *Determinants of Individual-level Demand Forecasting Performance*. AFIT/ENS/DS/17S-045. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AFSC. [COA]

MASTER'S THESES

BAKER, DOMINIC G., *Determining Field Requirements of the Air Force Supply System: A Delphi Study*. AFIT/ENS/MS/17M-113. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFSC.

SCHULTZ, DIANE E., *Derating Predicted Mean Time Between Failures for Life Cycle Cost Estimates*. AFIT/ENV/MS/17M-223. Faculty Advisor: Maj Jason K. Freels. Sponsor: AFSC.

4.6. AIR MOBILITY COMMAND

DOCTORAL DISSERTATIONS

ROBERTS, MATTHEW D., *Development and Investigation of an Air Transportation Operations Safety Climate Scale*. AFIT/ENS/DS/17S-042. Faculty Advisor: Dr. Matthew A. Douglas. Sponsor: AMC.

GRADUATE RESEARCH PAPERS

BREDESEN, DAVID T., *More With Less: Increasing The Strategic Airlift Fleet Capability Through Optimized Planning Factors*. AFIT/ENS/MS/17J-018. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 618 AOC. [COA]

DAVIS, JEFFREY C., *Mobility Air Force Aircrew Flight Training Requirements Validation Through the use of Line Oriented Safety Audit Data*. AFIT/ENS/MS/17J-019. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AMC.

EVANS, JASON B., *Guam Tankers: A Quantitative Analysis of KC-135s at Andersen AFB*. AFIT/ENS/MS/17J-024. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: AMC.

FRENCH, JONATHAN M., *Organizing Major Commands for Today's Cyber Security Challenges*. AFIT/ENS/MS/17J-026. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AMC. [COA]

GILLET, BRANDON G., *Cost Comparison of Military versus Commercial Airlift*. AFIT/ENS/MS/17J-028. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AMC.

MCKEOWN, BARRY V., *Evaluating the Effect of Aircrew Flight Events on AMC Aircraft Safety Incidents*. AFIT/ENS/MS/17J-036. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: AMC.

PARISE, NICHOLAS A., *Chutes Over Pope: Air Mobility Support to GRF Airborne Readiness Training*. AFIT/ENS/MS/17J-041. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: 18AF/A3D.

PARKER, JACOB R., *Tanker Force Nuclear Structure: Are We Properly Organized, Trained, and Equipped?* AFIT/ENS/MS/17J-042. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: 18AF/CC.

PEDERSEN, JEFFREY J., *Assessment of MAF Pilot Overabsorption: Expansion of the 1999 Rated Summit Intent*. AFIT/ENS/MS/17J-044. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AMC. [COA]

RIGOLLET, MATTHIEU A., *Increasing Pilot Production by Applying Elements of 'Lean Production Theory' and 'Value Stream Analysis' to the Current Specialized Undergraduate Pilot Training Syllabi*. AFIT/ENS/MS/17J-046. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AMC.

SANDERS, CORY E., *Development of a Fuel Efficiency Motivation Survey*. AFIT/ENS/MS/17M-303. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: AMC.

4.7. AIR FORCE SPACE COMMAND

MASTER'S THESES

BENTLEY, MICHAEL J., *Enabling Air Force Satellite Ground System Automation through Software Engineering*. AFIT/ENG/MS/17M-006. Faculty Advisor: Maj Alan C. Lin. Sponsor: SMC. [CCR/CSRA]

DEBOIS, PETER A., *The Financial Impact of Commercial Small Satellite and Small Launch Providers on the Department of Defense*. AFIT/ENV/MS/17M-183. Faculty Advisor: Lt Col Clay M. Koschnick. Sponsor: SMC.

4.8. AIR FORCE SPECIAL OPERATIONS COMMAND

MASTER'S THESES

HARRIS, JASON O., *Total Force Integration: A Look at the Integrated Wing Pilot Program at Seymour-Johnson AFB, NC*. AFIT/ENS/MS/17J-030. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: AFSOC.

4.9. USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS

AIR FORCE CIVIL ENGINEERING CENTER

MASTER'S THESES

ALLEN, BRIAN R., *Actionable Stitched Images from an Unmanned Aerial System*. AFIT/ENV/MS/17M-168. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFCEC.

BLAESS, MICHAEL J., *A Portfolio Decision Analysis Study for Improving Consequence of Facility Failure Indices*. AFIT/ENV/MS/17M-175. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: AFCEC.

BUYER, JOSEPH C., *Refining Air Force Asset Management Strategy: Connecting Air Force Infrastructure to Core Missions*. AFIT/ENV/MS/17M-177. Faculty Advisor: Lt Col Vhance V. Valencia. Sponsor: AFCEC.

DANIELS, JIM H., *Analyzing Performance in Air Force Facility Maintenance and Repair*. AFIT/ENV/MS/17M-182. Faculty Advisor: Lt Col Christopher M. Stoppel. Sponsor: AFCEC.

ESHLEMAN, JUSTIN E., *Enhancing the Thermal Performance of Temporary Fabric Shelters for the Advanced Energy Efficient Shelter System*. AFIT/ENV/MS/17M-186. Faculty Advisor: Capt Robert A. Lake. Sponsor: AFCEC.

GREINER, NATHAN A., *Runway Repair using Additive Manufacturing*. AFIT/ENV/MS/17M-190. Faculty Advisor: Maj Jason K. Freels. Sponsor: AFCEC.

GUINN, VICTOR L., *Smartphone-Based Infrastructure Work Order Submission*. AFIT/ENV/MS/17M-192. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: AFCEC.

KRAMER, ERICH C., *An Empirical Analysis of Air Force Military Construction Project Delivery Method Performance in the United States*. AFIT/ENV/MS/17M-199. Faculty Advisor: Lt Col Christopher M. Stoppel. Sponsor: AFCEC.

MARTEL, CHAD A., *Quantifying the Strategic Value of United States Air Force Airfields*. AFIT/ENV/MS/17M-201. Faculty Advisor: Maj Heidi M. Tucholski. Sponsor: AFCEC.

MURPHY, SEAN T., *Strength Test and Analysis of Additive Manufactured Gears and Their Applicability for Explosive Ordnance Disposal Robots*. AFIT/ENV/MS/17M-204. Faculty Advisor: Lt Col Vhance V. Valencia. Sponsor: AFCEC.

OLIVE, MARY C., *An Energy Benchmarking Categorization Scheme and Consumption Data Validation for Air Force Facilities*. AFIT/ENV/MS/17M-207. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: AFCEC.

PAGE, WILLIAM L., *Air Force Additive Manufacturing: Case Studies on Tools, Jigs, and Topology Optimization*. AFIT/ENV/MS/17M-212. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: AFCEC.

PETERSON, MICHAEL W., *The Security Risks Associated with using a Mobile Application to Collect Work Order Data*. AFIT/ENV/MS/17M-213. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: AFCEC.

TWIGG, CHRISTOPHER M., *Recommended Selective Maintenance and Rehabilitation Treatment Approach for Air Force Primary Rigid Runway Pavement Systems*. AFIT/ENV/MS/17M-232. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: AFCEC.

VEITENHEIMER, SHANE R., *Implication of Additive Manufacturing on United States Air Force Expeditionary Civil Engineer Squadron Supply Chain*. AFIT/ENV/MS/17M-234. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: AFCEC.

WILLIAMS, ANTHONY D., *Predicting Solar Performance in a Contingency Environment to Meet Net-Zero Facility Power*. AFIT/ENV/MS/17M-237. Faculty Advisor: Lt Col Christopher M. Stoppel. Sponsor: AFCEC.

AIR FORCE COST ANALYSIS AGENCY

MASTER'S THESES

BROWN, MICHAEL J., *An Evaluation of Cost and Schedule in Open Mission System Avionic Versus Historical Proprietary Designs*. AFIT/ENV/MS/17M-176. Faculty Advisor: Dr. Robert D. Fass. Sponsor: AFCAA.

D'AMICO, CORY N., *A Longitudinal Study and Color Rating System of Acquisition Cost Growth*. AFIT/ENC/MS/17M-181. Faculty Advisor: Dr. Edward D. White. Sponsor: AFCAA.

RONNING, DANIEL, *The use of Price Indices and Cost Estimating Relationships (CERs) in Forecasting Aircraft Maintenance Costs*. AFIT/ENV/MS/17M-218. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFCAA.

AIR FORCE MEDICAL OPERATIONS AGENCY

MASTER'S THESES

HUGHES, KELSIE L., *Supply Base Reduction Efforts Regarding Laboratory Reagents within Hospital Networks*. AFIT/ENS/MS/17M-134. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AFMOA.

AIR FORCE RAPID CAPABILITY OFFICE

MASTER'S THESES

BARRETT, DONALD A., *Development of the Architecture Cost Effectiveness Framework and Application to Open Systems Architectures*. AFIT/ENV/MS/17M-171. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRCO.

AIR FORCE TECHNICAL APPLICATIONS CENTER

DOCTORAL DISSERTATIONS

BURLEY, JARRED L., *A Computational Tool for Hyperspectral Propagation of NUDET Effects*. AFIT/ENP/DS/17S-021. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFTAC. [CDE]

MASTER'S THESES

SCHULMEISTER, TAYLOR R., *Modeling the White Sands Missile Range Fast Burst Reactor using a Discrete Ordinates Code, PENTRAN*. AFIT/ENP/MS/17M-104. Faculty Advisor: Lt Col James R. Fee, Jr. Sponsor: AFTAC.

TILLMAN, ROMAN, *Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures*. AFIT/ENV/MS/17M-277. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFTAC. [CSRA]

NATIONAL AIR AND SPACE INTELLIGENCE CENTER

MASTER'S THESES

BROCH, LAURA H., *Constellation Architecture Design for Persistent Space Situational Awareness of Direct Ascent to Geosynchronous Orbit*. AFIT/ENY/MS/17M-247. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: NASIC. [CSRA]

CERANSKI, ALISON M., *Simulation of Aerothermal and Chemical Concentrations for an RDX Explosion*. AFIT/ENY/MS/17M-250. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

CUHRAN, JOSEPH J., JENKINS, MATHEW K., & WALTERS, MICHAEL J., *Quantifying and Evaluating the Resilience of Optimized Space Constellations for Fire Detection*. AFIT/ENV/MS/17J-057. Faculty Advisor: Dr. John M. Colombi. Sponsor: NASIC. [CSRA]

HOEFFNER, ZACHARY W., *A Computational Study: The Effect of Hypersonic Plasma Sheaths on Radar Cross Section for Over the Horizon Radar*. AFIT/ENP/MS/17M-097. Faculty Advisor: Maj Charlton D. Lewis. Sponsor: NASIC.

JENKINS, MATHEW K., See CUHRAN, JOSEPH J. [CSRA]

LISKOWCYZ, MATTHEW M., *SpaceX: Breaking the Barrier to the Space Launch Vehicle Industry*. AFIT/ENV/MS/16D-045. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: NASIC.

WALTERS, MICHAEL J., See CUHRAN, JOSEPH J. [CSRA]

US AIR FORCE ACADEMY

GRADUATE RESEARCH PAPERS

WELLS, MICHAEL W., *Reduced-Engine Taxi: A Cost-Savings Exploration*. AFIT/ENS/MS/17J-051. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: USAFA. [COA]

WRIGHT-PATTERSON AFB FIRE EMERGENCY SERVICES

MASTER'S THESES

VAIRA, KEEGAN D., *Improving Fire Station Turnout Time through Discrete-Event Simulation*. AFIT/ENV/MS/17M-233. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: WPAFB Fire Emergency Services.

4.10. DEPARTMENT OF DEFENSE

MASTER'S THESES

OWENS, JOSEPH R., *Evaluating Process Improvement Courses of Action through Modeling and Simulation*. AFIT/ENV/MS/17S-049. Faculty Advisor: Dr. John M. Colombi. Sponsor: 513 EWS.

GRADUATE RESEARCH PAPERS

ZENNER, AMANDA L., *An Analysis of E-3A Component's End of Lifecycle Spare Parts Reclamation*. AFIT/ENS/MS/17J-055. Faculty Advisor: Dr. Kevin J. Gaudette. Sponsor: LWS.

DEFENSE THREAT REDUCTION AGENCY

DOCTORAL DISSERTATIONS

KANANEN, BRANT T., *Luminescence in Lithium Borates*. AFIT/ENP/DS/17S-027. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

MARTIN, JACOB A., *Passively Estimating Index of Refraction for Specular Reflectors using Polarimetric Hyperspectral Imaging*. AFIT/ENP/DS/16D-016. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: DTRA. [CTISR]

MASTER'S THESES

CHALAOPAK, KASIDIT V., *Rapid Location and Characterization of Radioactive Sources using an Autonomous Unmanned Aerial Vehicle*. AFIT/ENP/MS/17M-090. Faculty Advisor: Dr. Justin A. Clinton. Sponsor: DTRA.

FARLEY, KEVIN J., *An Experimental Design and Approach to a Response Surface Validation of an Environmental Weapons Effects Model*. AFIT/ENS/MS/17J-025. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: DTRA.

HAWS, DEREK W., *Using Principal Component Analysis to Improve Fallout Characterization*. AFIT/ENP/MS/17M-096. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

LOGAN, JULIE V., *Rotating Scatter Mask for Gamma Source Imaging*. AFIT/ENP/MS/17M-101. Faculty Advisor: Lt Col Buckley E. O'Day. Sponsor: DTRA.

DOD CYBER CRIME CENTER

MASTER'S THESES

GOOD, RYAN A., *AutoProv: An Automated File Provenance Collection Tool*. AFIT/ENG/MS/17M-031. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DC3. [CCR]

DIRECTED ENERGY JOINT TECHNOLOGY OFFICE

DOCTORAL DISSERTATIONS

BAUER, WILLIAM A., *Laser Heating of Graphite and Pulsed Laser Ablation of Titanium and Aluminum*. AFIT/ENP/DS/17S-020. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]

EMMONS, DANIEL J., *Analysis of Ar(1s5) Metastable Populations in High Pressure Argon-Helium Gas Discharges*. AFIT/ENP/DS/17S-025. Faculty Advisor: Dr. David E. Weeks. Sponsor: DEJTO. [CDE]

ESHEL, BEN, *Linear and Nonlinear Spectroscopy of Optically-Thick Argon and Argon-Helium Plasmas in Radio-Frequency Dielectric-Barrier Discharges*. AFIT/ENP/DS/17J-011. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]

GONZALES, ASHLEY E., *Kinetics of Graphite Oxidation in Reacting Flow from Imaging Fourier Transform Spectroscopy*. AFIT/ENP/DS/17M-093. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]

HALUSKA, NATHAN D., *Cascade and Two-Photon Lasing from Two-Photon Excitation of Cesium 62D*. AFIT/ENP/DS/17S-026. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]

JOINT CHIEF OF STAFF

MASTER'S THESES

LEIBY, BENJAMIN D., *A Conditional Logistic Regression Predictive Model of World Conflict Considering Neighboring Conflict and Environmental Security*. AFIT/ENS/MS/17M-140. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: JS/J7

GRADUATE RESEARCH PAPERS

RIGOLLET, TAYLOR S., *One Size Does Not Fit All: Removing Unnecessary Barriers To Entry In The Pilot Community*. AFIT/ENS/MS/17J-047. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: JCS/J4. [COA]

JOINT WARFARE ANALYSIS CENTER

MASTER'S THESES

CABALLERO, WILLIAM N., *On Proportionate and Truthful International Alliance Contributions: An Analysis of Incentive Compatible Cost Sharing Mechanisms to Burden Sharing*. AFIT/ENS/MS/17M-117. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: JWAC.

KLINE, ALEXANDER G., *Real-Time Heuristic Algorithms for the Static Weapon-Target Assignment Problem*. AFIT/ENS/MS/17M-139. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: JWAC.

MUNIZ, MEGAN L., *Analyzing the Critical Supply Chain for Unmanned Aircraft Systems*. AFIT/ENS/MS/17M-149. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: JWAC.

WILLIAMS, RANDI D., *Optimal Location of Integrated Air Defense Radars and Interceptor Batteries within a Game Theoretic Framework*. AFIT/ENS/MS/17J-052. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: JWAC.

MISSILE DEFENSE AGENCY

MASTER'S THESES

THORP, ETHAN D., *RbHe Potential Energy Surface Sensitivity Study*. AFIT/ENP/MS/17M-107. Faculty Advisor: Maj Charlton D. Lewis. Sponsor: MDA.

OFFICE OF THE SECRETARY OF DEFENSE

DOCTORAL DISSERTATIONS

ATKINSON, ANDREW D., *Wavelet-Based Simulation Model Validation of Functional Data*. AFIT/ENS/DS/17S-034. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD

STORM, SCOTT M., *Validation of Discrete and Functional Simulation Responses over Experimental Regions using Response Surfaces*. AFIT/ENS/DS/17S-044. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

MASTER'S THESES

ALWABEL, ABDULRAHMAN S., *Effect of Fused Filament Fabrication Process Parameters on the Mechanical Properties of Carbon Fiber Reinforced Polymers*. AFIT/ENV/MS/17S-046. Faculty Advisor: Maj Jason K. Freels. Sponsor: OSD.

BENSON, BENJAMIN, *An Initial Ambient Noise Database Based on National Park Service Data*. AFIT/ENS/MS/17M-114. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

DILLARD, DOUGLAS A., *Reduction Methods of Wind Tunnel Testing Data Requirements*. AFIT/ENS/MS/17M-124. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

UNITED STATES ARMY

DOCTORAL DISSERTATIONS

ROBINSON, PAUL D., *Duality Behaviors of the Quantile Regression Model Estimation Problem*. AFIT/ENS/DS/17S-043. Faculty Advisor: Dr. James W. Chrissis. Sponsor: ARCYBER.

MASTER'S THESES

BARNES, BRANDON B., *Environmental Applications of Small Unmanned Aircraft Systems in Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Reconnaissance and Surveillance*. AFIT/ENV/MS/17M-170. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: ECBC.

FERGUSON, MATTHEW D., *A Scenario-Based Parametric Analysis of Stable Marriage Approaches to the Army Officer Assignment Problem*. AFIT/ENS/MS/17M-128. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: AHRC.

GUTIERREZ, ROBERT J., *A Tabulated Vector Approach for Log-Based Anomaly Detection*. AFIT/ENS/MS/17M-131. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: ARCYBER. [COA]

JENKINS, PHILLIP R., *Using Markov Decision Processes with Heterogeneous Queueing Systems to Examine Military MEDEVAC Dispatching Policies*. AFIT/ENS/MS/17M-137. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: MEPD.

UNITED STATES NAVY

MASTER'S THESES

BINGGELI, ALICIA D., *A Cost Benefit Analysis of Emerging LED Water Purification Systems in Expeditionary Environments*. AFIT/ENV/MS/17M-174. Faculty Advisor: Lt Col Clay M. Koschnick. Sponsor: NAVFAC.

HARRIS, SHARIF F., *Learning Curves: An Alternative Analysis*. AFIT/ENV/MS/17M-193. Faculty Advisor: Dr. John Elshaw. Sponsor: NPS.

POST, CASSANDRA R., *Towards Automation of Tipping and Cueing between Small Satellites in a Constellation*. AFIT/ENG/MS/17M-061. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: NPS.

UNITED STATES EUROPEAN COMMAND

GRADUATE RESEARCH PAPERS

DIERDORF, JEFFREY M., *Airlift at Risk: Modeling Operations in a European Contested, Denied, Operationally Limited Environment*. AFIT/ENS/MS/17J-022. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: EUCOM.

HALL, TERRY L., *How Can the United States Better Contribute to NATO'S Dual Capable Aircraft Mission?* AFIT/ENS/MS/17J-029. Faculty Advisor: Dr. Adam B. Lowther. Sponsor: EUCOM.

UNITED STATES SPECIAL OPERATIONS COMMAND

MASTER'S THESES

COX, TRAVIS L., *The use of Data Mining and Network Algorithms for Chemical Warfare Agent Interdiction*. AFIT/ENS/MS/17M-120. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: USSOCOM.

JAMESON, GARRETT L., *Refugees in Urban Environments: Social, Economic, and Infrastructure Impacts*. AFIT/ENS/MS/17M-136. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: USSOCOM.

UNITED STATES TRANSPORTATION COMMAND

DOCTORAL DISSERTATIONS

HANKS, ROBERT W., *Robust Goal Programming and Risk Assessment using Cardinality-Constrained and Strict Robustness via Alternative Uncertainty Sets*. AFIT/ENS/DS/17S-035. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM. [COA]

MASTER'S THESES

FAIRMAN, CHRISTIANA R., *Intermodal Shipment Planning Over the USPACOM Distribution Network: An Analysis of the Tradeoff Space*. AFIT/ENS/MS/17M-126. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM.

SCHULTE, KATLYN A., *Resilience Analysis of Distribution Networks In Response to Regional Disruption, as Applied to the USPACOM Area of Responsibility*. AFIT/ENS/MS/17M-157. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM.

4.11. OTHER FEDERAL AGENCIES

DEPARTMENT OF HOMELAND SECURITY

DOCTORAL DISSERTATIONS

LOPEZ, JR., JUAN, *Enhanced Industrial Control System (ICS) and Supervisory Control and Data Acquisition (SCADA) Security for ISA99 Level-0 using Field Device Wired Signal Distinct Native Attributes (WS-DNA) Fingerprints*. AFIT/ENG/DS/16D-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: DHS. [ANT/CCR]

MASTER'S THESES

CHAVES, ANDREW J., *Increasing Cyber Resiliency of Industrial Control Systems*. AFIT/ENG/MS/17M-013. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

- DAOUD, JOSEPH K., *Multi-PLC Exercise Environments for Training ICS First Responders*. AFIT/ENG/MS/17M-020. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- GALLENSTEIN, JUSTIN K., *Integration of the Network and Application Layers of Automatically Configured Programmable Logic Controller Honeypots*. AFIT/ENG/MS/17M-029. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- GUTIÉRREZ DEL ARROYO, JOSÉ A., *Enhancing Critical Infrastructure Security using Bluetooth Low Energy Traffic Sniffers*. AFIT/ENG/MS/17M-034. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: DHS. [ANT/CCR]
- LIN, HTEIN A., *Framework for Industrial Control System Honeypot Network Traffic Generation*. AFIT/ENG/MS/17M-046. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- MAYS, CALEB E., *Constructing Honeypots to Defend Building Automation Systems*. AFIT/ENG/MS/17M-049. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- MCCARGAR, ELWYN J., *Synchronization Algorithms for Programmable Logic Controller Emulation*. AFIT/ENG/MS/17M-050. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- PLUMLEY, EVAN G., *A Framework for Categorization of Industrial Control System Cyber Training Environments*. AFIT/ENG/MS/17M-059. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- ROSE, ANTHONY J., *Security Evaluation and Exploitation of Bluetooth Low Energy Devices*. AFIT/ENG/MS/17M-066. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]
- ROSSON, JOHN P., *An Expanded Cyber Insurance Framework to Mitigate Cyber Induced Economic Losses of the US Power Industry*. AFIT/ENV/MS/17M-219. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS.
- SIBIGA, MATTHEW P., *Applying Cyber Threat Intelligence to Industrial Control Systems*. AFIT/ENG/MS/17M-069. Faculty Advisor: Dr. Robert F. Mills. Sponsor: DHS. [CCR]
- STINE, IAN W., *A Cyber Risk Scoring System for Medical Devices*. AFIT/ENG/MS/17M-072. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS. [CCR]
- YERKES, BLAKE E., *Cyber Security Analysis and Strategy Development for Software-Defined Radars*. AFIT/ENG/MS/17M-083. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

DOMESTIC NUCLEAR DETECTION OFFICE

DOCTORAL DISSERTATIONS

- MATTERS, DAVID A., *Nuclear Structure of ¹⁸⁶Re*. AFIT/ENP/DS/16D-017. Faculty Advisor: Dr. John W. McClory. Sponsor: DNDO.

MASTER'S THESES

- MOFFETT, KAZ A., *Optimization of a Positron Annihilation Lifetime Spectrometer to Measure Negative Point Vacancies in Hydrothermally Grown Single-Crystal Thorium Dioxide*. AFIT/ENP/MS/17M-102. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DNDO.

ENVIRONMENTAL PROTECTION AGENCY

DOCTORAL DISSERTATIONS

STUBBS, JOHN E., *Dynamics of Chemical Degradation in Water using Photocatalytic Reactions in an Ultraviolet Light Emitting Diode Reactor*. AFIT/ENV/DS/17S-052. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA.

MASTER'S THESES

JAMES, SHANDON L., *Investigating Point-of-Use UV-LED Water Purification Device using Computational Multiphysics Modeling Software*. AFIT/ENV/MS/17M-196. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA.

KOHLHEPP, DAVID A., *Modeling and Validating a Continuous Flow Ultraviolet Light Emitting Diode Water Purification Reactor*. AFIT/ENV/MS/17M-198. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA.

RUSSELL, MORGAN M., *Destruction of Aqueous Phase Organic Pollutants using Ultraviolet Light Emitting Diodes and Photocatalysis*. AFIT/ENV/MS/17M-220. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: EPA.

SCHMIDT, CHRISTOPHER T., *Adsorption of Perfluorinated Compounds from Post-Emergency Response Wastewater*. AFIT/ENV/MS/17M-222. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: EPA.

SMITH, MATTHEW D., *The Effect of Bacillus Globigii Spores on the Activity and Performance of Activated Sludge*. AFIT/ENV/MS/17M-226. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA.

FEDERAL EMERGENCY MANAGEMENT AGENCY

GRADUATE RESEARCH PAPERS

RIDLEY, MICHAEL E., *Cascadia Subduction Zone Earthquake Basing and Supply Delivery Strategy Based on Current Planning and Historical Event Analysis*. AFIT/ENS/MS/17J-045. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: FEMA. [COA]

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MASTER'S THESES

JACKSON, BRYAN V., *Alternate Stimuli for the Elicitation of Event-Related Potentials*. AFIT/ENV/MS/17M-195. Faculty Advisor: Dr. Michael E. Miller. Sponsor: NASA. [ANT]

NATIONAL NUCLEAR SECURITY ADMINISTRATION

MASTER'S THESES

SHELBY, CLINTON A., *Tumbler-Snapper Atmospheric Nuclear Test Series Streak Film Analysis*. AFIT/ENP/MS/17M-105. Faculty Advisor: Dr. John W. McClory. Sponsor: NNSA.

4.12. NON-FEDERAL SPONSORS

ARGENTINE AIR FORCE MATERIEL GENERAL DIRECTORATE

MASTER'S THESES

BERTRAM, ROBERTO H., *Spectrometric Oil Analysis Program Enhancements for the Argentine Air Force*. AFIT/ENS/MS/17M-115. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: Argentine Air Force Materiel General Directorate.

BOOZ ALLEN HAMILTON, INC

MASTER'S THESES

DEGROOT, COREY R., *Identifying Partnership Opportunities at Air Force Installations: A Geographic Information Systems Approach*. AFIT/ENV/MS/17M-184. Faculty Advisor: Maj Jason K. Freels. Sponsor: Booz Allen Hamilton, Inc.

CUMMONS INC

MASTER'S THESES

BIERHAUS, ZACHARY S., *Feasibility and Environmental Implications of using Waste Motor Oil as Alternative Supplemental Fuel in Contingency Prime Power Generation*. AFIT/ENV/MS/17M-173. Faculty Advisor: Dr. Eric G. Mbonimpa. Sponsor: Cummons Inc.

INNOVATIVE SCIENTIFIC SOLUTIONS, INC.

MASTER'S THESES

ASHBY, ROBERT W., *Scaling Film Cooling Performance from Ambient to Near Engine Temperatures*. AFIT/ENV/MS/17M-240. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: Innovative Scientific Solutions, Inc.

LINCOLN LABORATORY – MIT

MASTER'S THESES

LAPP, KEVIN P., *Design and Testing of a Micro-Scale Wave Rotor System*. AFIT/ENV/MS/17S-067. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: MIT/LL.

LOCKHEED MARTIN

MASTER'S THESES

CARSON, DANIEL J., *Aerial Visual-Inertial Odometry Performance Evaluation*. AFIT/ENG/MS/17M-010. Faculty Advisor: Dr. John F. Raquet. Sponsor: Lockheed Martin. [ANT]

CORBETT, STUART, *Agent-Based Modeling to Analyze the Tactical Employment of a Small Advanced Capability Missile*. AFIT/ENS/MS/17M-119. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin.

MAATZ, IAN M., *Computational Evaluation of the Aerodynamics of a Missile Undergoing a Prescribed Pitching Motion*. AFIT/ENV/MS/17M-274. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: Lockheed Martin.

THE CHARLES STARK DRAPER LABORATORY, INC

MASTER'S THESES

JACKSON, PHILIP C., *Performance Evaluation of Astro-Optical-Inertial Navigation System*. AFIT/ENG/MS/17M-035. Faculty Advisor: Dr. John. F. Raquet. Sponsor: CSDL. [ANT]

RAYTHEON SPACE AND AIRBORNE SYSTEM

MASTER'S THESES

WILSON, JACOB A., *Measuring the Nonlinear Performance of Indium Gallium Phosphide using the Z-Scan and Intensity Variation Methods*. AFIT/ENP/MS/17J-013. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: Raytheon Space and Airborne System.

SANDIA NATIONAL LABORATORIES

MASTER'S THESES

RIGGS, CASEY J. R., *Resource Evaluation of Quantum Linear Systems Algorithm for Application to Electromagnetic Scattering Problems*. AFIT/ENV/MS/17M-216. Faculty Advisor: Maj Logan O. Mailloux. Sponsor: Sandia National Laboratories.

TURKISH AIR FORCE

MASTER'S THESES

BINGOL, GUNDUZ, *Simulation of Aircraft Sortie Generation under an Autonomic Logistics System*. AFIT/ENS/MS/16D-052. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: TuAF.

UK MINISTRY OF DEFENCE

GRADUATE RESEARCH PAPERS

BLAND, JESSICA S., *How can the UK Ministry of Defense More Effectively Convey the Role and Importance of An Independent Nuclear Deterrent?* AFIT/ENS/MS/17J-017. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: UK Ministry of Defence.

5. ACADEMIC DEPARTMENT PUBLICATIONS AND FUNDING INFORMATION

5.1. DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

Access Phone: 937-255-3069, DSN 785-3069

Fax: 937-656-7621, DSN 986-7621

Homepage: <http://www.afit.edu/ENY/>

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5.1.1. DOCTORAL DISSERTATIONS

CARR, RYAN W., *Optimal Control Methods for Missile Evasion*. AFIT/ENY/DS/17S-055. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

COTTLE, ANDREW E., *Flow Field Dynamics in a High-g Ultra-Compact Combustor*. AFIT/ENY/DS/16D-037. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFOSR.

GREENE, KARA M., *Toward a Flying Qualities Standard for Unmanned Aircraft*. AFIT/ENY/DS/17M-260. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

OWENS, CHRISTOPHER T., *Effects of Mechanical Load History on Lamb Wave Interactions with Fatigue Cracks in Aluminum Plates*. AFIT/ENY/DS/17S-061. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

WHEELER, PAMELA L., *Satellite Propulsion Spectral Signature Detection and Analysis for Space Situational Awareness using Small Telescopes*. AFIT/ENY/DS/17S-063. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [CSRA]

5.1.2. MASTER'S THESES

ALF, CHRISTIAN N., *Image Processing for Space Situational Awareness using Commercial-off-the-Shelf Imagery*. AFIT/ENY/MS/17M-238. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

ALZAHIRANY, RIYADH A., *Corrosion Fatigue Behavior of AISI 4340 Steel Coated With Cadmium and Zinc-Nickel with and Without Scribed Damage in Saltwater Environment*. AFIT/ENY/MS/17S-001. Faculty Advisor: Dr. Shankar Mall. Sponsor: N/A.

ANDERSON, RYAN J., *Using a Plenoptic Camera for Real-Time Depth Estimation*. AFIT/ENY/MS/17M-002. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

ASHBY, ROBERT W., *Scaling Film Cooling Performance from Ambient to Near Engine Temperatures*. AFIT/ENY/MS/17M-240. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: Innovative Scientific Solutions, Inc.

BARNES, DANIEL R., *An Analysis of Radio-Frequency Geolocation Techniques for Satellite Systems Design*. AFIT/ENY/MS/17M-241. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

BLANTIN, JASON R., *Characterization and Scaling Study of Energy Pathways in Small Four-stroke Internal Combustion Engines*. AFIT/ENY/MS/17S-054. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

BOUCHER, NICHOLAS J., *Fatigue Behavior of an Advanced Melt-Infiltrated SiC/SiC Composite at 1200°C in Air and in Steam*. AFIT/ENY/MS/17M-242. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

BOWEN, THOMAS A., *Stressed Oxidation of Hafnium Diboride in Air at 1500°C*. AFIT/ENY/MS/17M-243. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

BOWER, ANDREW D., *Investigation of Dynamic Store Separation out of a Weapons Bay Cavity Utilizing a Low Speed Wind Tunnel*. AFIT/ENY/MS/17M-244. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RW.

BOX, CHRISTOPHER A., *Analysis of Additively Manufactured Lattice Structures using Finite Element Methods*. AFIT/ENY/MS/17M-245. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: AFRL/RW. [CSRA]

BRICK, JOHN N., *Military Space Mission Design and Analysis in a Multi-Body Environment: An Investigation of High-Altitude Orbits as Alternative Transfer Paths, Parking Orbits for Reconstitution, and Unconventional Mission Orbits*. AFIT/ENY/MS/17M-246. Faculty Advisor: Lt Col Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

BROCH, LAURA H., *Constellation Architecture Design for Persistent Space Situational Awareness of Direct Ascent to Geosynchronous Orbit*. AFIT/ENY/MS/17M-247. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: NASIC. [CSRA]

BRYANT, CAROL E., *Relative Contributions to Overall Effectiveness in Gas Turbine Cooling*. AFIT/ENY/MS/17M-248. Faculty Advisor: Maj James L. Rutledge. Sponsor: AFRL/RQ.

CALLAHAM, ANTHONY M., *Two-Dimensional Modeling of Self-Healing Shock Waves in Porous Explosives*. AFIT/ENY/MS/17M-249. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: N/A.

CERANSKI, ALISON M., *Simulation of Aerothermal and Chemical Concentrations for an RDX Explosion*. AFIT/ENY/MS/17M-250. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

CHILDRESS, JONATHON M., *Control Allocation Methods for Constrained and Over Actuated Satellite Attitude Control Systems*. AFIT/ENY/MS/17M-215. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

COUCH, BRIAN D., *Busek ICM Micro Radio-Frequency Ion Thruster Empirical Performance Determination*. AFIT/ENY/MS/17M-253. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

CUNNINGHAM, CAMERON R., *Evaluation of Networked Satellite Command & Control via Internet Conduit*. AFIT/ENY/MS/17M-254. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

DOWNEY, JACOB J., *Structural Analysis of a 3D Printed Composite Truss*. AFIT/ENY/MS/17M-256. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

DUNKEL, MELISSA A., *The Impact of Atmospheric Fluctuations on Optimal Boost Glide Hypersonic Vehicle Dynamics*. AFIT/ENY/MS/17M-257. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

DUNKEL, PATRICK N., *Application of RF-DNA Fingerprinting Techniques to ICOM Radio Satellite Communication*. AFIT/ENY/MS/17M-258. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

EISENSMITH, DAVID L., *Fatigue Effects of Laser Shock Peening Minimally Detectable Partial-through Thickness Surface Cracks*. AFIT/ENY/MS/17M-259. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

HAMIDANI, ALI M., *Evaluating the Autonomous Flying Qualities of a Simulated Variable Stability Aircraft*. AFIT/ENY/MS/17M-261. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

HEIDLARF, PETER, *Optimal UAV Path Planning with Dynamic No-Fly-Zones for Target Geolocation using Line-of-Bearing Measurements and Kalman Filtering*. AFIT/ENY/MS/17M-262. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

HOSKINS, CHRISTOPHER R., *An Analysis of Two Geometries at Mach 3 using Cleanly Seeded PIV Techniques*. AFIT/ENY/MS/17M-265. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RQ.

HYATT, NICHOLAS L., *Hall Effect Thruster Characterization through Potential, Magnetic, and Optical Measurements*. AFIT/ENY/MS/17M-267. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR. [CSRA]

KACZMAREK, JEREMY J., *Analysis of Image Processing and Data Reduction for Space Situational Awareness Applications in CubeSats*. AFIT/ENY/MS/17M-268. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

KNAPP, KEVIN R., *Time-dependent Validation of Finite Element Strain Distribution of a Plastically-deformed Plate via Digital Image Correlation*. AFIT/ENY/MS/17M-269. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

LANZO, DANIEL T., *Additively Manufactured Spacecraft Thermal Control System*. AFIT/ENY/MS/17M-271. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]

LAPP, KEVIN P., *Design and Testing of a Micro-Scale Wave Rotor System*. AFIT/ENY/MS/17S-067. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: MIT/LL.

LEE, JOSHUA J., *Study of Chaotic Behavior in the Nonlinear Dynamic Response of an Airfoil with a Trailing Edge Flap*. AFIT/ENY/MS/17M-272. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RW.

LOWERY, JASON P., *Measuring Light Curve Uncertainty for Surrogate Geostationary Satellite Models*. AFIT/ENY/MS/17S-060. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

LUM, ERIC W., *Mechanical Properties of Additively Manufactured Stainless Steel*. AFIT/ENY/MS/17M-273. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

MAATZ, IAN M., *Computational Evaluation of the Aerodynamics of a Missile Undergoing a Prescribed Pitching Motion*. AFIT/ENY/MS/17M-274. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: Lockheed Martin.

MITCHELL, RONALD K., *Creep of Hi-Nicalon™ S Ceramic Fiber Tows at 900°C In Air and In Silicic Acid-Saturated Steam*. AFIT/ENY/MS/17M-277. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

OLIVER, RACHEL, *Model Fidelity Analysis for Production of Accurate Theoretical Light Curves*. AFIT/ENY/MS/17M-279. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

PETRIE, RYAN C., *Characterization of the Variable Camber Compliant Wing using a Vortex Panel Method*. AFIT/ENY/MS/17M-281. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

PITMAN, BRIAN W., *Maneuver Detection and Characterization using Wavelets for Geosynchronous Spacecraft*. AFIT/ENY/MS/17M-282. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

PROVCHY, ZACHARIAH A., *Topology Optimized Perforator for Multi-Layered Target*. AFIT/ENY/MS/17M-283. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: N/A.

REABE, MARISSA C., *Formation Flight of Earth Satellites on Kamtorus using Classical Orbital Elements*. AFIT/ENY/MS/17M-285. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A. [CSRA]

RICH, ADAM T., *Investigating Analytical and Numerical Methods to Predict Satellite Orbits using Two-Line Element Sets*. AFIT/ENY/MS/17M-286. Faculty Advisor: Dr. William E. Wiesel. Sponsor: AFRL/RV. [CSRA]

ROBINSON, CHRISTINE, *Evaluating the Viability of Planar Laser-Induced Fluorescence to Determine the Constituents of AF-M315E Exhaust Plume*. AFIT/ENY/MS/17M-287. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

ROTH, KRISTA, *Analysis of an Experimental Space Debris Removal Mission*. AFIT/ENY/MS/17J-071. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

SADOWSKI, JUSTIN A., *Dynamic Logical Mission Modeling Tool*. AFIT/ENY/MS/17M-290. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

SNYDER, JORDAN W., *A Study of Quasi-Static and Dynamic Analyses of a Hexakis Icosahedron Frame for use in a Vacuum Lighter Than Air Vehicle*. AFIT/ENY/MS/17M-291. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

STEGEMANN, BEAU J., *Fuel Injection Requirements of the Rotating Detonation Engine*. AFIT/ENY/MS/17M-292. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

STUART, KENNETH J., *KAM Tori from Two-Line Element Sets: A Comparison to SGP4*. AFIT/ENY/MS/17M-293. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A. [CSRA]

- TOMMILA, CHRISTOPHER D., *Performance Losses in Additively Manufactured Low Thrust Nozzles*. AFIT/ENY/MS/17M-295. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A. [CSRA]
- TULLINO, STEPHEN K., *Testing and Evaluating Deployment Profiles of the Canisterized Satellite Dispenser (CSD)*. AFIT/ENY/MS/17M-296. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]
- VAHLE, MARK W., *Application and Validation of Off-Nominal Aircraft Performance Models*. AFIT/ENY/MS/17M-297. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.
- VORGERT, CHRISTOPHER J., *Relating Film Cooling Performance Between Ambient and Near Engine Temperatures*. AFIT/ENY/MS/17M-298. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFOSR.
- WELCH, LUKE A., *Computational Optimization under Uncertainty of an Active Flow Control Jet*. AFIT/ENY/MS/17M-299. Faculty Advisor: Lt Col Jacob A. Freeman. Sponsor: AFRL/RQ.

5.1.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AYRES, BRADLEY J.,

Visiting Assistant Professor of Systems Engineering (through Aerospace Corp.), Department of Aeronautics and Astronautics, AFIT Appointment Date: 2012 (AFIT/ENY); BS, Chemical Engineering, University of Missouri, Columbia, 1982; MA, Procurement and Acquisition Management, Webster University, St. Louis, 1991; MS, Software Systems Management, Air Force Institute of Technology, 1992; PhD, Business Administration specializing in MIS, Florida State University, 2003. Dr. Ayres' research interests include development of complex systems. He is a member of AIAA, the Project Management Institute, and the International Council on Systems Engineering. AFIT research center affiliation(s): CSRA. Tel. 937-255-3355 x3422, email: Bradley.Ayres.ctr@afit.edu

BETTINGER, ROBERT A., Maj,

Assistant Professor of Astronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2017 (AFIT/ENY); BS, Astronautical Engineering, United States Air Force Academy, 2007; MA, History, American Public University, 2010; MS, Astronautical Engineering, Air Force Institute of Technology, 2011; PhD, Astronautical Engineering, Air Force Institute of Technology, 2014. Maj Bettinger's research interests include reentry dynamics, spacecraft design, and optimization and control for aerospace applications. Recent research includes developing optimal skip reentry maneuvers for altering spacecraft orbital elements. Maj Bettinger is a member of Tau Beta Pi and Sigma Gamma Tau. Tel. 937-255-3636 x4578, email: Robert.Bettinger@afit.edu

COBB, RICHARD G.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2001 (AFIT/ENY); BS, Pennsylvania State University, 1988; MS, Air Force Institute of Technology, 1992; PhD, Air Force Institute of Technology, 1996. Dr. Cobb teaches courses on control theory, optimization and satellite design. His research focuses on dynamics and control of space structures for space-based remote sensing, and optimization and control for aerospace applications. Recent research includes developing optimal trajectory plans for Global Strike missions, maneuver planning for satellite proximity operations, and dynamics and control techniques for lightweight space optics and sensor systems for Space Situational Awareness. While on active duty, Dr. Cobb served as the technical advisor for AFRL's Space Vehicles Technology Branch, and led several space flight experiment programs, including the Vibration Isolation and Suppression System sponsored by BMDO and the Satellite Ultra-quiet Isolation Technology Experiment. Dr. Cobb also served as a launch operations officer at Cape Canaveral AFS on the Global Positioning System program, responsible for the integration and launch of the GPS Block II satellite constellation. Dr. Cobb is an Associate Fellow of AIAA. AFIT research center affiliation(s): ANT, CDE, CSRA and CTISR. Tel. 937-255-3636 x4559, email: Richard.Cobb@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Optimization and Computer Vision for Proximity Operations.” Sponsor: Undisclosed. Funding: \$40,000 – Cobb 50%, Swenson 50%. [CSRA]

“Optimization for Tactical Off-Board Sensing and Persistent Intelligence, Surveillance, and Reconnaissance.” Sponsor: AFRL/RQ. Funding: \$35,000 – Cobb 50%, Kunz 50%. [ANT]

“Optimization and Decision Support for TMAP.” Sponsor: NASIC. Funding: \$35,000. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Livermore, R., Lindholm, G., Neal, C., Cobb, R. and Colombi, J., “Heuristic Near-Optimal UAS Path Planning for Convoy Overwatch,” *Journal of Unmanned Aerial Systems*, Vol. 2, No. 1, 2016. [ANT]

Denton, J., Hodson, D., Cobb, R., Mailloux, L., Grimaila, M., and Baumgartner, G., “A Model to Estimate Performance of Space-Based Quantum Communication Protocols Including Quantum Key Distribution Systems,” *Journal of Defense Modeling and Simulation (JDMS)*, Nov 2016. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Carr, and Cobb, R. "An Energy Based Objective for Solving an Optimal Missile Evasion Problem," AIAA Guidance, Navigation, and Control Conference, AIAA SciTech Forum, 8-12 Jan 2017 Grapevine, TX. [ANT]
- Humphreys, J., Cobb R., Jacques D, and Reeger, J., "Dynamic Re-Plan of the Loyal Wingman Optimal Control Problem," AIAA Guidance, Navigation, and Control Conference, AIAA SciTech Forum, 8-12 Jan 2017 Grapevine, TX. [ANT]
- Wheeler, P., Cobb, R., Hartsfield, C. and Prince, B., "Satellite Propulsion Spectral Signature Detection and Analysis," IEEE Aerospace Conference 2017, Mar 4-11, Big Sky MT, March 2017. [CSRA]
- Wheeler, P., Cobb, R., Hartsfield, C. and Prince, B., "Satellite propulsion spectral signature detection and analysis through Hall effect thruster plume and atmospheric modeling," Proceedings SPIE 9974, Infrared Sensors, Devices, and Applications VI, 99740T (2016). doi:10.1117/12.2238021. [CSRA]
- Prince, E. and Cobb, R., "Optimal Slew-rate-limited Guidance for Combined Formation Establishment and Reconfiguration of Inspector Satellite with Exclusion Cone," 27th AAS/AIAA Space Flight Mechanics Meeting, San Antonio, TX, Feb 5-9, 2017. [CSRA]
- Prince, E. and Cobb, R., "Optimal Inspector Satellite Guidance to Quasi-Hover via Relative Teardrop Trajectories," IAF 9th International Workshop on Satellite Constellations and Formation Flying, Boulder, CO, 19-21 June 2017. [CSRA]
- Stern J., Wachtel, S., Colombi, J., Meyer, D., and Cobb, R., "Multi-objective Optimization of Geosynchronous Earth Orbit Space Situational Awareness System Architectures," CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach CA, Mar 23-25, 2017. [CSRA]
- Shultz, D., Colombi, J., Jacques, D., and Cobb, R., "Model-based Engineering: Analysis of Alternatives for Optical Satellite Observation," CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach, CA, Mar 23-25, 2017. [ANT/CSRA]

COMER, ADAM L., Capt,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Mechanical Engineering, United States Air Force Academy, 2009; PhD, Engineering, University of Cambridge, 2013. Capt Comer's research interests include fluid mechanics, combustion, and computational fluid dynamics-based design optimization with a focus on developing and applying practical and advanced computational models of turbulent combustion and multiphase flows for gas turbine propulsion applications. Specific research efforts include an automated, CFD-based optimization of a gas turbine fuel injector and computational modeling of bluff-body flame dynamics and instability. During his previous assignment as a deputy branch chief and combustion research engineer at AFRL, he gained exposure to a variety of applied and fundamental research efforts for current and future combustion systems for propulsion. Tel. 937-255-6565 x4745, email: Adam.Comer@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Comer, A.L., Sardeshmukh, S., Rankin, B.A., Harvazinski, M.E. and Sankaran, V., 2017. Grid Convergence Studies of Bluff Body Stabilized Turbulent Premixed Combustion. In *55th AIAA Aerospace Sciences Meeting* (p. 0377).

CROWE, DARRELL S., Maj,

Student Operations Division Chief and Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Aerospace Engineering, Texas A&M, 2003; MS, Aeronautical Engineering, Air Force Institute of Technology, 2008; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2014. Maj Crowe's research interests include computational fluid dynamics, weapon aerodynamics, propulsion systems integration, fuel film cooling, and grid generation methods. Maj Crowe teaches courses on computational fluid dynamics. He has experience in propulsion sustainment engineering and has worked as

a computational fluid dynamics engineer in the area of aircraft/store compatibility. He is a member of Tau Beta Pi, Sigma Gamma Tau, and AIAA. Tel. 937-255-3636 x4204, email: Darrell.Crowe@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Computational Fluid Dynamics Investigation Using Bleed as a Method of Active Flow Control.” Sponsor: AFRL/RQ. Funding: \$5,450.

FREEMAN, JACOB A., Lt Col,

Deputy Head and Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Mechanical Engineering, Brigham Young University, 1997; MS, Aeronautical Engineering, Air Force Institute of Technology, 2003; PhD, Aeronautical Engineering, Virginia Tech, 2012. Lt Col Freeman’s research interests include computational fluid dynamics, optimization under uncertainty, and computational turbulence modeling. Lt Col Freeman has experience as the GPS deputy chief engineer; computational aircraft-store separation; computational, experimental and flight testing of a micro air vehicle; small-satellite testing, launch and operations; and as assistant professor of aeronautical engineering at the Air Force Academy; he also deployed to Guantanamo Bay, Cuba, to support Operation Enduring Freedom and to US Central Command Headquarters in Florida as a military strategic planner. He is a member of AIAA. Tel. 937-255-3636 x4901, email: Jacob.Freeman@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Welch, L.A., Freeman, J.A. and Beran, P.S., “Computational Optimization Under Uncertainty of an Active Flow Control Jet,” AIAA Paper 2017-3913, June 2017. doi: 10.2514/6.2017-3913.

FULLER, DANE F., Col

Senior Military Professor, School of Engineering and Management, AFIT Appointment Date: 2016 (AFIT/EN); BS Electrical Engineering, The University of Texas at Austin, 1993; MS Electrical Engineering, Air Force Institute of Technology, 1997; MS of Operational Art and Science, Air Command and Staff College, 2008, PhD Electrical Engineering, Air Force Institute of Technology, 2011; Col Fuller has over 23 years of active duty military service and experience. His research interests include space systems engineering and remote sensing, in particular radar imaging, electromagnetic scattering, and pattern recognition. Col Fuller is a member of Tau Beta Pi, and Eta Kappa Nu. AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x4679, email: Dane.Fuller@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Actinide Radiation Detector Payload.” Sponsor: Undisclosed. Funding: \$367,850 – Fuller 40%, Petrosky 20%, Hogsed 30%, Cobb 5%. [CSRA]

“Long Wave Polarimetric Imaging Research.” Sponsor: Undisclosed. Funding: \$150,000 – Fuller 20%, Gross 40%, Cobb 40%. [CSRA/CTISR]

“SkyPad.” Sponsor: Undisclosed. Funding: \$661,292 – Fuller 25%, Cobb 25%, Hartsfield 25%, O’Hara 25%. [CSRA]

“Radiation Testing Jeston TX1 and TX2.” Sponsor: Undisclosed. Funding: \$24,300 – Fuller 10%, Hogsed 80%, Cobb 10%. [CSRA]

GEISEL, CHRISTOPHER D., Lt Col,

Assistant Professor of Astronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2014 (AFIT/ENY); BS, Astronautical Engineering, United States Air Force Academy, 2001; MS, Astronautical Engineering, Air Force Institute of Technology, 2008; PhD, Purdue University, 2013. Lt Col Geisel’s research interests include astrodynamics and dynamical systems theory. He has investigated spacecraft orbit design in a multi-body environment as well as navigation solutions for on-orbit inspection of satellites. Previously, he worked as an orbital analyst for the Advanced Payload Design Team at NASA’s Jet Propulsion Laboratory. At the Air Force Research Laboratory Sensors Directorate, he led the design of a sensor system for hypersonic vehicles. At the Space

and Missile Systems Center / Missile Defense Systems Group, he supervised development, integration, testing, and operator training for two satellites designed to track ballistic missiles. He also mentored Iraqi and Afghan security forces during Operation Iraqi Freedom and Operation Enduring Freedom. Lt Col Geisel is a member of Sigma Gamma Tau, Tau Beta Pi, and AIAA. AFIT research center affiliation(s): CSRA.

GREENDYKE, ROBERT B.,

Associate Professor of Aeronautics and Astronautics and Director, AFIT Scientist and Engineer Education Programs at Kirtland AFB, Department of Aeronautics and Astronautics, Appointment Date: 2005 (AFIT/ENY); BBA, Economics, Baylor University, 1979; BS, Aerospace Engineering, Texas A&M University, 1986; MS, Aerospace Engineering, Texas A&M University, 1988; PhD, Interdisciplinary Engineering, Texas A&M University, 1998. Dr. Greendyke's research interests include computational fluid dynamics, Direct Simulation Monte Carlo methods, hypersonic and reacting flows, radiation simulation, thermophysics, and plasma simulation. Dr. Greendyke was a Research Scientist at NASA-Langley Research Center studying re-entry and aerobraking flows, and an Associate Professor in the University of Texas at Tyler establishing a start-up Mechanical Engineering Program from concept through accreditation. He has published over 30 journal articles, technical reports and conference publications in multiple fields. He is an Associate Fellow of the American Institute of Aeronautics and Astronautics. Tel. 937-255-3636 x4567, email: Robert.Greendyke@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“The Use of Chemical Reaction Models in Hydrocode Simulation of Explosives.” Sponsor: AFOSR. Funding: \$23,995.

“Porosity Effects on Detonation Waves.” Sponsor: AFRL/RW. Funding: \$9,265.

“Hypersonic Stability and Transition Analysis.” Sponsor: AFRL/RW. Funding: \$45,000.

“Aerothermal Effects of Thermal Protection System Defects.” Sponsor: AFOSR. Funding: \$14,523.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“A Non-Technical Introduction to Hypersonics.” Sponsor: NASIC. Funding: \$5,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Matthew Schwaab, Robert Greendyke, Bryan Steward, “Arrhenius Rate Chemistry-Informed Inter-Phase Source Terms (ARCIIST),” 20th Biennial APS Conference on Shock Compression of Condensed Matter, July 9-14, 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Donegan, B., Greendyke, R., Ravichandran, R., Lewis, S., Morgan, R., and McIntyre, T. “Preliminary Investigation of Ablating Hypersonic Radiating Wake Flows.” Poster presented at the 9th Ablation Workshop, 30-31 August 2017, Montana State University, Bozeman, MT.

Schwaab, M and Greendyke, R., “Arrhenius Rate Chemistry Informed Inter-Phase Source Terms (ARCIIST) for Macro-Scale Explosive Hydrocodes,” Tri-Service Energetic Materials Basic Science Program Review, August 2017.

HARTSFIELD, CARL R.,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Aerospace Engineering, Georgia Institute of Technology, 1991; MS, Aeronautical Engineering, Air Force Institute of Technology, 2001; PhD, Astronautical Engineering, Naval Postgraduate School, 2006. Dr. Hartsfield is a former faculty member of The Ohio State University, former space sensor payload program manager, and retired USAF Lt Col. His research interests include space and rocket propulsion and optimal design of spacecraft, including integration and testing of spacecraft. Dr. Hartsfield's research focuses on experimental evaluation and diagnostics for space propulsion, analytic evaluation of spacecraft design, and applications of additive manufacturing for optimal spacecraft structures. He served as an invited space propulsion session co-chair at a 2011

NASA GRC HBCUOMI Outreach Symposium, as a session chair at the 2011 and 2012 Dayton/Cincinnati Aerospace Sciences Symposia, and as chair for the technical program and session chair at the 2017 Dayton/Cincinnati Aerospace Sciences Symposium. Dr. Hartsfield is a member of AIAA, Sigma Gamma Tau, and the American Society for Engineering Education. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4667, email: Carl.Hartsfield@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Ultra-High Speed Plasma Diagnostics in an ExB Device for the Determination of Anomalous Transport Diffusion.” Sponsor: AFOSR. Funding: \$27,593. [CSRA]

“Additively Manufactured Metallic Phase Change Thermal Management Systems.” Sponsor: Undisclosed. Funding: \$95,850 – Hartsfield 34%, Swenson 33%, O'Hara 33%. [CSRA]

“Design for Satellite Structures Built In Space.” Sponsor: Undisclosed. Funding: \$99,900 – Hartsfield 34%, Swenson 33%, O'Hara 33%. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hall Effect Thruster Characterization Through Potential, Magnetic, and Optical Measurements (AIAA 2017-0169) Nicholas Hyatt, Carl Hartsfield, David Cunningham; 55th AIAA Aerospace Sciences Meeting, 9 Jan 2017. [CSRA]

Kan Liu, Dylan Stelzer, David Liu, Carl Hartsfield, Austin Williamson; 58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 11 Jan 2017 (Jefferson Goblet Best Student paper, SciTech 2017).

Thrust Coefficient Losses in Additively Manufactured Low Thrust Nozzles (AIAA 2017-170) Christopher Tommila, Carl Hartsfield; 55th AIAA Aerospace Sciences Meeting, 9 Jan 2017. [CSRA]

HESS, JOSHUAH, A., Capt,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Aerospace Engineering, Virginia Polytechnic and State University, 2009; MS, Astronautical Engineering, Air Force Institute of Technology, 2011; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2016. Capt Hess's research interests include orbital mechanics, spacecraft attitude determination, relative satellite motion, estimation theory differential games, and optimal control theory. He has investigated adaptive estimation of nonlinear spacecraft attitude dynamics as well as the relative navigation between satellites conducting proximity operations. Previously, Capt Hess worked as a space systems engineer at the National Air and Space Intelligence Center (NASIC), and has deployed to Southwest Asia in support of Operation Enduring Freedom. He is a member of Tau Beta Pi, Sigma Gamma Tau, and AIAA. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x6190, email: Joshuah.Hess@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Roth, K, Swenson, E. D., and Hess, J.A., “Analysis of an Experimental Space Debris Removal Mission,” AIAA SPACE and Astronautics Forum and Exposition, AIAA SPACE Forum, (AIAA 2017-5346). [CSRA]

Prince, E.R., Cobb, R.G., Hess, J.A., “Optimal Slew-Rate-Limited Guidance for Combined Formation Establishment and Reconfiguration of Inspector Satellite with Exclusion Cone,” AAS 17-530, Feb 2017. 27th AAS/AIAA Space Flight Mechanics Meeting February 5-9, 2017, San Antonio, Texas. [CSRA]

JOHNSON, KIRK, W., Lt Col,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Mechanical Engineering, Worcester Polytechnic Institute, 2000; MS, Astronautical Engineering, Air Force Institute of Technology, 2010; PhD, Aerospace Engineering, Texas A&M University, 2016. Lt Col Johnson's research interests include orbital mechanics and astrodynamics, focusing on satellite relative motion, formation flying, general perturbation methods, and space navigation. Lt Col Johnson has led engineering teams

performing analysis and modeling and simulation for the National Air and Space Intelligence Center and for the Missile Defense Agency. He is a member of Tau Beta Pi, and Sigma Gamma Tau. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4285, email: Kirk.Johnson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Algorithms for Small-Satellite Formation Flying.” Sponsor: AFRL/RV. Funding: \$10,750. [CSRA]

KOMIVES, JEFFREY R., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Aeronautical & Astronautical Engineering, Purdue University, 2003; MS, Aeronautical Engineering, Air Force Institute of Technology, 2009; PhD, Aerospace Engineering & Mechanics, University of Minnesota, 2016. Maj Komives' research interests include aerodynamics, hypersonics, and computational fluid dynamics. Maj Komives is a developmental engineer with experience in simulation, test and evaluation, and electronic warfare. In his deployment to Operation Enduring Freedom he was responsible for Counter Remote Controlled-IED Electronic Warfare training across most of Afghanistan. He is a member of Sigma Gamma Tau, AIAA, and Association of Old Crows. Tel. 937-255-3636 x4744, email: Jeffrey.Komives@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Wall-Modeled Large Eddy Simulation of Non-Equilibrium Boundary Layers.” Sponsor: AFRL/RQ. Funding: \$13,184.

REFEREED JOURNAL PUBLICATIONS

Knight, D., Chazot, O., Austin, J., Badr, M.A., Candler, G., Celik, B., de Rosa, D., Donelli, R., Komives, J., Lani, A. and Levin, D., (2017). *Assessment of Predictive Capabilities for Aerodynamic Heating in Hypersonic Flow*. Progress in Aerospace Sciences.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kerst, A., Rhoby, M., Gross, K. C., Oren, E. P., Komives, J. R., & Ombrello, T. (2017). *Preliminary Investigation of a Scramjet Flowfield with Hyperspectral Imaging*. AIAA paper 2017-3554, 33rd AIAA Aerodynamic Measurement Technology and Ground Testing Conference.

Reinert, J. D., Gs, S., Candler, G. V., & Komives, J. R. (2017). *Three-Dimensional Simulations of Hypersonic Double Wedge Flow Experiments*. AIAA paper 2017-4125, 47th AIAA Fluid Dynamics Conference.

KUNZ, DONALD L.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2003 (AFIT/ENY); BS, Syracuse University, 1971; MS, Georgia Institute of Technology, 1972; PhD, Georgia Institute of Technology, 1976; Dr. Kunz's research interests include rotorcraft dynamics, vibrations, and loads, structural dynamics, aeroelasticity, flying qualities of UAVs, multibody dynamics, and computational structural mechanics. He has published more than 100 journal articles, conference papers, and technical reports. Prior to coming to AFIT, Dr. Kunz worked at the US Army Aeroflightdynamics Directorate, McDonnell Douglas Helicopter Company, Old Dominion University, and the US Army Aviation and Missile Command. He is an Associate Fellow of AIAA, a member of AHS and ASME, and a licensed professional engineer in the Commonwealth of Virginia. Tel. 937-255-3636 x4548, email: Donald.Kunz@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Basic Research with Integrated Flight Test.” Sponsor: AFOSR. Funding: \$91,714 – Kunz 50%, Reeder 20%, Cobb 20%, Crowe 10%.

“Research Support for Joint AFIT/TPS Test Management Projects.” Sponsor: USAF TPS. Funding: \$30,000.

REFEREED JOURNAL PUBLICATIONS

Kunz, D.L., “The Joint AFIT/TPS Program: A Test and Evaluation Partnership,” *The ITEA Journal of Test and Evaluation*, Vol. 38, No. 2, June 2017, pp. 131-134.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Olsen, C.C., and Kunz, D.L., “Dynamic Vehicle Routing with Indirect Communication via Unattended Ground Sensors,” AIAA 2017-1527, AIAA Guidance, Navigation, and Control Conference, AIAA SciTech Forum, Grapevine, Texas, January 2017, doi: 10.2514/6.2017-1527.

LIEBST, BRADLEY S.,

Professor of Aerospace Engineering and Head, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1989 (AFIT/ENY); BS, Wichita State University, 1978; MS, Massachusetts Institute of Technology, 1979; PhD, Massachusetts Institute of Technology, 1981. Dr. Liebst's research interests include eigenstructure assignment and control, stability and control of aerospace vehicles, passive and active control of large flexible structures, and aircraft handling qualities. He has published over 30 articles and reports and chaired over 40 theses and dissertations. Prior to teaching at AFIT, Dr. Liebst was Assistant Professor of Aerospace Engineering for six years at the University of Minnesota where he was voted the 1987 Best Institute of Technology (U of M) Professor. Tel. 937-255-3636 x4636, email: Bradley.Liebst@afit.edu

LINGENFELTER, ANDREW J., Capt,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2016 (AFIT/ENY); BS, Mechanical Engineering, University of Nebraska – Lincoln, 2008; MEng, Industrial and Systems Engineering, University of Florida, 2011; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2016. Capt Lingenfelter's research interests include aircraft survivability, weapons, weapons testing, and additive manufacturing. His previous research has focused on flow visualization and ballistically induced failure of aircraft fuel tanks. Capt Lingenfelter is a member of AIAA, Tau Beta Pi, and Sigma Gamma Tau. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4282, email: Andrew.Lingenfelter@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“REBEL Satellite Simulator Automated Mass Balance System.” Sponsor: AFRL/RV. Funding: \$47,000 – Lingenfelter 90%, Swenson 10%. [CSRA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Weapons and Aircraft Survivability Education and Research.” Sponsor: JASPO. Funding: \$54,000.

REFEREED JOURNAL PUBLICATIONS

Lingenfelter, A.J., Liu, D., Reeder, M.F., “Time resolved flow field measurements of orifice entrainment during a hydrodynamic ram event,” *Journal of Visualization*, Vol. 20, No. 1, February 2017, pp. 63-74.

MALL, SHANKAR,

Distinguished Professor, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1986 (AFIT/ENY); BS, Mechanical Engineering, Banaras Hindu University, India, 1964; MS, Mechanical Engineering, Banaras Hindu University, 1966; PhD, Mechanical Engineering, University of Washington, 1977. Dr. Mall's research centers on composite and smart materials, fatigue and fracture. Dr. Mall has authored over 300 papers and has been the co-editor of a book and five conference proceedings. He is a Fellow of ASME and an Associate Fellow of AIAA. He was also the Principal Materials Research Engineer, Materials and Manufacturing Directorate, Air Force Research Laboratory.

SPONSOR FUNDED RESEARCH PROJECTS

“Characterization of Cryogenic Electromechanical Behavior of CNT Multi-Yarn (Conductor).” Sponsor: AFOSR. Funding: \$36,300.

“Applications of Carbon Nanotube (CNT) Fabric in Satellites including CubeSat.” Sponsor: Undisclosed. Funding: \$25,520 – Mall 70%, Swenson 20%, Rutledge 10%.

“Characterization of Carbon Nanotube (CNT) Yarn and Fabric, and 3-D Printed CNT/ULTEM 1010 Composite.” Sponsor: Undisclosed. Funding: \$64,735.

REFEREED JOURNAL PUBLICATIONS

Singh, A.K., Sabelkin, V. and Mall, S., 2017. Creep-rupture behaviour of notched oxide/oxide ceramic matrix composite in combustion environment. *Advances in Applied Ceramics*, pp.1-12.

Singh, A.K., Sabelkin, V. and Mall, S., 2017. Fatigue behavior of double-edge notched oxide/oxide ceramic matrix composite in a combustion environment. *Journal of Composite Materials*.

Cobb, G.R., Singh, A.K. and Mall, S., 2017. In-situ characterization of microstructural changes in a carbon nanotube sheet under sustained load. *Materials & Design*, 134, pp.494-501.

Singleton, J.W., Misak, H.E. and Mall, S., 2017. Relationships between tensile behavior, physical parameters and manufacturing parameters of carbon nanotube sheet. *Materials & Design*, 116, pp.199-206.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Zakrajsek, A.J. and Mall, S., 2017. The Development and use of a Digital Twin Model for Tire Touchdown Health Monitoring. In *58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*.

O'HARA, RYAN P., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Mechanical Engineering, US Air Force Academy, 2000; MS, Aeronautical Engineering, Wright State University, 2005; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2012. Maj O'Hara's research focuses on the application of mechanical structures and structural dynamics. Areas of interest include turbine engines, laminate composites, small UAS, and additive manufacturing. AFIT research center affiliation(s): CSRA. Tel. 937-255-6565 x4542, email: Ryan.OHara@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Abnormal Grain Growth in Beta Annealed Ti-6Al-4V.” Sponsor: AFRL/RX. Funding: \$40,000.

“Optimized, Integrated, and Additively Manufactured CubeSat Structural Bus.” Sponsor: Undisclosed. Funding: \$110,700 – O'Hara 34%, Hartsfield 33%, Swenson 33%. [CSRA]

“High Temperature Fatigue and Fracture Characterization of Additively Manufactured Metals.” Sponsor: AFRL/RQ. Funding: \$25,000.

“Structural Mechanics Characterization of Periodic Structures.” Sponsor: AFRL/RW. Funding: \$24,806.

“Optimizing LPBF Process Controls for Advanced Heat Exchanger Design and Manufacturing.” Sponsor: AFRL/RQ. Funding: \$51,296.

PALAZOTTO, ANTHONY N.,

Distinguished Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1975 (AFIT/ENY); BS, New York University, 1955; MS, Brooklyn Polytechnic Institute, 1961; PhD, New York University, 1968. Dr. Palazotto's interests include nonlinear mechanics, shell analysis, finite elements, composite materials, viscoplasticity, and nonlinear dynamics. Dr. Palazotto is the co-author of a textbook, “The Nonlinear Analysis of Shell Structures,” published in 1992 by the AIAA. In addition he has authored 242 archival technical

publications and more than 600 technical presentations and manuscripts. Dr. Palazotto received the Hetanyi Award in 1982 from the Society of Experimental Mechanics, the Cleary Award in 1981 from the Air Force Materials Lab, the Structures and Materials Award from the ASCE in 1986, and the AIAA Sustained Service Award in 2004. Dr. Palazotto is a Fellow of the ASCE, a Fellow of the AIAA, a Fellow of the American Academy of Mechanics, and a Fellow of the Engineering Mechanics Institute. He is a registered Professional Engineer in the State of Ohio. Tel. 937-255-3636 x4599, email: Anthony.Palazotto@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“The Analysis of Small Lighter Than Air Vehicles.” Sponsor: AFOSR. Funding: \$46,109.

“Computational Analysis of Problems Containing both Heat Transfer and Structural Vibration.” Sponsor: AFRL/RQ. Funding: \$20,165.

“A Study of the Point-wise Effects of Laser Shock Peening.” Sponsor: AFRL/RQ. Funding: \$17,587.

“Additive Manufacturing Related to Warhead Design.” Sponsor: AFRL/RW. Funding: \$25,853.

REFEREED JOURNAL PUBLICATIONS

You, C., Palazotto, A., and Buentello, R., “Evaluation of Thermomechanical Damage of a Slipper and Rail in a Rocket Sled System,” Journal of Testing and Evaluation, ASTM, Vol. 44, No. 4, pp 1443-1453, 2016.

Just, L., Deluca, A., and Palazotto, A., “Nonlinear Dynamic Analysis of an Icosahedron Frame Which Exhibits Chaotic Behavior,” ASME, Journal of Computational and Nonlinear Dynamics, Vol. 12, pp 01106-1-10, January, 2017.

Abed, N., Abu-Al-Rub, R., and Palazotto, A., “Micromechanical Finite Element Analysis of the Effects of Martensite Morphology on the Overall Mechanical Behavior of Dual Phase Steel,” Intl. Journal of Solids and Structures, Vol. 104-105, pp 8-24, 2017.

Easterday, O., Palazotto, A., Baker, W., and Branam, R., “Damping Properties of Coatings at Elevated Temperatures,” Surface and Coatings Technology, Vol. 321, pp. 186-199, 2017.

Cranston, B., Alghofaily, M., and Palazotto, A., “Design and Structural Analysis of a Unique Structure under an Internal Vacuum,” Aerospace Science and Technology, Vol. 68, pp. 68-76, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Song, R., Muliana, A., and Palazotto, A., “Steady State and Transient Creep Response of High Temperature Alloys” AIAA-2017-1363, 58th AIAA/ASCE/AHS/ASC SciTech 2017, Dallas, TX. January, 9-13, 2017.

Park, Palazotto, A., and Hale, C., “Longitudinal Crack Damage Detection Using Lamb Waves” AIAA-2017-0862, 58th AIAA/ASCE/AHS/ASC SciTech 2017, Dallas, TX. January, 9-13, 2017.

Knapp, K., Palazotto, A., and Scott-Emuakpor, O., “Comparison of Finite Element Strain Distribution to in Situ Strain Field of a Plastically Deformed Plate, AIAA 2017-1139,(Lockheed-Martin Best Student Paper Award), 58th AIAA/ASCE/AHS/ASC SciTech 2017, Dallas, TX. January, 9-13, 2017.

Lum, E., Palazotto, A., and Dempsey, A., “Analysis of the Effects of Additive Manufacturing on the Material Properties of 15-5 PH Stainless Steel,” AIAA 2017-1142, 58th AIAA/ASCE/AHS/ASC SciTech 2017, Dallas, TX. January, 9-13, 2017.

Provchy, Z., and Palazotto, A., “Additively Manufactured Penetrators,” AIAA 2017-1143, 58th AIAA/ASCE/AHS/ASC SciTech 2017, Dallas, TX. January, 9-13, 2017.

Snyder, J., and Palazotto, A., “Design and Modal Analysis of Unique Structure under an Internal Vacuum,” AIAA 2017-1596, 58th AIAA/ASCE/AHS/ASC SciTech 2017, Dallas, TX. January, 9-13, 2017.

Palazotto, A., and Hopkins, R., “Model Characteristics of a Piezoelectric Shaker Table,” AIAA 2017- 1597, 58th AIAA/ASCE/AHS/ASC SciTech 2017, Dallas, TX. January, 9-13, 2017.

Eisensmith, D., Palazotto, A., and Langer, K., “ Residual Stress Evaluation of Laser Shock Penning Over a Partial Through the Thickness Crack,” 6th Internal Conference on Laser Penning and Related Phenomena, South Africa, November, 6-11, 2016.

Palazotto, A., and AlGhofaily, M., “Design of a Icosahedron Frame,” Engineering Mechanic Institute Conference, San Diego, CA. June 4-7, 2017.

BOOKS AND CHAPTERS IN BOOKS

Palazotto, A., Additive Manufacturing Handbook: Product Development for the Defense Industry; Editors; Badiru, A. Valencia, V., and Liu, D. June, 2017.

Palazotto, A., Chapter 29. Surface Roughness of Electron Beam Melting Ti-6 Al-4V Effects on Ultrasonic Testing.

Palazotto, A., Chapter 30. Dynamic Properties of Additively Manufactured 15-5 Stainless Steel and Three-Dimensional Microstructure Characterization.

Palazotto, A., Chapter 32. Impact Response of Titanium and Titanium Boride Monolithic and Functionally Graded Composite Plates.

Palazotto, A., Chapter 45. Topology Optimization of a Penetrating Warhead.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Gockel, J., and Palazotto, A., “The Effect of Anisotropy in the Constitutive Relationship of Additive Manufactured 15-5 PH Subjected to High Strain Rates,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November, 1, 2016.

Lum, E., and Palazotto, A., “Analysis of the Effects of Additive Manufacturing on the Material Properties of Additive Manufactured 15-5 PH Stainless Steel,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November 1, 2016.

Schwemmer, J., Chrissis, J., and Palazotto, A., “Optimal Design of a Hexakis Icosahedron Vacuum Based Lighter Than Air Vehicle,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November 1, 2016.

Snyder, J., and Palazotto, A., “Design and Dynamic Analysis of a Unique Structure Under an Internal Vacuum,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November 1, 2016.

Knapp, K., Palazotto, A., and Scott-Emuakpor, O., “In Situ Validation of Residual Stress Gradients in Plasticity Deformed Vibration Based Fatigue Plates,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November 1, 2016.

Eisensmith, D., Palazotto, A., and Langer, K., “Residual Stress Evaluation of Laser Shock Penning,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November 1, 2016.

Provchy, Z., and Palazotto, A., “Topology Optimization of a Warhead,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November 1, 2016.

Park, C., Palazotto, A., and Hale, C., “Longitudinal Damage Detection Using Lamb Waves,” 12th Annual ASME Dayton Engineering Science Symposium, WSU, November, 1, 2016.

- Lee, J., and Palazotto, A., “Study of Chaotic Behavior in the Dynamic Response of an Airfoil,” 12th Annual ASME Dayton.
- Provy, Z., and Palazotto, A., “Optimization of a Perforator Made from Additive Manufactured Material,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Lee, J., and Palazotto, A., “Evaluating the Inclusion of an Optimized and Deformable Internal Structure on an Airfoil’s Aerodynamic Response,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Schwemmer, J., Chrissis, J., and Palazotto, A., “Optimal Design of a Lighter Than Air Vehicle,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Snyder, J., and Palazotto, A., “A Study of Quasi-Static and Dynamic Analysis of a Hexakis Icosahedron,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Hale, C., Park, C., and Palazotto, A., “Longitudinal Damage Detection in a Beam Using Lamb Waves,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Knapp, K., Palazotto, A., Scott-Emuakpor, O., “Time Dependent Validation of Strain Distribution of a Plastically Deformed Plate,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Lum, E., and Palazotto, A., “Analysis of the Effects of A.M. On Material Properties,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Eisensmith, D., Palazotto, A., Langer, K., “Fatigue Effects of Laser Shock Penning,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.
- Palazotto, A., and Hodkin, R., “The Evaluation of a ROM for a Piezoelectric Shaker Table,” 42nd Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair Conference Center, March, 1, 2017.

PATENT APPLICATIONS

- Palazotto, Anthony N., “Hexakis Icosahedron Frame-Skin Vacuum Lighter than Air Vehicle,” Air For Docket No. AFD-1585P, US Serial No. 62/439,994.

INVENTION DISCLOSURES

- Palazotto, Anthony N., Chrissis, James, Schwemmer, Joseph R., “Four Foot Hexakis Icosahedron Vacuum Lighter than Air Vehicle,” filed 13 Jul 17, Air Force Docket No. ADF-1723.

POLANKA, MARC D.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2009 (AFIT/ENY); BS, Mechanical Engineering, University of Dayton, 1992; MS, Mechanical Engineering, Stanford University, 1993; PhD, Mechanical Engineering, University of Texas, 1999. Prior to accepting a position with AFIT, Dr. Polanka served 17 years in Turbine Engine Division of the Air Force Research Laboratory’s Propulsion Directorate. Dr. Polanka’s research interests include aspects of heat transfer, combustion, and fluid mechanics focusing on experimental applications involving turbine and combustor aerodynamics and cooling techniques. He has been published in a variety of journals including the AIAA Journal of Propulsion and Power, the ASME Journal of Turbomachinery and the Journal of Engineering for Gas Turbines and Power. He also has two patents to his credit. Dr. Polanka is an Associate Fellow of the AIAA, the past Section Chair of the Dayton-Cincinnati Section of the AIAA,

and the Honors and Awards Chair for the same section. Dr. Polanka serves as the Faculty representative for the AFIT Student Section branch of AIAA. He is also a Fellow of the ASME and serves on the Executive Board of the K-14 Committee of the International Gas Turbine Institute where he is also a past Point Contact for the annual Turbo Expo conference. Tel. 937-255-3636 x4714, email: Marc.Polanka@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Combustion Physics under High Centripetal Acceleration.” Sponsor: AFOSR. Funding: \$54,390 – Polanka 85%, Rutledge 15%.

“AFIT Combustion Laboratory Program Concerning UCC, RDE, Small Engines, and Secondary Reaction Combustion Phenomena.” Sponsor: AFRL/RQ. Funding: \$91,607 – Polanka 98%, Comer 2%.

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Shewhart, A.T., Lynch, A.J., Greiner, N.J., Polanka, M.D., and Rutledge, J.L., “Mitigation of Heat Release From Film Cooling in Fuel Rich Environments” *Journal of Propulsion and Power*, Vol. 32 Issue 6, pp.1454-1461, November, 2016, doi: 10.2514/1.B35903.

Greiner, N.J., Polanka, M.D., Rutledge, J.L., and Shewhart, A.T “Effect of Variable Properties and Radiation on Convective Heat Transfer Measurements at Engine Conditions,” *Journal of Heat Transfer*, Vol. 138(11), pp. 112002 1:8, 2016. doi: 10.1115/1.4033537.

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Benhassen, F., Polanka, M.D., and Reeder, M.F., “Time Resolved Filtered Rayleigh Scattering Measurement of a Buoyant Jet in a Co-flow,” *Journal of Aerospace Engineering*, Vol. 30 Issue 1, pg 04016067 1-11, 2017.

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Ausserer, J.K., Polanka, M.D., Litke, P.J., and Baranski, J.R., “Mapping of Fuel Anti-Knock Requirements for Small Remotely Piloted Aircraft Engines,” Small Engines Technology Conference, 16 SETC-0070, Charleston, S.C., 15-17 November 2016.

Bohan, B.T., and Polanka, M.D., “Computational Analysis of a Novel Cooling Scheme for Ultra Compact Combustor Turbine Vanes,” ASME Turbo Expo, GT-2017-63319, Charlotte, NC, June 25-30, 2017.

Wiese, C.J., Rutledge, J.L., Polanka, M.D., 2017, “Experimental Evaluation of Adiabatic Effectiveness Using Both Infrared Thermography and Pressure Sensitive Paint Techniques,” ASME Turbo Expo, GT-2017-65019, Charlotte, NC, June 25-30, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Blantin, J.R., Ausserer, J.K., Polanka, M.D., Litke, P.J., and Baranski, J.R., "Power Loss Pathways and Energy Balance of a Small Four-Stroke Internal Combustion Engine," AIAA-2017-0389, Grapevine, TX, Jan 9-13, 2017.
- Hornedo, E.A., Bohan, B.T., Cottle, A.E., Schmiedel, C., Polanka, M.D., and Goss, L.P. "Design Strategy for Product Migration from a Circumferential Combustion Cavity," AIAA-2017-0390, Grapevine, TX, Jan 9-13, 2017.
- Bohan, B.T., and Polanka, M.D., "Development and Testing of a Variable Geometry Diffuser in an Ultra-Compact Combustor," AIAA SciTech Conference, AIAA-2017-0777, Grapevine, TX, Jan 9-13, 2017.
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- Vorgert, C.J., Ashby, R.W., Schmiedel, C., Polanka, M.D., Rutledge, J.L., "Relating Film Cooling Performance at Ambient and Near Engine Temperatures," AIAA SciTech Conference, AIAA-2017-1280, Grapevine, TX, Jan 9-13, 2017.
- Meyer, S.J., Polanka, M.D., Schauer, F.R., Anthony, R.J., Stevens, C., Hoke, J.L. and Rein, K., "Experimental Characterization of Heat Transfer Coefficients in a Rotating Detonation Engine," AIAA SciTech Conference, AIAA-2017-1285, Grapevine, TX, Jan 9-13, 2017.
- Lapp, K.P., Polanka, M.D., McClearn, M.J., Hoke, J.L., and Paxson, D.E., "Design and Testing of a Micro-Scale Wave Rotor System," AIAA Joint Propulsion Conference, AIAA-2017-5030, Atlanta, GA, Jul 10-12, 2017.
- Stegemann, B. J., Polanka, M.D., Naples, A.G., Hoke, J.L., Schauer, F.R., "Fuel Injection Requirements of a Rotating Detonation Engine," AIAA Joint Propulsion Conference, AIAA-2017-5061, Atlanta, GA, Jul 10-12, 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- Bohan, B.T., Polanka, M.D., Rutledge, J.L., "Computational Analysis of an Ultra Compact Combustor with Conjugate Heat Transfer," 42DCASS-078, Sinclair Community College, Dayton, OH, 1 Mar, 2017.
- Vorgert, C.J., Polanka, M.D., Rutledge, J.L., "Relating Film Cooling at Low and High Temperatures," 42DCASS-080, Sinclair Community College, Dayton, OH, 1 Mar, 2017.
- Bryant, C.E., Rutledge, J.L., Polanka, M.D., "Relative Contributions to Overall Effectiveness in Turbine Blade Leading Edge Cooling," 42DCASS-125, Sinclair Community College, Dayton, OH, 1 Mar, 2017.
- Meyer, S.J., Polanka, M.D., Schauer, F.R., Anthony, R.J. "Experimental Characterization of Heat Transfer Coefficients in a Rotating Detonation Engine," 42DCASS-117, Sinclair Community College, Dayton, OH, 1 Mar, 2017.
- Blantin, J.R., Polanka, M.D., Litke P.J., Baranski, J.A., "Power Loss Pathways and Energy Balance of Two Small Four-Stroke Internal Combustion Engines," 42DCASS-116, Sinclair Community College, Dayton, OH, 1 Mar, 2017.
- Stegemann, B.J., Polanka, M.D., "A Comparison of Liquid Jets in a Gaseous Crossflow," 42DCASS-147, Sinclair Community College, Dayton, OH, 1 Mar, 2017.
- Hornedo, E.A., Polanka, M.D., Bohan, B.T., Goss, L.P. "Temperature Distribution of the Exit Plane from an Ultra Compact Combustor," 42DCASS-156, Sinclair Community College, Dayton, OH, 1 Mar, 2017.

Polanka, M.D., “Rotating Detonation Engine Work at AFIT,” Invited Seminar, University of Texas at Austin, Austin, Texas, 29 Apr, 2017.

Polanka, M.D., “Heat Transfer with Combustors,” IGTI Tutorial, ASME Turbo Expo 2017, Charlotte, NC, 26 June, 2017.

INVENTION DISCLOSURES

Polanka, Marc D., Rutledge, James L., Crabtree, Brian, Pickle, Carl, Harkless, Christopher, “Reverse Wake Minimizing Wind Tunnel Wake Generator,” Filed 20 Dec 16, Air Force Docket No. ADF-1633.

REEDER, MARK F.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2002 (AFIT/ENY); BS, Mechanical Engineering, West Virginia University, 1989; MS, Mechanical Engineering, The Ohio State University, 1991; PhD, Mechanical Engineering, The Ohio State University, 1994. Prior to accepting a position with AFIT, Dr. Reeder served as an NRC Research Associate at NASA Glenn and subsequently as the manager of Research and Development for a manufacturer of industrial mixing equipment. Dr. Reeder’s research interests include all aspects of fluid mechanics with an emphasis on experimental applications involving external aerodynamics, mixing enhancement, and propulsion. Publications include characterizations of store separation from a cavity using pressure sensitive paint and measurements relating to several types of aircraft using 6-DOF balances, particle image velocimetry, filtered Rayleigh scattering, and other diagnostic tools. He has also recently published in the area of low temperature ablation in a supersonic flow as applied to thermal management systems for space access vehicles. Dr. Reeder has been published in a variety of journals including Experiments in Fluids, Journal of Fluid Mechanics, The AIAA Journal, The AIAA Journal of Propulsion and Power, AIAA Journal of Aircraft, the AIAA Journal of Spacecraft and Rockets, Physics of Fluids, NASA Tech Briefs, the AIChE Journal, and Chemical Engineering Progress. He also has four patents to his credit, is a licensed Professional Engineer in the State of Ohio, and is an elected member of the Academy of Distinguished Alumni, Department of Mechanical and Aerospace Engineering, West Virginia University. Dr. Reeder currently serves as the editor-in-chief of the International Journal of Micro Air Vehicles. Dr. Reeder is an Associate Fellow of the AIAA and a member of ASME. Tel. 937-255-3636 x4530, email: Mark.Reeder@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Missile Development Concepts and Solutions.” Sponsor: Lockheed Martin. Funding: \$80,000 – Reeder 40%, Miller 40%, Crowe 20%.

“AFIT/ENY and AFRL/RQV Cooperative Research Agreement.” Sponsor: AFRL/RQ. Funding: \$29,000.

“‘Flight Testing’ in the AFIT Low Speed Wind Tunnel Using the MTA System.” Sponsor: AFRL/RW. Funding: \$65,000 – Reeder 50%, Cobb 50%.

“Drop Testing in the AFIT Small Supersonic Tunnel with Ejection Mechanism.” Sponsor: AFRL/RQ. Funding: \$30,000 – Reeder 80%, Crowe 20%.

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Probst, Z., Reeder, M.F., Johnson, R., and Grove J., “Flight-Test Experiments on Cavity Flow in an SUU- 41 Pod,” *Journal of Aircraft*, Vol. 54, No. 5, September 2017, pp. 1814-1824.

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Seney, S.D., Huffman, R.E., Bailey, W., Liu, D., Reeder, M.F., and Stults, J. "Improving Performance of a Sliding Dielectric Barrier Discharge Actuator Using Multiple Potentials," *AIAA Journal*, Vol. 54 (10), October 2016, pp. 3316-3319.

RUGGLES-WRENN, MARINA B.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2003 (AFIT/ENY); BS, Polytechnic Institute of New York, 1981; MS, Rensselaer Polytechnic Institute, 1983; PhD, Rensselaer Polytechnic Institute, 1987. Dr. Ruggles-Wrenn's interests center on mechanics of materials and structures, including experimental investigation of material behavior in extreme environments, advanced structural materials, high-temperature structural design methods, and viscoplasticity. Dr. Ruggles-Wrenn has published over 140 peer reviewed scientific publications. Dr. Ruggles-Wrenn received several research and best paper awards; Stinson Trophy of the National Aeronautic Association, Col Gage H. Crocker Outstanding Professor Award, as well as the AFIT Instructor of the Quarter Award. Prior to joining AFIT, Dr. Ruggles-Wrenn was a research scientist at the Oak Ridge National Laboratory (1987-2003). Dr. Ruggles-Wrenn is a member of the Editorial Board of Applied Composite Materials and an Associate Technical Editor of the ASME Journal of Pressure Vessel Technology. Dr. Ruggles-Wrenn is a Fellow of the American Society of Mechanical Engineers (ASME) and a member of the American Ceramic Society. She is the Chair of the ASME Pressure Vessels and Piping Division. Tel. 937-255-3636 x4641, email: Marina.Ruggles-Wrenn@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Creep Deformation and Durability of Ultra High Temperature Ceramics in Extreme Environments." Sponsor: AFOSR. Funding: \$55,000.

"Mechanical Properties and Fatigue Behavior of Carbon Fiber Reinforced Inorganic Polymer Matrix Composites." Sponsor: AFRL/RQ. Funding: \$24,999.

"Effect of Film Cooling Holes on Damage Progression of CMCs." Sponsor: AFRL/RX. Funding: \$7,500.

REFEREED JOURNAL PUBLICATIONS

S. J. Robertson, K. B. Sprinkle, M. B. Ruggles-Wrenn, "Facility for testing SiC fiber tows at elevated temperature in silicic acid-saturated steam," *Ceramic Engineering and Science Proceedings*, Vol. 37, No. 2, 2017, pp. 95-107.

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S. J. Robertson, K. B. Sprinkle, M. B. Ruggles-Wrenn, "Testing SiC Fiber Tows At Elevated Temperature In Silicic Acid-Saturated Steam," GT2017-65247, *Proceedings of ASME Turbo Expo 2017*, Charlotte NC, June 15–19, 2017.

A. J. DeGregoria and M. B. Ruggles-Wrenn, "Compression Creep of HfB₂ and HfB₂-SiC at 1500°C in Argon; Effects of Grain Size and SiC Content," *Proceedings of the 41st International Conference & Exposition on Advanced Ceramics & Composites*, Daytona Beach FL, January 23-27, 2017.

M. W. Piper and M. B. Ruggles-Wrenn, "Creep of Hi-Nicalon™ S Fiber Tows at 700°C in Air and in Silicic Acid-Saturated Steam," *Proceedings of the 41st International Conference & Exposition on Advanced Ceramics & Composites*, Daytona Beach FL, January 23-27, 2017.

M. P. Wilkinson and M. B. Ruggles-Wrenn, "Mechanical Properties and Fatigue Behavior of 2D Woven PMC and Unitized Composite Airframe Structures at Elevated Temperature," IMECE2016-65763, *Proceedings of the ASME*

2016 International Mechanical Engineering Congress and Exposition IMECE 2016, Phoenix AZ, November 11-17, 2016.

M. B. Ruggles-Wrenn, "Mechanical Behavior of an Oxide-Oxide Ceramic Matrix Composite at Elevated Temperature in Air and in Steam," Proceedings of the MS&T'16, Materials Science & Technology 2016 Conference and Exhibition, Salt Lake City UT, October 23-27, 2016.

BOOKS AND CHAPTERS IN BOOKS

M. B. Ruggles-Wrenn, ed., Elsevier, 2017, Ceramic and Carbon Matrix Composites, Comprehensive Composite Materials II.

M. B. Ruggles-Wrenn and M. P. Wilkinson, *Fatigue of 2D and 3D Carbon-Fiber-Reinforced Polymer Matrix Composites and of a Unitized Polymer/Ceramic Matrix Composite at Elevated Temperature*, The Structural Integrity of Carbon Fiber Composites. Fifty Years of Progress and Achievement of the Science, Development, and Applications, P. W. R. Beaumont and C. Soutis, eds., Springer, 2017, pp. 873-907.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board Member, Applied Composite Materials – International Journal for the Science and Application of composite Materials

Associate Technical Editor, ASME Journal of Pressure Vessel Technology

RUTLEDGE, JAMES L., Maj,

Associate Professor of Aerospace Engineering; Department of Aeronautics and Astronautics, AFIT Appointment Date: 2011 (AFIT/ENY); BS, Mechanical Engineering, University of Texas at Austin, 2002; MS, Mechanical Engineering, University of Texas at Austin, 2004; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2009. Lt Col Rutledge's research interests include experimental and computational investigations of gas turbine heat transfer, unsteady fluid mechanics, inverse heat transfer and aerothermodynamics. He holds a patent, has published over 20 archival journal articles and was awarded the Rohsenow Prize in 2008 by ASME. Lt Col Rutledge is a member of the ASME K-14 Gas Turbine Heat Transfer Committee, ASME, AIAA, and Tau Beta Pi. He is a registered professional engineer in the State of Texas and has deployed to Afghanistan in support of Operation Enduring Freedom. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4734, email: James.Rutledge@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Film Cooling Data Scaling From Experimental to Engine Conditions." Sponsor: AFRL/RQ. Funding: \$48,393 – Rutledge 90%, Polanka 10%.

REFEREED JOURNAL PUBLICATIONS

Rutledge, J.L., Polanka, M.D., Greiner, N.J., 2017, "Computational Fluid Dynamics Evaluations of Film Cooling Flow Scaling Between Engine and Experimental Conditions," *Journal of Turbomachinery*, Vol. 139, No. 2, February, pp. 021004-1 – 021004-7.

Polanka, M.D., Rutledge, J.L., Bogard, D.G., and Anthony, R.J., 2017, "Determination of Cooling Parameters for a High Speed, True Scale, Metallic Turbine Vane," *Journal of Turbomachinery*, Vol. 139, No. 1, January, pp. 011001-1 - 011001-9.

Shewhart, A.T., Lynch, A.J., Greiner, N.J., Polanka, M.D., Rutledge, J.L., "Mitigation of Heat Release from Film Cooling in Fuel-Rich Environments," *Journal of Propulsion and Power*, Vol. 32, No. 6, November-December 2016, pp. 1454 – 1461.

Greiner, N.J., Polanka, M.D., Rutledge, J.L., and Shewhart, A.T., “Effect of Variable Properties and Radiation on Convective Heat Transfer Measurements at Engine Conditions,” *Journal of Heat Transfer*, Vol. 138, No. 11, November 2016, pp. 112002-1 - 112002-8.

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Bohan, B.T., Polanka, M.D., Rutledge, J.L., 2017, “Computational Analysis of a Novel Cooling Scheme for Ultra Compact Combustor Turbine Vanes,” ASME Turbo Expo 2017, Charlotte, North Carolina, Paper No. GT2017-63319.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Vorgert, C.J., Ashby, R.W., Schmiedel, C., Polanka, M.D., Rutledge, J.L., 2017, “Relating Film Cooling Performance at Ambient and Near Engine Temperatures,” 55th AIAA Aerospace Sciences Meeting, Grapevine, Texas, Paper No. AIAA 2017-1280.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Rutledge, J.L., “Inverse Heat Transfer Applied to Unsteady Film Cooling Flows,” Department of Mechanical Engineering, University of Texas at Austin, Austin, Texas, 27 Mar 2017.

INVENTION DISCLOSURE

Polanka, Marc D., Rutledge, James L., Crabtree, Brian, Pickle, Carl, Harkless, Christopher, “Reverse Wake Minimizing Wind Tunnel Wake Generator,” Filed 20 Dec 16, Air Force Docket No. ADF-1633.

SWENSON, ERIC D.,

Associate Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2006 (AFIT/ENY); BS, Civil Engineering, The Ohio State University, 1993; MS, Astronautical Engineering, Air Force Institute of Technology, 1998; PhD, Aerospace Engineering, University at Texas at Austin, 2006. Dr. Swenson is a retired Lt Col in the Air Force whose more than 25 years of service includes experience as an Astronautical Engineering Professor, Titan Launch Pad Engineer, Civil Engineer, and a Nuclear Measurements Technician. More recently, he has been a key player in AFIT’s recent expansion in space-related experimental research, including the development of 6U CubeSats, a satellite attitude simulator called SimSat, and various other space experiments. His previous research focused on solving multi-million degree of freedom finite element models with viscoelastic materials, satellite design and test, damage detection techniques, and system identification through optimization. He is a Technical Area Editor for the Journal of Small Spacecraft, and he is a member of Chi Epsilon, SPIE, Tau Beta Pi, and AIAA. AFIT research center affiliation(s): CSRA.

SPONSOR FUNDED RESEARCH PROJECTS

“Program Analyst for Integrated Air and Missile Defense.” Sponsor: MDA. Funding: \$173,559. [CSRA]

“Hybrid Flex Circuit Testing.” Sponsor: AFRL/RX. Funding: \$15,000 – Swenson 50%, Hartsfield 50%. [CSRA]

“Geoperceive.” Sponsor: Undisclosed. Funding: \$99,000 – Swenson 25%, Hartsfield 25%, Cobb 25%, Fuller 25%. [CSRA]

“Geoscan.” Sponsor: Undisclosed. Funding: \$98,000 – Swenson 25%, Hartsfield 25%, Cobb 25%, Fuller 25%. [CSRA]

THOMAS, LEVI M., Maj,

Associate Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2017 (AFIT/ENY); BS, Aeronautical Engineering, United States Air Force Academy, 2006; MS, Aeronautical Engineering Air Force Institute of Technology, 2009; AA, Foreign Language, Defense Language Institute, 2011; PhD, Mechanical Engineering, Purdue University, 2017. Maj Thomas' research interests include laser measurement techniques and combustion. He has experience as an intelligence analyst in foreign air-to-air weapon systems, as a combustion research engineer testing detonation combustors, and as an exchange officer working with the German Aerospace Center. Previous research included laser-based velocity measurements in the "Ultra-Compact Combustor," and high-speed temperature measurements in spray combustion using coherent anti-Stokes Raman scattering spectroscopy. Maj Thomas is a member of AIAA and the Combustion Institute, and is a registered professional engineer in the state of Colorado. Tel. 937-255-3636 x4500, email: Levi.Thomas@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Thomas, L.M., Lowe, A., Satija, A., Masri, A., and Lucht, R.P., "Femtosecond Chirped-Probe-Pulse Coherent Anti-Stokes Raman Scattering Thermometry in a Piloted Spray Burner," 10th US National Combustion Meeting, April 2017.

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Thomas, L.M., *Combustion measurements using Femtosecond Chirped-Probe-Pulse Coherent Anti-Stokes Raman Scattering*, PhD dissertation, Purdue University, West Lafayette, Indiana, July 2017.

TORVIK, PETER J.,

Professor Emeritus of Aerospace Engineering and Engineering Mechanics, Department of Aeronautics and Astronautics, (AFIT/ENY); BS, University of Minnesota, 1960; MS, University of Minnesota, 1962; PhD, University of Minnesota, 1965; BA, Wright State University, 1980. Professor Torvik is a specialist in theory of elasticity, wave propagation, shock and vibration, impact damage in aircraft systems, laser-material interactions, and aircraft survivability/vulnerability. His primary research interests include structural dynamics, specifically damping, impact, and penetration mechanics. Dr. Torvik is the author of over 100 technical papers and reports and some 30 other publications. He served as Head of the Department of Aeronautics and Astronautics, 1980-1990. He is the recipient of the AF Meritorious Civilian Service Award, the AF Exceptional Civilian Service Award, the Outstanding Civilian Career Service Award, USAF, and the John Leland Atwood Award and Medal, AIAA and ASME. Dr. Torvik is a Fellow of AIAA, a Fellow of the ASME, and a Fellow of Ohio Academy of Science.

WIESEL, WILLIAM E., Jr.,

Professor of Astronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1977 (AFIT/ENY); BS, University of Massachusetts, 1970; MS, Harvard University, 1972; PhD, Harvard University, 1974. Dr. Wiesel's research interests include applications of dynamical systems theory to orbital mechanics and astrodynamics, especially KAM theory; estimation and control, planetary astronomy, stability theory, and optimal control. Dr. Wiesel is the author of *Spaceflight Dynamics*, a leading introductory text on astronautical engineering. He has authored over 50 technical papers and has been a member of the department for nearly 40 years. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4312, email: William.Wiesel@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Precision Onboard Orbit Determination." Sponsor: Undisclosed. Funding: \$120,000. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Wiesel, W. E., A Numerical, Literal, and Converged Perturbation Algorithm. *Journal of the Astronautical Sciences*, 2017, Vol. 64, pp. 251-266. [CSRA]

Wiesel, W. E., “Estimating Nongravitational Accelerations on High Area-to-Mass Ratio Objects,” *Journal of Guidance, Control and Dynamics*, Vol. 39, No. 6 (2016), pp. 1438-1443. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wiesel, W.E., “A KAM Tori Algorithm for Earth Satellite Orbits,” paper AAS 17-553, AAS/AIAA Astrodynamics Specialist Conference, Aug 20-24, 2017. [CSRA]

Adam T. Rich, Kenneth J. Stuart, and William E. Wiesel, “Stochastic Dynamics of and Collision Prediction for Low Altitude Earth Satellites,” paper AAS 17-582, accepted for the AAS/AIAA Astrodynamics Specialist Conference, Aug 20-24, 2017. [CSRA]

5.2. DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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5.2.1. DOCTORAL DISSERTATIONS

BADENHOP, CHRISTOPHER W., *A Multifaceted Security Evaluation of Z-Wave, a Proprietary Implementation of the Internet of Things*. AFIT/ENG/DS/17J-074. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RV. [CCR]

CADY, CAMDON J., *A Tree Locality-Sensitive Hash for Secure Software Testing*. AFIT/ENG/DS/17S-005. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

CLIMER, JONATHON R., *Dynamic Prototype Addition in Generalized Learning Vector Quantizers*. AFIT/ENG/DS/17S-009. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

COMPTON, ANDREW JM., *A Location-Aware Middleware Framework for Collaborative Visual Information Discovery and Retrieval*. AFIT/ENG/DS/17S-010. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: N/A. [ANT/CCR]

DEPPENSMITH, RANDALL D., *Integrated Circuit Wear-out Prediction and Recycling Detection using Radio-Frequency Distinct Native Attribute Features*. AFIT/ENG/DS/16D-002. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV.

LAURVICK, TOD V., *Improvements to Micro-Contact Performance and Reliability*. AFIT/ENG/DS/16D-003. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

LEWIS, TYRONE A.L., *Biologically Inspired Network (BiONet) Authentication using Logical and Pathological RF-DNA Credential Pairs*. AFIT/ENG/DS/17S-012. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]

LIEFER, NATHANIEL C., *Application of Radio Frequency Distinct Native Attribute Fingerprinting to Commercial Push-to-Talk (PTT) Radios*. AFIT/ENG/DS/17S-013. Faculty Advisor: Dr. Michael A. Temple. Sponsor: N/A. [CCR]

LOPEZ, JR., JUAN, *Enhanced Industrial Control System (ICS) and Supervisory Control and Data Acquisition (SCADA) Security for ISA99 Level-0 using Field Device Wired Signal Distinct Native Attributes (WS-DNA) Fingerprints*. AFIT/ENG/DS/16D-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: DHS. [ANT/CCR]

MILLAR, JEREMY R., *A Stochastic Model of Plausibility in Live-Virtual-Constructive Environments*. AFIT/ENG/DS/17S-015. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A. [CCR]

RICE, JOHN C., *RF-DNA Aided Ambiguity Resolution in a Dual Process Electronic Warfare Receiver*. AFIT/ENG/DS/16D-001. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RV. [CCR]

SATTLER, JAMES, *Engineered Surfaces to Control Secondary Electron Yield for Multipactor Suppression*. AFIT/ENG/DS/17S-018. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A. [CSRA]

5.2.2. MASTER'S THESES

AUST, MATTHEW E., *Proactive Host Mutation in Software-Defined Networking*. AFIT/ENG/MS/17M-003. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

BECHERER, NICHOLAS C., *Transfer Learning in Convolutional Neural Networks for Fine-Grained Image Classification*. AFIT/ENG/MS/17M-005. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RQ. [ANT]

BENTLEY, MICHAEL J., *Enabling Air Force Satellite Ground System Automation through Software Engineering*. AFIT/ENG/MS/17M-006. Faculty Advisor: Maj Alan C. Lin. Sponsor: SMC. [CCR/CSRA]

BLACH, NOAH T., *Energy Harvesting with Micro Machines*. AFIT/ENG/MS/17M-007. Faculty Advisor: Capt Robert. A. Lake. Sponsor: N/A.

BUSHO, COLIN R., *Tactical Targeting Network Technology (TTNT) Device Discrimination using Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting*. AFIT/ENG/MS/17M-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV. [CCR]

CABERTO, EDDIE K., *Securing Controller Area Networks in Vehicles via Packet Switched Network Segregation*. AFIT/ENG/MS/17M-009. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]

CARSON, DANIEL J., *Aerial Visual-Inertial Odometry Performance Evaluation*. AFIT/ENG/MS/17M-010. Faculty Advisor: Dr. John F. Raquet. Sponsor: Lockheed Martin. [ANT]

CHAMBERLAIN, CHAD N., *Genetic Algorithm Receiver Optimization for Passive, Bi-static Synthetic Aperture Radar*. AFIT/ENG/MS/17S-007. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: N/A.

CHAPPELL, RICHARD E., *A Game Theory Model for Allocating Scarce Resources in Critical Infrastructure Protection*. AFIT/ENG/MS/17M-012. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]

CHAVES, ANDREW J., *Increasing Cyber Resiliency of Industrial Control Systems*. AFIT/ENG/MS/17M-013. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

CHOATE, JEFFREY L., *Extending AFSIM with Behavioral Emergence*. AFIT/ENG/MS/17M-014. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/RQ.

COATES, SEAN, *An Investigation of the Homicidal Chauffeur Differential Game*. AFIT/ENG/MS/17M-015. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/RW. [ANT]

COLLIS, SCHUYLER, *GPS Spoof Detection via Receiver Statistical Signal Processing*. AFIT/ENG/MS/17M-016. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT]

COON, CAMERON W., *Comparative Analysis of RF Emission Based Fingerprinting Techniques for ZigBee Device Classification*. AFIT/ENG/MS/17M-017. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]

COOPER, KEVIN S., *Process Categorization using Tree Edit Distance*. AFIT/ENG/MS/17M-018. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

COOPER, MATTHEW A., *Converting a 2D Scanning LiDAR to a 3D System for use on Quad-Rotor UAVs in Autonomous Navigation*. AFIT/ENG/MS/17M-019. Faculty Advisor: Dr. John. F. Raquet. Sponsor: AFRL/RW. [ANT]

DAOUD, JOSEPH K., *Multi-PLC Exercise Environments for Training ICS First Responders*. AFIT/ENG/MS/17M-020. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

DAY, JOSHUA A., *Signature Analysis, Basis Editing, and Reconstruction (SABER) Tool Study*. AFIT/ENG/MS/17M-022. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 704 TG.

DAZZIO, ELAINE L., *Statistically Modeling Fuel Consumption with Heteroscedastic Data*. AFIT/ENG/MS/17J-075. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A. [CCR]

EMMONS, STEPHEN T., *Application of the Modal Method and Response Surface Analysis to X-Band and Ka-Band Cavity Scattering Problems*. AFIT/ENG/MS/17M-025. Faculty Advisor: Maj Michael D. Seal. Sponsor: AFRL/RV.

ERSTEIN, ELLIOT R., *Experimental Validation of a Heterogeneous Radar Clutter Statistical Estimation Method*. AFIT/ENG/MS/17M-026. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/RV.

FAIN, BENJAMIN M., *Small Fixed-wing Aerial Positioning using Inter-vehicle Ranging Combined with Visual Odometry*. AFIT/ENG/MS/17M-027. Faculty Advisor: Dr. John. F. Raquet. Sponsor: AFRL/RW. [ANT]

FOGARTY, BENJAMIN I., *Single Layer Permittivity Extraction from Multilayered Biaxial Anisotropic Media using a Rectangular Waveguide*. AFIT/ENG/MS/17M-028. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/RV.

GALLENSTEIN, JUSTIN K., *Integration of the Network and Application Layers of Automatically Configured Programmable Logic Controller Honey Pots*. AFIT/ENG/MS/17M-029. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

GARNICK, CHRISTOPHER J., *A Study of Human Reliance on Imperfect Automation*. AFIT/ENG/MS/17M-030. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: AFOSR. [ANT]

GOOD, RYAN A., *AutoProv: An Automated File Provenance Collection Tool*. AFIT/ENG/MS/17M-031. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DC3. [CCR]

GOODGION, JONATHON S., *Active Response using Host-Based Intrusion Detection System and Software-Defined Networking*. AFIT/ENG/MS/17M-032. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

GUERRERO, JUSTIN, *GNSS Receiver Front-End Component Characterization for High Fidelity Signal Deformation Monitoring Applications*. AFIT/ENG/MS/17M-033. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: N/A. [ANT]

GUTIÉRREZ DEL ARROYO, JOSÉ A., *Enhancing Critical Infrastructure Security using Bluetooth Low Energy Traffic Sniffers*. AFIT/ENG/MS/17M-034. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: DHS. [ANT/CCR]

JACKSON, PHILIP C., *Performance Evaluation of Astro-Optical-Inertial Navigation System*. AFIT/ENG/MS/17M-035. Faculty Advisor: Dr. John. F. Raquet. Sponsor: CSDL. [ANT]

JOHNSON, DANIEL T., *Combined Stereo Vision and Inertial Navigation for Automated Aerial Refueling*. AFIT/ENG/MS/17M-036. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

JONES, ANDREW M., *Investigations Into Near Infrared Sensitive Solar Cells*. AFIT/ENG/MS/17M-037. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

KAVAL, WILLIAM G., *Electrostrictive Polymers for Mechanical to Electrical Energy Harvesting*. AFIT/ENG/MS/17M-038. Faculty Advisor: Capt Robert A. Lake. Sponsor: AFRL/RV.

KHOU, STEPHEN, *A Framework for Understanding, Prioritizing, and Applying Systems Security Engineering Processes, Activities, and Tasks*. AFIT/ENG/MS/17M-039. Faculty Advisor: Maj Logan O. Mailloux. Sponsor: AFRL/RI. [CCR]

KIM, MARK S., *Celestial Aided Inertial Navigation by Tracking High Altitude Vehicles*. AFIT/ENG/MS/17M-040. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: AFRL/RW. [ANT]

KIRK, JORDAN T., *Multi-Hypothesis Test Detection for Star Tracking Systems*. AFIT/ENG/MS/17M-041. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A. [CSRA]

KNISELY, ANDREW J., *Design and Development of a Unique Two-Way Field Probe System using a Shielded Octocopter*. AFIT/ENG/MS/17M-042. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 704 TG.

LEDFORD, MICHAEL J., *Development of a Software-Defined GNSS Simulation Prototype for Advanced Signals Research*. AFIT/ENG/MS/17M-043. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV. [ANT]

LEFGREN, SCOTT, *Classification of Matched Filtered Replicated Signals in Interference using Radio Frequency Distinct Native Attributes*. AFIT/ENG/MS/17M-044. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT]

LESCH, NOAH C., *A Software Framework for Image Retrieval and Visual Understanding in Dynamic and Sensor Rich Environments*. AFIT/ENG/MS/17M-045. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RI.

LIN, HTEIN A., *Framework for Industrial Control System HoneyPot Network Traffic Generation*. AFIT/ENG/MS/17M-046. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

LUGO, DANIEL, *A Sandbox in Which to Learn and Develop Soar Agents*. AFIT/ENG/MS/17M-047. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A. [CCR]

MASH, ROBERT L., *Toward Automated Aerial Refueling: Automated Visual Aircraft Identification with Convolutional Neural Networks*. AFIT/ENG/MS/17M-048. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RQ. [ANT]

MAYS, CALEB E., *Constructing HoneyPots to Defend Building Automation Systems*. AFIT/ENG/MS/17M-049. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

MCCARGAR, ELWYN J., *Synchronization Algorithms for Programmable Logic Controller Emulation*. AFIT/ENG/MS/17M-050. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

MCKINION, ERIC M., *Evaluation of Security Flaws in the Current Probe Request Design and Proposed Solutions*. AFIT/ENG/MS/17M-051. Faculty Advisor: Maj Alan C. Lin. Sponsor: 711 HPW/RH. [CCR]

MCMURRY, RICHARD R., *Improving Space Object Detection for Ground Telescopes with Poisson Distribution Statistics*. AFIT/ENG/MS/17M-052. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A. [CSRA]

MEYER, TIMOTHY R., *Small-muscle Movement and Its Effect on Cognitive Functions*. AFIT/ENG/MS/17M-053. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: AFOSR.

O'NEILL, SEAN P., *Radio Frequency-Based Device Discrimination of Mixed-Signal Integrated Circuits and Counterfeit Detection*. AFIT/ENG/MS/17M-055. Faculty Advisor: Maj Joan A. Betances. Sponsor: AFRL/RY. [CCR]

ORTIZ, ROSEMBERG, *Scouting in Real-Time Strategy Games: Theory, Methods and Implementation*. AFIT/ENG/MS/17M-056. Faculty Advisor: Dr. Gary. B. Lamont. Sponsor: N/A.

PARSONS, CHRISTOPHER A., *Improving Automated Aerial Refueling Stereo Vision Pose Estimation using a Shelled Reference Model*. AFIT/ENG/MS/17M-057. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ. [ANT]

PETREE, OLIVER W., *On the Application of FLO_K and PPTE to Extract the Permittivity and Permeability Tensors of Split Ring Resonator Structures*. AFIT/ENG/MS/17M-058. Faculty Advisor: Maj Michael D. Seal. Sponsor: N/A.

PLUMLEY, EVAN G., *A Framework for Categorization of Industrial Control System Cyber Training Environments*. AFIT/ENG/MS/17M-059. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

PORTANTE, ANTHONY A., *Analysis of Denial-of-Service Attack Vectors in Software-Defined Networks*. AFIT/ENG/MS/17M-060. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

POST, CASSANDRA R., *Towards Automation of Tipping and Cueing between Small Satellites in a Constellation*. AFIT/ENG/MS/17M-061. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: NPS.

POTTHOFF, TRAVIS S., *A Proof-Of-Concept for Software-Only Attestation on Real-Time Systems using Von Neumann Architecture and Dynamic Memory Allocation*. AFIT/ENG/MS/17M-062. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RV. [CCR]

REBER, PATRICK A., *A Comprehensive Security Analysis of and an Implementation Framework for Embedded Software Attestation Methods Leveraging FPGA-Based System-On-A-Chip Architectures*. AFIT/ENG/MS/17M-063. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/RV. [CCR]

RENNICH, TRAVIS B., *Low Probability of Detection Communication using Inverse Beamforming in GNU Radio using Code Division Multiple Access*. AFIT/ENG/MS/17M-064. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV.

RICHARDSON, DANIEL P., *Cloud Benchmark Testing of Cassandra on Raspberry Pi for Internet of Things Capability*. AFIT/ENG/MS/17M-065. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RI.

ROSE, ANTHONY J., *Security Evaluation and Exploitation of Bluetooth Low Energy Devices*. AFIT/ENG/MS/17M-066. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

ROSS, BRADY P., *Physical-Layer Identification of Power Line Communications using WS-DNA Fingerprinting*. AFIT/ENG/MS/17M-067. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/RV. [CCR]

SCIACCA, JOSEPH R., *AFIT's Random Noise Radar Characterization*. AFIT/ENG/MS/17M-068. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A.

SIBIGA, MATTHEW P., *Applying Cyber Threat Intelligence to Industrial Control Systems*. AFIT/ENG/MS/17M-069. Faculty Advisor: Dr. Robert F. Mills. Sponsor: DHS. [CCR]

SMITH, DAVID A., *Satellite Communications in the V and W Band: Natural and Artificial Scintillation Effects*. AFIT/ENG/MS/17M-070. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFRL/RI. [CSRA]

SPULLER, JAKE M., *Analysis of How Communication Affects Human Teams in a Dynamic Game*. AFIT/ENG/MS/17M-071. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: AFOSR. [ANT]

STINE, IAN W., *A Cyber Risk Scoring System for Medical Devices*. AFIT/ENG/MS/17M-072. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS. [CCR]

STROM, ALEX R., *Correction of Stair Mode for an Optical Phased Array using an ArrayTilt Estimator*. AFIT/ENG/MS/17M-073. Faculty Advisor: Lt Col Milo W. Hyde. Sponsor: AFRL/RV.

TALBOT, CHRISTOPHER M., *Securing Insteon Home Automation Networks using Slope-Based FSK (SB-FSK) Fingerprinting*. AFIT/ENG/MS/17M-074. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV. [CCR]

UMODU, KEBIN, *Hypergame Analysis of Cyber Systems*. AFIT/ENG/MS/17M-075. Faculty Advisor: Dr. Gary. B. Lamont. Sponsor: N/A.

VAN PATTEN, DONALD A., *Prototyping Modern Web Technologies and Lambda Architecture Concepts to Facilitate Collection, Analysis, and Presentation of UAS Log Data*. AFIT/ENG/MS/17M-076. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/RV. [CCR]

VAUGHN, ALTON M., *MIL-STD-1553 Fingerprinting using Wired Signal Distinct Native Attributes*. AFIT/ENG/MS/17M-077. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/RV. [CCR]

WEATHERS, DAVID L., *Sound Based Positioning*. AFIT/ENG/MS/17M-081. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/RV. [ANT]

WIREMAN, MARK J., *Signal Deformation Analysis of the GLONASS Constellation using Chip Shape Processing*. AFIT/ENG/MS/17M-082. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: AFRL/RY. [ANT]

YANTERI, ERHAN E., *Analysis of Small Muscle Movement Effects on EEG Signals*. AFIT/ENG/MS/16D-051. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: AFOSR.

YERKES, BLAKE E., *Cyber Security Analysis and Strategy Development for Software-Defined Radars*. AFIT/ENG/MS/17M-083. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

YIELDING, NICHOLAS J., *Statistically Applied Non-Uniformity Correction*. AFIT/ENG/MS/17M-084. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

ZIMMERMAN, NICOLAS H., *The Effects of Multi-static Processing and Autofocusing on an Experimental Passive Synthetic Aperture Radar Imaging System*. AFIT/ENG/MS/17M-085. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/RY.

5.2.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BETANCES, JOAN A., Maj,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BSEE, Walla Walla University, 2003; MS, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2016. Maj Betances' research interests include software-defined radios, cognitive radios, and wireless security. He is a member of Eta Kappa Nu and Tau Beta Pi honor societies. AFIT research center affiliation(s): ANT and CSRA. Tel. 937-255-3636 x3305, email: Joan.Betancesjorge@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Cyber Secure CONOPS for On-Orbit Reprogramming of a Software Defined Radio.” Sponsor: AFRL/RV. Funding: \$40,500. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

S. O'Neill, A. Betances, S. Stone and R. Baldwin, “Comparison of Various Discrimination Techniques on Counterfeit Mixed-Signal Integrated Circuits,” in International Conference on Cyber Warfare and Security (ICWS), Dayton OH, Mar 2017.

BINDEWALD, JASON M., Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BA, Computer Science, Gettysburg College, 2005; MS, Cyber Operations, Air Force Institute of Technology, 2015; PhD, Computer Science, Air Force Institute of Technology, 2015. Maj Bindewald's research interests include human-machine teaming, machine learning, autonomous agents, and player modeling. He is a member of AAI, HFES, and Tau Beta Pi engineering honorary society. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4614, email: Jason.Bindewald@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Measuring Human-Machine Trust Relationships.” Sponsor: AFOSR. Funding: \$29,415 – Bindewald 55%, Rusnock 45%. [ANT]

“Cyber Operations and Behavior Modeling in AFSIM.” Sponsor: AF/A9. Funding: \$59,000 – Bindewald 34%, Hodson 33%, Peterson 33%. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, Jason M., Gilbert L. Peterson, Michael E. Miller. “Clustering-Based Online Player Modeling.” International Joint Conference on Artificial Intelligence (IJCAI) – Computer Games Workshop. New York, NY, 2016. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Gutierrez del Arroyo, Jose A., Jason M. Bindewald, Benjamin W. Ramsey. “Securing Bluetooth Low Energy Enabled Industrial Monitors,” 12th International Conference on Cyber Warfare and Security (ICWS 2017), Dayton, OH, March 2017. [CCR]

Rose, Anthony J., Jose A. Gutierrez del Arroyo, Jason M. Bindewald, and Benjamin W. Ramsey. “BlueFinder: A Range-finding Tool for Bluetooth Classic and Low Energy,” 12th International Conference on Cyber Warfare and Security (ICWS 2017), Dayton, OH, March 2017. [CCR]

BORGHETTI, BRETT J.,

Associate Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 2008 (AFIT/ENG); BSEE, Worcester Polytechnic Institute, 1992; MSCS, Air Force Institute of Technology, 1996; PhD, Computer Science, University of Minnesota, 2006. Dr. Borghetti's research interests include machine learning, autonomous agents, and multi-agent systems. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4612, email: Brett.Borghetti@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Modeling Decision Confidence to Improve Cyber Mission Effectiveness." Sponsor: 711 HPW. Funding: \$27,089. [CCR]

REFEREED JOURNAL PUBLICATIONS

Hefron, Ryan G., Borghetti, Brett, J., Christensen, James C. Schubert Kabban, Christine M. "Deep long short-term memory structure model temporal dependencies improving cognitive workload estimation," *Pattern Recognition Letters* (IEEE), Vol. 94, 15 July 2017, pp. 96-104. [ANT]

Borghetti, B.J., Giametta, J.J., & Rusnock, C.F., "Assessing Continuous Operator Workload with a Hybrid Scaffolded Neuroergonomic Modeling Approach," *Human Factors*, Vol. 59, No. 1, Feb 2017, pp. 134-146. doi: 10.1177/0018720816672308. [ANT]

Rusnock, C.F., and Borghetti, B.J., "Workload Profiles: A continuous Measure of Mental workload," *International Journal of Industrial Ergonomics*, (In Press / available online, 2016). [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hefron, R.G., Borghetti, B.J. "A New Feature for Cross-day Psychophysiological Workload Estimation," 15th IEEE International Conference on Machine Learning and Applications (ICMLA'16), December 18-20, 2016, Anaheim, California, USA. [ANT]

Mash, R.L., Borghetti, B.J., Pecarina, J.M., "Improved Aircraft Recognition for Aerial Refueling through Data Augmentation in convolutional Neural Networks," *Proceedings of the 12th International Symposium on visual Computing* (ISVC'16), December 12-14, 2016, Las Vegas, Nevada, USA. [ANT]

BROWN, FRANK M.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1961 (AFIT/ENG); BS, MS, PhD, The Ohio State University. Dr. Brown's research interests are discrete mathematics and operations research.

CAIN, STEPHEN C.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2003 (AFIT/ENG); BSEE, University of Notre Dame, 1992; MSEE, Michigan Technological University, 1994; PhD, University of Dayton, 2001. Dr. Cain's research interests include electro-optics, remote sensing, and signal processing. Tel. 937-255-3636 x4716, email: Stephen.Cain@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Improved Resident Space Object Detection via Atmospheric Scintillation Effects." Sponsor: AFOSR. Funding: \$42,136 – Cain 50%, Vitayaudom 50%.

"Solid State Batteries with Doped Silicon Electrolyte." Sponsor: AFOSR. Funding: \$19,980.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

D. Becker and S. Cain, “A Space Object Detection Algorithm Using Fourier Domain Likelihood Ratio Test,” AMOS technical conference, Maui, HI September 19-22, 2017.

PATENT APPLICATIONS

Cain, Stephen C., Seal, Michael D., “Statistically applied Non-Uniformity Correction (SANUC),” Air Force Docket No. AFD-1753P, US Serial No. 62/560,249.

INVENTION DISCLOSURES

Cain, Stephen C., Seal, Michael D., Yielding, Nicholas J., Catarius, Adroam, “Statistically applied Non-Uniformity Correction (SANUC), filed 28 Aug 17, Air Force Docket No. ADF-1753.

CANCIANI, AARON J., Capt,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BSEE, Air Force Academy, 2010; MSEE, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2016. Capt Canciani’s research interests include GPS-alternative navigation systems using environmental signals. He is a member of The Institute of Navigation (ION). AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4618, email: Aaron.Canciani@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Magnetic Anomaly Navigation for Naval Platforms.” Sponsor: ONR. Funding: \$250,000. [ANT]

“Cooperative Navigation and Magnetic/Vision Navigation Approaches.” Sponsor: AFRL/RW. Funding: \$100,000 – Canciani 80%, Raquet 20%. [ANT]

REFEREED JOURNAL PUBLICATIONS

Canciani, A.J., J. Raquet, “Airborne Magnetic Anomaly Navigation,” *IEEE Transactions on Aerospace and Electronics Systems*, Vol. 53, No. 1, February 2017. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Canciani, A.J., K. Brink, “Improved Magnetic Anomaly Navigation through Cooperative Navigation,” *ION Pacific Navigation and Timekeeping Conference*. Honolulu, Hawaii, May 2017. [ANT]

CARBINO, TIMOTHY J., Maj,

Electrical Engineering Division Chief, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BSCE, University of Florida, 2006; MSEE, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2015. Maj Carbino’s research interests include critical infrastructure protection, computer communication networks, computer security, side channel analysis, reconfigurable computing systems, Radio Frequency Intelligence, and VLSI design. He is a member of the Eta Kappa Nu and IEEE. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x4220, email: Timothy.Carbino@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ross, Brady P., Carbino, Timothy J., and Temple, Michael A., “Simulcasted Power Line Communication Network (SPN) Configuration Validation for Home Automation Applications Using Wired Signal Distinct Native Attributes (WS-DNA) Fingerprinting,” *Journal of Information Warfare* 16.3 (2017): 95-118. Print. [CCR]

Ross, Brady P., Carbino, Timothy J., Stone, Samuel J., “Physical-Layer Discrimination of Power Line Communications,” 12th Int’l Conference on Computers, Networking and Communications (ICNC17), Jan 17, Silicon Valley CA. [CCR]

Ross, Brady P., Carbino, Timothy J., Temple, Michael A., “Physical-Layer Identification of Power Line Communications (PLC) Using Wired Signal Distinct Native Attribute (WS-DNA),” Int’l Conference on Cyber Warfare & Security (ICCWS14), Mar 17, Dayton OH. [CCR]

Talbot, Christopher M., Temple, Michael A., Carbino, Timothy J., “Securing Insteon Home Automation Systems Using Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprints,” Int’l Conference on Cyber Warfare & Security (ICCWS14), Mar 17, Dayton OH. [CCR]

CASEY, DANIEL J., Maj,

Instructor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS, Computer Science, United States Air Force Academy, 2006; MS, Computer Science, Southern Methodist University, 2009. Maj Casey’s research interests include software defined networking and reverse engineering. He is a member of Tau Beta Pi Engineering Honor Society. AFIT research center affiliation(s): CCR. Tel 937-255-3636 x4613, email: Daniel.Casey@afit.edu

CHANDRAHALIM, HENGKY,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2017 (AFIT/ENG); BSC, The Ohio State University, 2000; MEng, Cornell University, 2004; MSc, Cornell University, 2008; PhD, Electrical and Computer Engineering, Cornell University, 2009. Dr. Chandralalim’s research interests include mutually enhancing electronic, phononic, and photonic multifunctional microsystems, fabrication techniques for novel integrated nanosystems, and molecular scale sensing. Tel. 937-255-3636 x4483, email: Hengky.Chandralalim@afit.edu

COLLINS, PETER J.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2006 (AFIT/ENG); BA, Bethel College, MN, 1985; BSEE, University of Minnesota, 1985; MSEE, Air Force Institute of Technology, 1990; PhD, Air Force Institute of Technology, 1996. His research interests include low observables, computational electromagnetics, radar cross section metrology, remote sensing, and electromagnetic material design and analysis. He is a senior member of the IEEE. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x7256, email: Peter.Collins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Technical Support: RCS Metrology.” Sponsor: 46 TG. Funding: \$155,000.

“Technical Support: RCS Metrology (Amendment).” Sponsor: 704 TG. Funding: \$125,000.

“Enabling Technologies for Radar Scattering Measurements.” Sponsor: AFRL/RV. Funding: \$130,307.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Knisely, Andrew, Collins, Peter J., and A. J. Terzuoli, “High Frequency RCS Characterization of a Unique Two Way Field Probe,” *Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017)*, Firenze, IT, 26-30 March 2017. [ANT]

D Smith, P Collins, J Fee, J Petrosky, A Terzuoli, and C Yardim, “Artificial Ionospheric Scintillation Effects on Communication Signals in the V and W Bands,” *Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017)*, Firenze, IT, 26-30 March 2017. [CSRA]

D Smith, B Shelters, D Hesser, P Collins, J Fee, J Petrosky, A Terzuoli, C Yardim, “Effects of Ionospheric Scintillation on V and W Band Signals,” *Proceedings of the 2017 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI)*, San Diego, CA, 9-14 July 2017. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Knisely, Andrew and Collins, Peter J., “Utilizing A Shielded Drone As A Two-Way Field Probe At A Radar Cross Section Range,” The 38th Antenna Measurement Techniques Association Symposium, Austin, Texas, 30 October – 4 November 2016. [ANT]

Knisely, Alexander, Hyde, M., Havrilla, M., and Collins, Peter J., “Uniaxial Anisotropic Material Measurement using a Single Port Waveguide Probe,” The 38th Antenna Measurement Techniques Association Symposium, Austin, Texas, 30 October – 4 November 2016. [ANT]

CORBELL, PHILLIP M., Lt Col,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BSEE, Southern Illinois University, 1998; MSEE, Air Force Institute of Technology, 2000; PhD, Air Force Institute of Technology, 2006. Lt Col Corbell’s research interests include Electronic Warfare, Navigation Warfare, Waveform Diversity, Phased array, Adaptive, Cognitive, MIMO, multi-static MTI Radar architectures, Software Defined Radios and other disruptive technologies. He is a member of Tau Beta Pi, Eta Kappa Nu, Alpha Lambda Delta, and IEEE. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x4370, email: Phillip.Corbell@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Timing Testbed.” Sponsor: Undisclosed. Funding: \$200,000. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Scott Lefgren, Phillip Corbell, “Classification of Matched Filtered Real and Replicated Signals Using RF-DNA,” 2017 Tri-Service Radar Conference, Springfield, VA, July 18-21 2017. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Schuyler Collis, Phillip Corbell, “GPS Spoofers Detection via Receiver Statistical Signal Processing” Institute of Navigation Joint Navigation Conference, Dayton, OH, June 6-8, 2017. [ANT]

COUTU, RONALD, A., Jr.,

Adjunct Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2008 (AFIT/ENG); BSEE, University of Massachusetts, Amherst, 1993; MSEE, California Polytechnic (CalPoly) State University, San Luis Obispo, 1995; PhD, Air Force Institute of Technology, 2004. Dr. Coutu’s research interests include microelectronics, microelectromechanical systems (MEMS) and MEMS fabrication with emphasis on micro electrical contacts, phase change materials, tunable metamaterials and terahertz components. His areas of expertise include design, fabrication, and test of micro/nano devices. He is a member of Tau Beta Pi, Eta Kappa Nu, SEM, SPIE, MRS, and a Senior Member of the IEEE.

DAVIS, NATHANIEL J., IV,

Professor Emeritus, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2005 (AFIT/ENG); BSEE, Virginia Polytechnic Institute and State University, 1976; MSEE, Virginia Polytechnic Institute and State University, 1977; PhD, Purdue University, 1985. Dr. Davis’ research interests include computer communications networks, cyber operations, and large scale computer architectures. He is a senior member of the IEEE and a member of the Sigma Xi, Eta Kappa Nu, and Tau Beta Pi honorary societies.

DEVER, MATTHEW C.,

Associate Director of the AF Cyberspace Technical Center of Excellence and the Center for Cyberspace Research, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS Communications, Ohio University, 1986; MS, Cybersecurity, University of Maryland University College, 2013. Mr. Dever’s research interests include weapon system vulnerabilities and mitigation strategies, cyber operations, and legal

aspects of cybersecurity policy. He is also a Certified Ethical Hacker (CEH) and a Certified Information Systems Security Professional (CISSP). AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4491, email: Matthew.Dever@afit.edu

GRAHAM, SCOTT R.,

Assistant Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BS, Electrical Engineering, Brigham Young University, 1993; MS, Electrical Engineering, Air Force Institute of Technology, 1999; PhD, Electrical Engineering, University of Illinois at Urbana-Champaign, 2004. Dr. Graham's research interests include the intersection between real physical systems and the computers that control them. Specific areas of interest include trusted avionics and vehicular computer systems. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4581, email: Scott.Graham@afit.edu

REFEREED JOURNAL PUBLICATIONS

Gutierrez, J., Bindewald, J., Graham, S.R., Rice, M., "Enabling Bluetooth Low Energy auditing through synchronized tracking of multiple connections," *International Journal of Critical Infrastructure Protection*, Mar 2017. [CCR]

Reber, P.E., Graham, S.R., "Evaluating System on a Chip Design Security," *Journal of Information Warfare*, Vol. 16, Issue 3, 2017. [CCR]

Badenhop, C.W., Graham, S.R., Ramsey, B.W., Mullins, B.E., Mailloux, L.O., "The Z-Wave Routing Protocol and it's Security Implications," *Elsevier Journal of Computers & Security*, Vol. 68, Jul 2017, pp. 112-129. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Simon, P.E., Graham, S.R., "Potential Privacy Ramifications of Modern Vehicle Software and Firmware," *12th European Conference on Cyber Warfare and Security (ECCWS 2017)*, Jun 2017. [CCR]

Gutierrez, J., Bindewald, J., Graham, S.R., Rice, M., "Enabling Bluetooth Low Energy auditing through synchronized tracking of multiple connections," *International Conference of Critical Infrastructure Protection*, Mar 2017. [CCR]

Potthoff T.S., Graham, S.R., "Dynamic Attestation of Real-Time Systems," *12th International Conference on Cyber Warfare and Security (ICCWS 2017)*, Mar 2017. [CCR]

Caberto, E.K., Graham, S.R., "A Method of Securing a Vehicle's Controller Area Network," *12th International Conference on Cyber Warfare and Security (ICCWS 2017)*, Mar 2017. [CCR]

Reber, P.E., Graham, S.R., "Security by Design in System on a Chip Applications," *12th International Conference on Cyber Warfare and Security (ICCWS 2017)*, Mar 2017. [CCR]

GUNAWARDENA, SANJEEV,

Research Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BSEE & BS, Engineering Physics, Ohio University, 1997; MSEE, Ohio University, 2000; PhD, Ohio University, 2007. Dr. Gunawardena's research interests include RF design, digital systems design, reconfigurable computing, software-defined radio, navigation warfare, and all aspects of GNSS receivers and associated signal processing. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x4659, email: Sanjeev.Gunawardena@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"GPS Waveform Prototyping Platform (GWPP)." Sponsor: AFRL/RV. Funding: \$300,000 – Gunawardena 90%, Raquet 10%. [ANT]

"GNSS Testbed Development." Sponsor: AFRL/RV. Funding: \$454,000. [ANT]

“Advanced Signal Prototyping on AFIT's Waveform Prototype Platform for Navigation and Timing Applications.”
Sponsor: AFRL/RV. Funding: \$67,500. [CSRA]

REFEREED JOURNAL PUBLICATIONS

S. Gunawardena, J. Raquet, M. Carroll, “Innovation: Correlator Beamforming for Low-Cost Multipath Mitigation,”
GPS World, January 2017. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. M. Guerrero, S. Gunawardena, “Characterization of Timing and Pseudorange Biases Due to GNSS Front-End Filters by Type, Temperature, and Doppler Frequency,” Proceedings of the 2017 International Technical Meeting of The Institute of Navigation, Monterey, California, January 2017, pp. 418-444. [ANT]

M. Wireman, S. Gunawardena, M. Carroll, “High-Fidelity Signal Deformation Analysis of the Live Sky GLONASS Constellation using Chip Shape Processing,” Proceedings of the 2017 International Technical Meeting of The Institute of Navigation, Monterey, California, January 2017, pp. 521-535. [ANT]

S. Gunawardena, J. Raquet, M. Carroll, “Correlator Beamforming for Multipath Mitigation at Relatively Low Cost: Initial Performance Results,” Proceedings of the 29th International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS+ 2016), Portland, Oregon, 2016, pp. 353-363. [ANT]

A. Lemmenes, P. Corbell, S. Gunawardena, “Detailed Analysis of the TEXBAT Datasets Using a High Fidelity Software GPS Receiver,” Proceedings of the 29th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2016), Portland, Oregon, 2016, pp. 3027-3032. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

S. Gunawardena, J. Raquet, M. Carroll, “Correlator Beamforming for Multipath Mitigation in High-Fidelity GNSS Monitoring Applications,” Proceedings of the 2017 International Technical Meeting of the Institute of Navigation, Monterey, California, January 2017, pp. 1173-1188. [ANT]

S. Gunawardena, M. Carroll, “GNSS Authentication using Natural Signal Deformation: Performance Evaluation during Live-Sky Exercises,” Classified Proceedings of the 2017 Joint Navigation Conference of The Institute of Navigation, Dayton, Ohio, June 2017. [ANT]

S. Pentecost, S. Gunawardena, “Implementation of L1C on a GNSS Waveform Prototyping Platform for Evaluating Next-Generation GPS Advanced Signal Concepts,” Proceedings of the 2017 Joint Navigation Conference of The Institute of Navigation, Dayton, Ohio, June 2017. [ANT]

E. Vinande, M. Carroll, S. Gunawardena, “High Gain Chip Shape Generation and Dissemination,” Proceedings of the 2017 Joint Navigation Conference of the Institute of Navigation, Dayton, Ohio, June 2017. [ANT]

P. Patel, M. Ledford, S. Gunawardena, “Development of a GNSS Waveform Prototyping Platform for Advanced Signals Research,” Proceedings of the 2017 Joint Navigation Conference of the Institute of Navigation, Dayton, Ohio, June 2017. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

S. Gunawardena, “Introduction to GNSS Software Defined Receivers,” Invited talk/tutorial, 2017 Joint Navigation Conference of the Institute of Navigation, Dayton, Ohio, June 2017. [ANT]

S. Gunawardena, “Correlator Beamforming for Multipath Mitigation in High-Fidelity GNSS Monitoring Applications,” Invited Talk, Dayton Section of The Institute of Navigation, Dayton, Ohio, May 2017. [ANT]

S. Gunawardena, “Chip-Shape Signal Processing for High-Fidelity GPS Signal Monitoring,” Invited Talk, Combined meetings of the Dayton Sections of the IEEE Signal Processing Society, IEEE Engineering in Medicine and Biology Society and IEEE Systems, Man, & Cybernetics Society, Nov 2016, Dayton Ohio. [ANT]

S. Gunawardena, “Advanced Correlator Architectures for Military GNSS,” Invited Talk, The MITRE Corporation. [ANT]

HARTRUM, THOMAS C.,

Associate Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1977 (AFIT/ENG); BEE, The Ohio State University, 1969; MS, The Ohio State University, 1969; PhD, The Ohio State University, 1973; MBA, Wright State University, 1979. Dr. Hartrum’s field of expertise is software engineering.

HAVRILLA, MICHAEL J.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2002 (AFIT/ENG); BS, Michigan State University, 1987; MSEE, Michigan State University, 1989; PhD, Michigan State University, 2001. Dr. Havrilla’s research interests include electromagnetic theory, guided wave theory and applications, electromagnetics of complex media, material characterization, low observables, electromagnetic scattering, and antenna theory. He is a member of HKN and Sigma Xi, Senior member of the IEEE, and a Full Member of the International Union of Radio Science-Commission B. Tel. 937-255-3636 x4582, email: Michael.Havrilla@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Material Measurement Laboratory Research.” Sponsor: AFRL/RV. Funding: \$264,800.

REFEREED JOURNAL PUBLICATIONS

A. Bogle, M. Hyde, M. Havrilla, J. Sovern, “High-temperature RF material characterization using a dual-chambered rectangular waveguide fixture,” IEEE Transactions on Instrumentation and Measurement, doi 10.1109/TIM.2017.2700918, June 2017.

R. Uber, A. Wood and M. Havrilla, “Analysis and Numerical Solution of Transient Electromagnetic Scattering from Two Cavities,” Journal of Computational Physics, doi 10.1016/j.jcp.2017.04.043, April 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

C. Kodama, R. Coutu and M. Havrilla, “Reconfigurable Terahertz Metamaterials with Germanium Telluride,” Metamaterials Conference Proceedings, pp. 648-650, Crete, Greece, 2016.

M. Havrilla, “Field Decomposition for Analysis of Hyperbolic Media,” Metamaterials Conference Proceedings, pp. 793-795, Crete, Greece, 2016.

M. Havrilla, “Comparison of Potential-Based Analysis Methods for Simple and Complex Media,” International Symposium on Electromagnetic Theory Proceedings, pp. 341-344, Espoo, Finland, 2016.

A. Knisely, M. Hyde, M. Havrilla and P. Collins, “Uniaxial Anisotropic Material Measurement using a Single Port Waveguide Probe,” Antenna Measurement Techniques Association Conference Proceedings, pp. 377-382, Austin, Texas, October 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

M. Havrilla, “Rectangular waveguide mode and bandwidth enhancement using common and differential excitation” URSI National Radio Science Meeting Abstracts, pg. 28, Boulder, Colorado, January 2017.

M. Havrilla, "Bianisotropic Scalar Potential Formulation and Depolarizing Dyad Anomaly," European Electromagnetics Symposium Abstracts, pg. 1-2, London, England, 2016.

HODSON, DOUGLAS D.,

Associate Professor of Software Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2011 (AFIT/ENG); BS, Physics, Wright State University, 1985; MS, Electro-Optics, University of Dayton, 1987; MBA, University of Dayton, 1999; PhD, Computer Engineering, Air Force Institute of Technology, 2009. Dr. Hodson's research interests include real-time distributed simulation architectures for training, test and analysis, networks, design patterns for modeling radar, and infrared effects. His research interests also include the modeling and simulation of Quantum Key Distribution protocols. AFIT research center affiliation(s): ANT, CCR, COA, and CSRA. Tel. 937-255-3636 x4719, email: Douglas.Hodson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"AFSIM Maturation and Capability Improvements." Sponsor: AFRL/RQ. Funding: \$34,269 – Hodson 50%, Peterson 50%. [ANT/CCR]

REFEREED JOURNAL PUBLICATIONS

L.O. Mailloux, M.R. Grimaila, D.D. Hodson and G.B. Baumgartner, "The Benefits of Joining an Effective Research Team," IEEE Potentials, Vol. 35, No. 3, 2017.

L.O. Mailloux, M.R. Grimaila, D.D. Hodson, R.D. Engle, C. McLaughlin and G.B. Baumgartner, "Modeling, Simulation, and Performance Analysis of Decoy State Enabled Quantum Key Distribution Systems," Applied Sciences, Jan 2017.

D.D. Hodson, M.R. Grimaila, L.O. Mailloux, C.V. McLaughlin and G.B. Baumgartner, "Modeling Quantum Optics for Quantum Key Distribution System Simulation," Journal of Defense Modeling and Simulation (JDMS), Nov 2016.

J. C. Denton, D.D. Hodson, R.G. Cobb, L.O. Mailloux, M.R. Grimaila, G.B. Baumgartner, "A Model to Estimate Performance of Space-Based Quantum Communication Protocols Including Quantum Key Distribution Systems," Journal of Defense Modeling and Simulation (JDMS), Nov 2016. [CSRA]

A.J. Kamrud, D.D. Hodson, G.L. Peterson and B.G. Woolley, "Unified Behavior Framework in Discrete Event Simulation Systems," Journal of Defense Modeling and Simulation (JDMS), Oct 2016. [ANT]

J.R. Millar, D.D. Hodson, G.L. Peterson and D.K. Ahner, "Consistency and Fairness in Real-Time Distributed Virtual Environments: Paradigms and Relationships," Journal of Simulation, Special issue on Data-driven and Large-scale Distributed Simulation, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

L.O. Mailloux, D.D. Hodson and M.R. Grimaila, "System-Level Considerations for Modeling Space-Based Quantum Key Distribution Architectures," IEEE Systems Conference (SysCon 2017), Jan 2017. [CSRA]

M.J. Bentley, A.C. Lin and D.D. Hodson, "Overcoming Challenges to Air Force Satellite Ground Control Automation," 2017 IEEE Conference on Cognitive and Computational Aspects of Situational Management (CogSIMA), Nov 2016. [ANT]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Session Chair and Associate Editor, "Modeling and Simulation Frameworks," 2017 International Conference on Scientific Computing (CSC17), Las Vegas, NV, July 17-20, 2017.

Associate Editor, Journal of Defense Modeling and Simulation.

HOPKINSON, KENNETH M.,

Interim Department Head, Professor, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BSCS, Rensselaer Polytechnic Institute, 1997; MSCS, Cornell University, 2002; PhD, Cornell University, 2004. Dr. Hopkinson research interests include wired and wireless networking, fault tolerant and reliable distributed systems, middleware, operating systems, net-centric warfare, network security, cloud computing, machine learning applied to remote sensing, and the use of networks to enhance critical infrastructures. Dr. Hopkinson is a Senior Member of the IEEE, a Senior Member of the ACM, and a member of the Upsilon Pi Epsilon, and the Eta Kappa Nu honorary societies. AFIT research center affiliation(s): ANT, CCR, CSRA, and CTISR. Tel. 937-255-3636 x4579, email: Kenneth.Hopkinson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Cognitive and Mobile Networks.” Sponsor: AFRL/RI. Funding: \$50,000.

“A Cognitive Recommender System for a Closed Feedback Tasking Loop.” Sponsor: NPS. Funding: \$150,000 – Hopkinson 40%, McBee 10%, Oxley 40%, Schubert Kabban 5%. [CTISR]

“Using Cognitive Radios to Enhance Communications Capabilities.” Sponsor: Undisclosed. Funding: \$50,000.

“Enhancing Satellite Security.” Sponsor: Undisclosed. Funding: \$50,000.

“Advancing Software Defined Radios for Use in Space Communications.” Sponsor: AFRL/RV. Funding: \$54,000. [CSRA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Enhancing Cybersecurity Education with Adversarial Thinking.” Sponsor: NSA. Funding: \$100,000. [CCR]

REFEREED JOURNAL PUBLICATIONS

Azghandi, S., Hopkinson, K.M., Laviers, R.L., “Benchmarking Approach for Empirical Comparison of Pricing Models in DRMS,” *IET Journal of Engineering*, October 2016, pp. 1-8.

Hamman, S.T., Hopkinson, K.M., “Teaching Adversarial Thinking for Cybersecurity,” *Journal of the Colloquium for Information System Security Education*, Vol. 4, Issue 1, 2016, pp. 93-110.

Betances, A., Hopkinson, K.M., Silvius, M., “Context Aware Routing Management Architecture for Airborne Networks,” *IET Networks*, Vol. 5, Issue 4, 2016, pp. 85-92.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Tong, X.Y., Zheng, Y., Hopkinson, K.M., Lian, W., “A Two-Stage Hybrid Online Fault Detection Method Based on Wide-Area Protection and Limited PMUs,” *IEEE International Conference on Smart Grid and Clean Energy Technologies*, 19-22 October 2016, Chengdu, China, pp. 37-43.

BOOKS AND CHAPTERS IN BOOKS

Hamman, S.T., Hopkinson, K.M., McCarty, L.A., “Applying Behavioral Game Theory to Cyber-Physical Systems Protection Planning,” *Cyber-Physical Systems: Foundations, Principles, and Applications*, H. Song, D.B. Rawat, S. Jeschke, and C. Brecher, eds., Elsevier, New York, NY, 2016, pp. 251-262.

HOUPIS, CONSTANTINE H.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 1952 (AFIT/ENG); BS, University of Illinois, 1947; MS, University of Illinois, 1948; PhD, University of Wyoming, 1971. Dr. Houpis' research interests include guidance and control of aerospace vehicles, application of optimal control theory to engineering systems, flight control systems, digital control systems, computational and numerical methods for control systems design, linear and nonlinear control theory, multivariable theory, and quantitative feedback theory. Dr. Houpis has published numerous technical articles and textbooks. He is a registered professional engineer and a Fellow of the IEEE.

HYDE, MILO W. IV, Maj,

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Appointment Date: 2010 (AFIT/ENG); BS, Computer Engineering, Georgia Institute of Technology, 2001; MSEE, Air Force Institute of Technology, 2006; PhD, Electrical Engineering, Air Force Institute of Technology, 2010. Maj Hyde's research interests include electromagnetic material characterization, optical material characterization, guided-wave theory, scattering, and optics. He is a senior member of IEEE and SPIE, and a member of OSA. AFIT research center affiliation(s): CDE and CTISR.

SPONSOR FUNDED RESEARCH PROJECTS

"Subaperture Adaptive Optics for Directed Energy Phased Arrays." Sponsor: tOSC. Funding: \$220,500. [CDE]

REFEREED JOURNAL PUBLICATIONS

Xifeng Xiao, David G. Voelz, Santasri Bose-Pillai, and Milo W. Hyde IV, "Modeling random screens for predefined electromagnetic Gaussian Schell-model sources," *Optics Express*, Vol. 25, No. 4, pp. 3656-3665, Feb 2017, doi: 10.1364/OE.25.003656. JIF: 3.148. [CDE]

Milo W. Hyde IV, Santasri Bose-Pillai, David G. Voelz, and Xifeng Xiao, "Generation of vector partially coherent optical sources using phase-only spatial light modulators," *Physical Review Applied*, Vol. 6, No. 6, 064030 pp. 12, Dec 2016, doi: 10.1103/PhysRevApplied.6.064030. JIF: 4.061. [CDE]

Milo W. Hyde IV, Santasri Bose-Pillai, Xifeng Xiao, and David G. Voelz, "A fast and efficient method for producing partially coherent sources," *Journal of Optics*, Vol. 19, No. 2, 025601 pp. 6, Dec 2016, doi: 10.1088/2040-8986/19/2/025601. JIF: 1.847. [CDE]

Noah R. Van Zandt, Milo W. Hyde IV, Santasri Bose-Pillai, David G. Voelz, Xifeng Xiao, and Steven T. Fiorino, "Synthesizing time-evolving partially-coherent Schell-model sources," *Optics Communications*, Vol. 387, pp. 377-384, Nov 2016, doi: 10.1016/j.optcom.2016.10.055. JIF: 1.480. [CDE]

Milo W. Hyde IV and Glenn A. Tyler, "Temporal coherence effects on target-based phasing of laser arrays," *Journal of the Optical Society of America A*, Vol. 33, No. 10, pp. 1931-1937, Oct 2016, doi: 10.1364/JOSAA.33.001931. JIF: 1.457. [CDE]

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A. Knisely, M. Hyde, M. Havrilla, and P. Collins, "Uniaxial anisotropic material measurement using a single port waveguide probe," *Antenna Measurement Techniques Association (AMTA) 38th Annual Meeting & Symposium*, pp. 377-382, Austin, TX, Nov 2016.

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Milo W. Hyde IV and Michael J. Havrilla, “A generalized approach for vector network analyzer calibration,” Materials Measurements Working Group, pp. 4, Dayton, OH, May 2017.

Milo W. Hyde IV, “Laser beam shaping by manipulating spatial coherence,” Proceedings of the 5th International Conference and Exhibition on Lasers, Optics & Photonics, *Journal of Lasers, Optics & Photonics*, Vol. 3, No. 3, pp. 64, Atlanta, GA, Nov 2016, doi: 10.4172/2469-410X.C1.008.

INVENTION DISCLOSURES

Milo W. Hyde IV and Santasri Bose-Pillai, “Generation of Vector Partially Coherent Optical Sources Using Phase-Only Spatial Light Modulators,” May 2017, Air Force Invention Number AFD-1689. [CDE]

JACKSON, JULIE A.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2009 (AFIT/ENG); BS, Electrical Engineering, Wright State University, 2002; MS, Electrical Engineering, The Ohio State University, 2004; PhD, Electrical Engineering, The Ohio State University 2009. Dr. Jackson’s research interests include electromagnetic and statistical modeling, radar imaging algorithms, and radar signal exploitation. She is a member of IEEE, Eta Kappa Nu, and Tau Beta Pi. AFIT research center affiliation(s): CTISR. Tel. 937-255-3636 x4678, email: Julie.Jackson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Multistatic Receiver Optimization and Target Detection.” Sponsor: AFRL/RV. Funding: \$60,000 – Jackson 70%, Lievsay 30%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

A. Evers, N. Zimmerman, and J. A. Jackson, “Semidefinite Relaxation Autofocus for Bistatic Backprojection SAR,” IEEE Radar Conference, Seattle, WA, May 2017, pp. 1332-1337.

J. A. Jackson and F. Lee-Elkin, “Channel Crosstalk Model for Fully-Polarimetric SAR Compressive Sensing,” IEEE Radar Conference, Seattle, WA, May 2017, pp. 1536-1541.

J. A. Jackson and F. Lee-Elkin, “Polarimetric Radar Crosstalk Removal During Sparse Imaging,” IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), New Orleans, LA, USA, 2017.

LAKE, ROBERT A. Capt,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment date: 2015 (AFIT/ENG); BE, Wentworth Institute of Technology, 1999; BSEE, University of Massachusetts at Lowell, 2008; MSEE, Air Force Institute of Technology, 2010; PhD, Electrical Engineering, Air Force Institute of Technology, 2014. Capt Lake’s research interests include microelectronics, MEMS, microfabrication, MEMS buckled membranes, and bistable compliant mechanisms. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4550, email: Robert.Lake@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Experimental Investigation of Thin Film Spreading Resistance Modeling for Improved Micro-Contact Performance.” Sponsor: AFOSR. Funding: \$47,397.

“Engineered Surfaces to Reduce Secondary Electron Yield for Multipactor Prevention.” Sponsor: Undisclosed. Funding: \$30,292.

“Germanium on Silicon Phototransistor.” Sponsor: AFRL/RX. Funding: \$25,000.

“Engineered Surfaces to Reduce Secondary Electron Yield for Multipactor Prevention.” Sponsor: Undisclosed.
Funding: \$126,961.

“Design, Model and Fabricated a 5x5 Large Tip, Tilt, and Piston MEMS Micromirror Array.” Sponsor: AFRL/R.Y.
Funding: \$80,586.

“Germanium on Silicon Phototransistor.” Sponsor: AFRL/RX. Funding: \$25,000.

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Laurvick, T.V., Coutu, Jr., R.A., Sattler, J.M., Lake, R.A., “Surface feature engineering through nanosphere lithography,” *Journal of Micro/Nanolithography, MEMS, MOEMS*, Vol. 15, No. 3, pp 1-12, 2016, doi:10.1117.1.JMM.15.3.031602

Kaval, W.G., Lake, R.A., Coutu, Jr., R.A., “PVDF-TrFE electroactive polymer mechanical-to-electrical energy harvesting experimental bimorph structure,” *MRS Advances*, pp. 1-6, 2016, doi:10.1557/adv.2017.397

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Sattler, J.M., Coutu, Jr., R.A., Lake, R.A., Laurvick, T.V., “Engineering and modeling micro-porous surfaces for secondary electron emission control,” International Workshop on Multipactor, Corona, and Passive Intermodulation (MULCOPIM, pp. 1-4, The Netherlands, 5-7 April, 2017.

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Kaval, W.G., Lake, R.A., Coutu, Jr., R.A., “PVDF-TrFE electroactive polymer based microelectromechanical systems (MEMS) structures,” *Proceedings of the 2017 Annual Conference on Experimental and Applied Mechanics*, pp. 1-8, Indianapolis IN, 12-14 Jun, 2017

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Waggoner, K., Lake, R.A., “Modeling of Semented Controlled Electrostatically Actuated Bimorph Beams,” 2017 IEEE National Aerospace and Electronics Conference (NAECON) and Ohio Innovation Summit (OIS), pp. 1-6, Dayton, OH, 27-30 June, 2017.

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INVENTION DISCLOSURES

Lake, Robert A., Waggoner, Kullen W., Walton, John, Starman, Lavern A., “Segmented Control of Electrostatically Actuated Bi-Morph Beams,” filed 15 Aug 17, Air Force Docket No. ADF-1745.

LAMONT, GARY B.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1970 (AFIT/ENG); BS, Physics, University of Minnesota, 1961; MSEE, University of Minnesota, 1967; PhD, University of Minnesota, 1970. Dr. Lamont teaches courses in computer science and computer engineering. His research interests include: evolutionary computation, artificial immune systems, intrusion and anomaly detection, information security, parallel and distributed computation, combinatorial optimization problems (single objective and multi-objective), software engineering, digital signal processing, and intelligent and distributed control. He has advised many MS and PhD students in these disciplines. Dr. Lamont has authored several textbooks (Multi-Objective EAs, Computer Control), various book chapters, as well as numerous papers. Dr. Lamont was also an engineering systems analyst for the Honeywell Aerospace Division for six years. He is a member of IEEE (senior member) ACM, ASEE, SIAM, Tau Beta Pi, and Eta Kappa Nu. Tel. 937-255-3636 x4718, email: Gary.Lamont@afit.edu

LAURVICK, TOD V. Maj,

Assistant Professor of Electric Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BSEE, Michigan Technological University, 1995; MS, Air Force Institute of Technology, 2009; PhD, Electrical Engineering, Air Force Institute of Technology, 2016. Maj Laurvick's research interests include advancement of micro/nanoscale fabrication techniques and how they apply to sensing and actuation. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4382, email: Tod.Laurvick@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Plasmonic Grating Geometries and Wavelength-Dependent Focus Depth in IR Detectors." Sponsor: AFRL/RV. Funding: \$13,500. [CSRA]

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Laurvick, T.V., Coutu, Jr. R.A., Sattler J.M. and Lake, R.A. "Surface Feature Engineering through Nanosphere Lithography," *SPIE Journal of Micro/Nanolithography, MEMS and MOEMS* 15, No. 3, (2016): 031602-031602.

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LEISHMAN, ROBERT C.,

Research Assistant Professor of Autonomy, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS, Utah State University, 2006; MS, Brigham Young University, 2009; PhD, Mechanical Engineering, Brigham Young University, 2013. Dr. Leishman's research interests include guidance, navigation and control of small unmanned aerial vehicles, GPS-denied navigation using vision systems, and autonomous systems and robotics. He is a member of The Institute of Navigation (ION) and The Institute of Electrical and Electronics Engineers (IEEE), including the IEEE Controls Systems Society (CSS) and IEEE Robotics and Automation Society (RAS). AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4755, email: Robert.Leishman@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Robust Back-end Navigation Techniques." Sponsor: AFRL/RV. Funding: \$25,000. [ANT]

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Leishman, R. C. and Raquet, J. “Utilization of UAV Autopilots in Vision-based Alternative Navigation,” ION GNSS+ 2017, Portland OR, September 25-29 2017. [ANT]

LIEVSAY, JAMES R., Maj,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2017 (AFIT/ENG); BSEE, United States Air Force Academy, 2006; MSEE, Air Force Institute of Technology, 2011; PhD, Electrical Engineering, University of Oklahoma, 2017. Maj Lievsay’s research interests include radar and array signal processing. Tel. 937-255-3636 x3369, email: James.Lievsay@afit.edu

REFEREED JOURNAL PUBLICATIONS

J.R. Lievsay and N.A. Goodman, “Modeling 3D passive STAP with heterogeneous clutter and pulse diversity waveform effects,” accepted to *IEEE Trans. Aerospace and Electronic Systems*, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

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J.R. Lievsay and G.A. Akers, “Moving target detection via digital time domain correlation of random noise radar signals,” in Proc. 2011 IEEE Radar Conference, pp. 784-788, Kansas City, MO, May 23 – 27, 2011.

LIN, ALAN C. Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BSCE, Rutgers University, 2004; MSCS, Air Force Institute of Technology, 2008; PhD, Computer Science, Air Force Institute of Technology, 2015. Maj Lin’s research interests include cyber security and education, serious gaming and gamification, data mining, space systems, and software engineering. He is a member of Tau Beta Pi. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4757, email: Alan.Lin@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-domain Scenario-based Wargaming.” Sponsor: 711 HPW. Funding: \$29,973 – Lin 67%, Peterson 33%. [CCR]

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M. Bentley, A. Lin, and D. Hodson, “Overcoming Obstacles to Air Force Satellite Ground Station Automation,” *IEEE CogSIMA*. Savannah, Georgia, Mar 2017. [CCR]

E. McKinion and A. Lin, “Evaluation of Security Flaws in the Current Probe Request Design and Proposed Solutions,” *ICCWS*, Dayton, OH. Mar 2017. [CCR]

D. P. Richardson, A. C. Lin, J. M. Pecarina. “Hosting Distributed Databases on Internet of Things-Scale Devices.” IEEE Conference on Dependable and Secure Computing. Taipei, Taiwan. Aug 2017. [CCR]

MARTIN, RICHARD K.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BS, Electrical Engineering and Physics, University of Maryland, 1999; MS, Electrical Engineering, Cornell University, 2001; PhD, Electrical Engineering, Cornell University, 2004. Dr. Martin’s research interests include source localization, navigation, radio tomographic imaging, and 3D laser radar imaging. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4625, email: Richard.Martin@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Detection and Estimation Algorithms for Temporally Multiplexed Spectropolarimetric LADAR.” Sponsor: AFRL/RW. Funding: \$47,120.

“Analytical Support for Hardware Assurance.” Sponsor: AFRL/RY. Funding: \$14,302. [CCR]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Learning about Signals through Tinkering and Game-Playing.” Sponsor: ONR (WWU). Funding: \$127,600. [CCR]

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R. K. Martin, A. G. Klein, J. Hefner, C. Watson, and K. R. Basinet, “Making and Gaming in Signal Processing Classes,” in *Proc. Int. Conf. on Acoustics, Speech, and Signal Proc. (ICASSP)*, New Orleans, LA, March 2017.

A. G. Klein, K. R. Basinet and R. K. Martin, “On Student Collaboration and Competition in an Inquiry-Based Multiuser Communications and Jamming Exercise,” in *Proc. ASEE Annual Conf. & Expo.*, Columbus, OH, June 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

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Christian Keyser, P. Khanh Nguyen, Rajendra Joshi, and Richard K. Martin, “Experimental Demonstration of Single Pulse Laser Polarimeter for Rapid Target-Surface Mueller Matrix Measurement,” in *Proc. 2017 Meeting of the Military Sensing Symposia (MSS) Specialty Group on Active E-O Systems*, Gaithersburg, MD, September 2017.

Luke Ausley, Christian Keyser, Richard K. Martin, and John McGowan, “Multi-Spectral Target Reflectivity Measurement using Raman-Based Wavelength-Dependent Temporal Waveforms,” in *Proc. 2017 Meeting of the Military Sensing Symposia (MSS) Specialty Group on Active E-O Systems*, Gaithersburg, MD, September 2017.

MAYBECK, PETER S.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1973 (AFIT/ENG); BS, Massachusetts Institute of Technology, 1968; PhD, Massachusetts Institute of Technology, 1972. Dr. Maybeck’s research interests include optimal estimation and stochastic control Kalman filtering, adaptive estimation, pointing and tracking, optimally aided inertial navigation systems, and multiple model adaptive filtering. He is the author of the widely recognized three-volume reference text, “Stochastic Models, Estimation and Control,” and over 100 technical articles. Dr. Maybeck has received numerous national and local awards including the C. Holmes MacDonald Distinguished Young Electrical Engineering Teach and the ASEE Frederick Emmons Terman Award as the outstanding Electrical Engineering Professor in the US and 1985. He is a fellow of the IEEE. AFIT research center affiliation(s): CCR.

MERKLE, LAURENCE D.,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BS, Computer and Systems Engineering, Rensselaer Polytechnic Institute, 1987; MSCE, Air Force Institute of Technology, 1992; PhD, Computer Engineering, Air Force Institute of Technology, 1996. Dr. Merkle’s research interests include Serious Games, Quantum Information Systems, Computational Science and Engineering, Computing Education, Evolutionary Computation, Secure Computing, Space Situational Awareness. AFIT research center affiliation(s): ANT, CCR, and CSRA. Tel. 937-255-3636 x4526, email: Laurence.Merkle@afit.edu

REFEREED CONFERENCE PAPER ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Chris Johnson, Monica McGill, Durell Bouchard, Michael K. Bradshaw, Víctor A. Bucheli, Laurence D. Merkle, Michael James Scott, Z. Sweedyk, J. Ángel, Zhiping Xiao, and Ming Zhang. 2016. Game Development for Computer Science Education. In *Proceedings of the 2016 ITiCSE Working Group Reports* (ITiCSE '16). ACM, New York, NY, USA, 23-44. doi: 10.1145/3024906.3024908. [ANT]

MILLAR, JEREMY R., Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2017 (AFIT/ENG); BS, University of Tennessee, 2000; MS, Air Force Institute of Technology, 2009; PhD, Computer Science, Air Force Institute of Technology, 2017. Maj Millar's research interests include parallel and distributed systems, modelling and simulation, and software engineering. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x3368, email: Jeremy.Millar@afit.edu

MILLS, ROBERT F.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2003 (AFIT/ENG); BS, Electrical Engineering, Montana State University, 1983; MS, Electrical Engineering, AFIT, 1987; PhD, Electrical Engineering, University of Kansas, 1994. Dr. Mills' research interests include electronic warfare, network security, and cyber resilience in weapon systems. He is a Senior Member of the IEEE and is a member of the Eta Kappa Nu and Tau Beta Pi honor societies. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4527, email: Robert.Mills@afit.edu

REFEREED JOURNAL PUBLICATIONS

Rich, M.D., Mills, R.F., Dube, T.E., and Rogers, S.K., "Evaluating Machine Learning Classifiers for Defensive Cyber Operations," *Military Cyber Affairs*, Vol. 2, Issue. 1, Article 6, pp. 1-18, doi: 10.5038/2378-0789.2.1.1005, 2016. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Wardell, D.C., Mills, R.F., Peterson, G.L., and Oxley, M.E., "A Method for Revealing and Addressing Security Vulnerabilities in Cyber-Physical Systems by Modeling Malicious Agent Interactions with Formal Verification," *Complex Adaptive Systems*, Publication 6, pp. 24-31, Nov 2016. [CCR]

BOOKS AND CHAPTERS IN BOOKS

Proceedings of the 12th International Conference on Cyber Warfare and Security, ed: Bryant, A.R., Lopez, J.R., and Mills, R.F., Academic Conferences and Publishing International, March 2017. [CCR]

PATENT APPLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., "Machine learning by construction of a Qualia Modeling Agent - method and apparatus," filed 16 May 2017, Air Force Invention number AFD-1680, US Serial Numbers 62/506,034 and 62/506,040. [CCR]

MULLINS, BARRY E.,

Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BS, Computer Engineering, University of Evansville, 1983; MS, Computer Engineering, Air Force Institute of Technology, 1987; PhD, Electrical Engineering, Virginia Polytechnic Institute and State University, 1997. Dr. Mullins' research interests cyber operations, critical infrastructure protection, cyber physical protection, computer/network/embedded systems security, wired/wireless networking, and reverse engineering. Tel. 937-255-3636 x7979, email: Barry.Mullins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Advanced Cyber Physical Security Research Support." Sponsor: DHS. Funding: \$194,918. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- M. E. Aust and B. E. Mullins, “Proactive Host Mutation in Software Defined Networking,” *12th International Conference on Cyber Warfare and Security ICCWS-2017*, Dayton OH, 2-3 March 2017, pp. 453-460. [CCR]
- J. S. Goodgion and B. E. Mullins, “Active Network Response Using Host-Based IDS and Software Defined Networking,” *12th International Conference on Cyber Warfare and Security ICCWS-2017*, Dayton OH, 2-3 March 2017, pp. 469-478. [CCR]
- A. Portante and B. E. Mullins, “Analysis of the OpenFlow Protocol in Software Defined Networks,” *12th International Conference on Cyber Warfare and Security ICCWS-2017*, Dayton OH, 2-3 March 2017, pp. 479-488. Best Masters Presentation/Paper. [CCR]

BOOKS AND CHAPTERS IN BOOKS

- K. A. Girtz, B. E. Mullins, M. Rice, and J. Lopez Jr., “Practical Application Layer Emulation In Industrial Control System Honeypots,” *Critical Infrastructure Protection X*, M. Rice and S. Sheno, eds., Springer, New York, NY, November 2016, pp. 83-98. [CCR]

NYKL, SCOTT L.,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BS, Software Engineering, University of Wisconsin-Platteville, 2006; MS, Computer Science, Ohio University, 2012; PhD, Computer Science, Ohio University, 2013. Dr. Nykl’s research interests include Computer Graphics, Interactive 3D Graphics, Level of Detail, Image-Based Rendering, GPGPU Programming/Parallel Computation, Distributed Real Time Visualizations, Computer Vision, Computational Geometry, Sensor Fusion, Linear Algebra, Numerical Analysis, Synthetic Vision (SVS), Augmented Reality (AR) Parallel/Concurrent Programming, Multi-Core/Multi-Threading, Algorithms, Big Data, and Networking, Data Structures. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4395, email: Scott.Nykl@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

- “Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase II.” Sponsor: AFRL/RQ. Funding: \$120,000 – Nykl 50%, Pecarina 50%. [ANT]
- “Reconnaissance Improvement through Secure, Reduced Bandwidth Communication and Cooperative Navigation Using Jetson TX1s (New).” Sponsor: Undisclosed. Funding: \$130,789 – Nykl 30%, Graham 30%, Pierce 30%, Carbino 10%. [ANT/CCR]

REFEREED JOURNAL PUBLICATIONS

- D. T. Johnson, S. Nykl, and J. Raquet, “Combining Stereo Vision and Inertial Navigation for Automated Aerial Refueling,” *Journal of Guidance, Control, and Dynamics*, Vol. 6, May 2017. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- C. Parsons and S. Nykl, “Real-Time Automated Aerial Refueling Using Stereo Vision,” in *Advances in Visual Computing: 12th International Symposium, ISVC 2016, Las Vegas, NV, USA, December 12-14, 2016, Proceedings, Part II*, ser. Lecture Notes in Computer Science. Springer International Publishing, 2016, Vol. 10073, pp. 605–615. [ANT]
- J. Robinson, M. Piekenbrock, L. Burchett, S. Nykl, B. Woolley, and A. Terzuoli, “Real-Time Automated Aerial Refueling Using Stereo Vision,” in *Advances in Visual Computing: 12th International Symposium, ISVC 2016, Las Vegas, NV, USA, December 12-14, 2016, Proceedings, Part II*, ser. Lecture Notes in Computer Science. Springer International Publishing, 2016, Vol. 10073, pp. 593–602. [ANT]

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- J. Roeber and S. Nykl, "Reducing C2 Bandwidth via Swarm-Based Real-time Three-Dimensional Model Synthesis," in Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC), ser. ION JNC '17. Dayton, OH, USA: Institute of Navigation, 2017. [ANT]
- Z. Paulson and S. Nykl, "Quantifying the Effect of Boom Occlusion on Relative Positioning for AAR," in Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC), ser. ION JNC '17. Dayton, OH, USA: Institute of Navigation, 2017. [ANT]
- N. Seydel and S. Nykl, "Autonomous Aerial Refueling Flight Testing and Data Collection Engineering," in Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC), ser. ION JNC '17. Dayton, OH, USA: Institute of Navigation, 2017. [ANT]
- M. Piekenbrock, J. Robinson, L. Burchett, S. Nykl, B. Woolley, and A. Terzuoli, in 2016 IEEE National Aerospace and Electronics Conference (NAECON) and Ohio Innovation Summit (OIS).

PACHTER, MEIR,

Professor, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1993 (AFIT/ENG); BS, Israel Institute of Technology, 1967; MS, Israel Institute of Technology, 1969; PhD, Israel Institute of Technology, 1975. Dr. Pachter's fields of expertise include automatic control of aircraft and missiles, adaptive control and system identification, inertial and GPS navigation, autonomous control/neural networks/fuzzy logic control, nonlinear control, and applied mathematics. Dr. Pachter has published papers in these areas and in differential games, robotics, and the theory of computational geometry. Dr. Pachter is interested in the application of mathematics to the solution of engineering and scientific problems. His current areas of interest include military operations optimization, cooperative control, estimation and optimization, statistical signal processing, adaptive optics, inertial navigation, and GPS navigation. For his work on adaptive and reconfigurable flight control, he received the AFRL Air Vehicle's Directorate Foulouis Award for 1994 together with Phil Chandler and Mark Mears. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x7247, email: Meir.Pachter@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

- "Dynamics and Control in Adversarial and Stochastic Environments." Sponsor: AFOSR. Funding: \$48,600.
- "Cooperative Control." Sponsor: AFRL/RQ. Funding: \$40,000. [ANT]

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- M. Pachter: "LQG Dynamic Games with a Control-Sharing Information Pattern," Dynamic Games and Applications, Vol. 7, No. 2, pp. 289-322, doi 10.1007/s13235-016-0182-6. [ANT]
- K. Kalyanam and M. Pachter: "The Role of Prior in Optimal Tea Decisions for Pattern Recognition," Communications in Information and Systems, Vol. 16, No. 1, 2016, pp. 1-16. [ANT]
- K. Kalyanam, D. Casbeer and M. Pachter: "Pursuit of a Moving Target with Bounded Constant Speed on a Directed Acyclic Graph under Partial Information," IMA Journal of Mathematical Control and Information (2016), Vol. 32, pp. 1-16. [ANT]

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- Weintraub, E. Garcia, D. Casbeer and M. Pachter: "An Optimal Aircraft Defense Strategy for the Active Target Defense Scenario," AIAA SciTech GNC Conference, 9-13 January 2017, Grapevine, TX, AIAA 2017-1917. [ANT]
- S. Coates and M. Pachter: "Optimal Control of a Dubins Car and the Homicidal Chauffeur Differential Game," Proceedings of the 57th Israel Annual Conference on Aerospace Sciences, Tel Aviv & Haifa, Israel, March 15-16, 2017. [ANT]

PECARINA, JOHN M., Maj,

Computer Science and Engineering Division Chief, Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, Angelo State University, 2001; MS, Air Force Institute of Technology, 2008; PhD, AFIT, 2013. Maj Pecarina's research interests include cognitive systems, mission centric workflow analysis, and information framework optimization.

PETERSON, GILBERT L.,

Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2002 (AFIT/ENG); BS, Architecture University of Texas at Arlington, 1995; MS, Computer Science, University of Texas at Arlington, 1998; PhD, University of Texas at Arlington, 2001. Dr. Peterson's research interests include uncertainty in artificial intelligence, robotics, machine learning, and digital forensics. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-6565 x4281, email: Gilbert.Peterson@afit.edu

REFEREED JOURNAL PUBLICATIONS

Schmitt, D.T. and Peterson, G.L., "Feature Detection and Matching on Atmospheric Nuclear Detonation Video," IET Computer Vision Journal, Vol. 10, No. 5, pp. 359-365, 2016.

Millar, J.R., Hodson, D.D., Peterson, G.L. and Ahner, D.K. "Data Quality Challenges in Distributed Live-Virtual-Constructive Test Environments," ACM Journal of Data and Information Quality, Vol. 7, No. 1-2, article 2, 2016.

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Ziegler, J., Bindewald, J.M., and Peterson, G.L., AutoTank, Education Advancement in Artificial Intelligence 2017, Model AI Assignment Workshop, 2017. [ANT]

Wardell, D.C., Mills, R.F., Peterson, G.L., and Oxley, M.E., "A Method for Revealing and Addressing Security Vulnerabilities in Cyber-Physical Systems by Modeling Malicious Agent Interactions with Formal Verification," Complex Adaptive Systems, Publication 6, pp. 24-31, Nov 2016. [ANT/CCR]

BOOKS AND CHAPTERS IN BOOKS

Peterson, G. and Sheno, S., *Advances in Digital Forensics XII*, Springer-Verlag, 2016. [CCR]

Bindewald, J.M., Peterson, G.L., Miller, M.E., Clustering-Based Online Player Modeling, In: Cazenave T., Winands M., Edelkamp S., Schiffel S., Thielscher M., Togelius J. (eds) Computer Games. Communications in Computer and Information Science, Vol. 705. Springer, 2017. [ANT]

PATENT APPLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., "Machine learning by construction of a Qualia Modeling Agent - method and apparatus," filed 16 May 2017, Air Force Invention number AFD-1680, US Serial Numbers 62/506,034 and 62/506,040. [CCR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Software Release: AutoProv, Good, R., and Peterson, G., Automated digital file provenance generation. [CCR]

PIERCE, SCOTT J., Maj,

Deputy Director of Autonomy and Navigation Technology Center, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, Electrical Engineering, Brigham Young University, 2002; MSEE, Air Force Institute of Technology, 2008; PhD, Air Force Institute of Technology, 2015. Maj Pierce's research interests include image-aided navigation, autonomous control, cooperative navigation, sensor fusion, and flight path optimization. He is a member of ION and IEEE. AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x3419, email: Scott.Pierce@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"New Star Tracker Design for Beaconless Sub-Microradian Spacecraft Pointing Estimation." Sponsor: Undisclosed. Funding: \$21,090 – Pierce 34%, Cain 33%, Oxley 33%. [ANT]

"Trade Study for Army Training Position/Attitude System." Sponsor: USA RDEC. Funding: \$200,000 – Pierce 80%, Raquet 20%. [ANT]

PYATI, VITTAL P.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1983 (AFIT/ENG); BE, University of Madras, India, 1953; MSE, Marquette University, 1962; PhD, Electrical Engineering, University of Michigan, 1966. Dr. Pyati's fields of expertise include electromagnetics, radar, low observables, and electronic ware. Dr. Pyati has authored over 40 publications in journals and DOD conferences. He has been a consultant to various Air Force organizations.

RAMSEY, BENJAMIN W. P., Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, Electrical Engineering, North Carolina State University, 2004; MS, Space Studies, American Military University, 2009; MS, Electrical Engineering, Air Force Institute of Technology, 2009; PhD, Computer Science, Air Force Institute of Technology, 2014. Maj Ramsey's interests include wireless computer networks and critical infrastructure protection. He is a member of IEEE, Eta Kappa Nu, and Tau Beta Pi.

RAQUET, JOHN F.,

Director of the Autonomy and Navigation Technology Center, Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1998 (AFIT/ENG); BS, US Air Force Academy, 1989; MS, Massachusetts Institute of Technology, 1991; PhD, University of Calgary, Canada, 1998. Dr. Raquet's areas of interest include Global Positioning System (GPS) precise positioning, non-GPS precision navigation, optically-aided navigation, navigation 101 using signals of opportunity, integration of MEMS-based inertial measurement units with other sensors, autonomous vehicle navigation and control, and electromagnetic interference and mitigation techniques affecting GPS performance. AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4580, email: John.Raquet@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"GPS/Inertial/Vision Integrated Navigation System (GIVINS) Development." Sponsor: AFRL/RW. Funding: \$150,000 – Raquet 50%, Woolley 25%, Jacques 25%. [ANT]

"Star Trackers for Non-GPS Navigation." Sponsor: Draper Laboratories. Funding: \$20,000 – Raquet 20%, Pierce 80%. [ANT]

"Support for Alternative Navigation Research." Sponsor: DARPA. Funding: \$9,836 – Raquet 80%, Pierce 20%. [ANT]

"Multi-Sensor Navigation Demonstration." Sponsor: USA CERDEC. Funding: \$450,000. [ANT]

“Ultra-High Accuracy Reference System (UHARS) Support.” Sponsor: 746 TS. Funding: \$100,000. [ANT]

“Trajectory Determination and Analysis Software (TDAS) Development Planning.” Sponsor: 812 TSS. Funding: \$150,000. [ANT]

“PNT Collaboration.” Sponsor: Lockheed Martin. Funding: \$100,000 – Raquet 50%, Pierce 10%, Canciani 40%. [ANT]

“ANT Center and Laboratory Support per MOA between AFIT and AFRL.” Sponsor: AFRL/RV. Funding: \$200,000 – Raquet 50%, Pierce 50%. [ANT]

“Non-GPS Smartphone Navigation.” Sponsor: AFRL/RI. Funding: \$173,000. [ANT]

“MAGPIE Project Support.” Sponsor: AFRL/RW. Funding: \$53,523. [ANT]

“Support for PNT Modeling and Simulation.” Sponsor: USA CERDEC. Funding: \$75,000 – Raquet 50%, Leishman 25%, Canciani 25%. [ANT]

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Canciani, A. and J. Raquet, “Airborne Magnetic Anomaly Navigation,” *IEEE Trans. On Aerospace and Electronic Systems*, Vol. 53, No. 1, pp. 67-80, Jan 2017. [ANT]

Gunawardena, S., J. Raquet, and M. Carroll, “Correlator Beamforming for Low-Cost Multipath Mitigation,” *GPS World* (trade magazine), Vol. 28, No. 1, pp. 54-63, Jan 2017. [ANT]

Venable, D. and J. Raquet, “Large Scale Image Aided Navigation,” *IEEE Trans. On Aerospace and Electronic Systems*, Vol. 52, No. 16, pp. 2849-2860, Dec 2016. [ANT]

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Jurado, J., and J. Raquet, “A Common Framework for Inertial Sensor Error Modeling,” *Proceedings of ION Pacific PNT*, Honolulu, HI, May 2017. [ANT]

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Kauffman, K., D. Marietta, J. Kresge, M. Veth, R. Patton, J. Gray, J. Raquet, A. Schofield, "Field Demonstration of Plug and Play Navigation System Using Scorpion and Smart Sensors/Cables," *ION Joint Navigation Conference*, Dayton, OH, Jun 2017. [ANT]

REITH, MARK G., Lt Col,

Director of Center for Cyberspace Research, Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS, Computer Science, University of Portland, 1999, MSCS, Air Force Institute of Technology, 2003; PhD, Computer Science, University of Texas at San Antonio, 2009. Lt Col Reith's research interests include cyber warfare theory and operation, software engineering, and software security and exploitation. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x4603, email: Mark.Reith@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mark Reith, Seeley Pentecost, Danial Celebucki, Robert Kaufman. "Operationalizing Cyber: Recommendations for Future Research," 12th International Conference on Cyber Warfare & Security, Dayton, OH. pp. 295-302. 2-3 March 2017.

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Jeffrey Guion, Mark Reith. "Dynamic Cyber Mission Mapping," 2017 Industrial & Systems Engineers Conference. Pittsburgh, PA. May 2017.

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Samuel Mayer, Mark Reith. "Sins of the Father: Avoiding Design Mistakes via Abuse Cases," 2017 Industrial & Systems Engineers Conference. Pittsburgh, PA. May 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Seeley Pentecost, Mark Reith. "An Advanced Maintenance Model for GPS Modernization," Joint Navigation Conference. Dayton, OH. June 2017.

SEAL, MICHAEL D., Maj,

Deputy Department Head, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BSEE, University of Missouri-Rolla, 2002; MSEE, Air Force Institute of Technology, 2007; PhD, Air Force Institute of Technology, 2013. Maj Seal's research interests are Plasmonic & Frequency Selective Surfaces, Laser Detection & Ranging (LADAR), and optical metrology. Member of SPIE. Tel. 937-255-3636 x3369, email: Michael.Seal@afit.edu

PATENT APPLICATION

Cain, Stephen C., Seal, Michael D., "Statistically applied Non-Uniformity Correction (SANUC)," Air Force Docket No. AFD-1753P, US Serial No. 62/560,249.

INVENTION DISCLOSURES

Cain, Stephen C., Seal, Michael D., Yielding, Nicholas J., Catarius, Adroam, "Statistically applied Non-Uniformity Correction (SANUC), filed 28 Aug 17, Air Force Docket No. ADF-1753.

STONE, SAMUEL J., Maj,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, Computer Engineering, Wright State University, 2003; MS, Electrical Engineering, Air Force Institute of Technology, 2008; PhD, Electrical Engineering, Air Force Institute of Technology, 2013. Maj Stone's research interests include Radio Frequency Intelligence, VLSI design, anti-tamper semiconductor hardware design, counterfeit device detection, and device design verification.

STRINGER, JEREMY P., Lt Col,

Electrical Engineering Division Chief, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BSEE, United States Air Force Academy, 1998; MSEE, Air Force Institute of Technology, 2000; PhD, Air Force Institute of Technology, 2013. Lt Col Stringer's research interests are Adaptive Beamforming, HF-Direction Finding, Passive Radar, Cognitive Radar, and Computational Electromagnetics. Member of IEEE, HKN, and TBP.

TEMPLE, MICHAEL A.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1996 (AFIT/ENG); BSE, Southern Illinois University, 1985; MSE, Southern Illinois University, 1986; PhD, Air Force Institute of Technology, 1993. Dr. Temple's research interests include the exploitation of signal (wired, wireless, intentional, unintentional, etc.) Distinct Native Attribute (DNA) features to improve device hardware and/or operation discrimination. This includes application to Radio Frequency (RF-DNA), Wired Signal (WS-DNA), and Correlation Based (CB-DNA) Fingerprinting methods that exploit inherent physical features to enhance authentication of hardware bit-level identities and the operational state of selected devices. Sponsored research activity, as adopted by and/or transitioned to Air Force, Department of Defense, and national agencies as provided approximately \$1M annually in R&D Technology benefit. Senior member of IEEE since Jan 2002. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4279, email: Michael.Temple@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"RF-EW Systems Support." Sponsor: AFRL/RX. Funding: \$120,233. [CCR]

"Application of RF-DNA to Enhance Transition of Functional Materials, Devices, and Components." Sponsor: AFRL/RX. Funding: \$15,000. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Talbot, Temple, Carbino, “Securing Insteon Home Automation Systems Using RF-DNA Fingerprints,” Proc of 12th Int’l Conf on Cyber Warfare and Security (ICCWS17), pp. 497-505, Dayton OH, Mar 2017.

Ross, Carbino, Temple, “Physical-Layer Identification of Power Line Communication (PLC) Devices Using WS-DNA Features,” Proc of 12th Int’l Conf on Cyber Warfare and Security (ICCWS17), pp. 313-322, Dayton OH, Mar 2017.

Bihl, Temple, Bauer, “An Optimization Framework for GRLVQ with Application to Z-Wave Device Fingerprinting,” Hawaii Int’l Conf on System Sciences (HICSS-50), pp. 2379-2387, Waikoloa Village, HI, Jan 2017.

TERZUOLI, ANDREW J., Jr.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 1982 (AFIT/ENG); BS, Electrical Engineering, Polytechnic Institute of Brooklyn, 1969; MS, Electrical Engineering, Massachusetts Institute of Technology, 1970; PhD, Electrical Engineering, The Ohio State University, 1982. Dr. Terzuoli’s research areas have included Antennas and Electromagnetics; Computer Model Based Studies; Application of Parallel Computation, VLSI Technology, and RISC Architecture to Numerical and Transform Methods; Remote Sensing and Communication; Passive RF Sensing; Wave Scattering, Radar Cross Section, and Stealth (LO/CLO) Technology; Machine Vision and Image Processing; and Automated Object Recognition. He has published numerous reports and articles in journals and conference proceedings in these and related areas. His research is funded by various agencies including AFRL and NASIC. Prior to joining AFIT in 1982, Dr. Terzuoli was a research associate at the ElectroScience laboratory at The Ohio State University and was a member of the technical staff at the Bell Telephone Laboratories in New Jersey. He is an active officer of IEEE and a fellow of the Electromagnetics Academy. AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4717, email: Andrew.Terzuoli@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Remote Sensing and Communications for Advanced Technical Exploitation.” Sponsor: NASIC. Funding: \$125,000.

“Nuclear Command, Control, and Communications.” Sponsor: AFRL/RI. Funding: \$225,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. Robinson, M. Piekenbrock, L. Burchett, S. Nykl, B. Woolley, and A. Terzuoli, “Real-Time Automated Aerial Refueling Using Stereo Vision,” in Advances in Visual Computing: 12th International Symposium, (ISVC 2016), Las Vegas, NV, 12-14 Dec 2016. Proceedings, Part II, ser. Lecture Notes in Computer Science. Springer International Publishing, 2016, Vol. 10073, pp. 593–602.

D Hesser, L Lee, L Burchett, R Marhefka, A Terzuoli, R Wasky, “Structural and Electromagnetic Design Considerations for Very Large Space Antennas,” Proceedings of the 2017 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI), San Diego, CA, 9-14 July 2017. [CSRA]

D Smith, B Shelters, D Hesser, P Collins, J Fee, J Petrosky, A Terzuoli, C Yardim, “Effects of Ionospheric Scintillation on V and W Band Signals,” Proceedings of the 2017 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI), San Diego, CA, 9-14 July 2017. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

D Smith, P Collins, J Fee, J Petrosky, A Terzuoli, and C Yardim, “Artificial Ionospheric Scintillation Effects on Communication Signals in the V and W Bands,” Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017), Firenze, IT, 26-30 March 2017. [CSRA]

A. Knisely, P. J. Collins, A. J. Terzuoli, “High Frequency RCS Characterization of a Unique Two Way Field Probe,” Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017), Firenze, Italy, 26-30 March 2017.

5.3. DEPARTMENT OF ENGINEERING PHYSICS

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5.3.1	<u>DOCTORAL DISSERTATIONS</u>	104
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5.3.1. DOCTORAL DISSERTATIONS

- BAUER, WILLIAM A., *Laser Heating of Graphite and Pulsed Laser Ablation of Titanium and Aluminum*. AFIT/ENP/DS/17S-020. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]
- BURGI, KENNETH W., *Reflection Matrix Method for Controlling Light after Reflection from a Diffuse Scattering Surface*. AFIT/ENP/DS/16D-011. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A.
- BURLEY, JARRED L., *A Computational Tool for Hyperspectral Propagation of NUDET Effects*. AFIT/ENP/DS/17S-021. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFTAC. [CDE]
- DAILEY, WHITMAN T., *Special Features of the Air-to-Space Neutron Transport Problem*. AFIT/ENP/DS/17S-022. Faculty Advisor: Dr. Kirk A. Mathews. Sponsor: N/A.
- EMMONS, DANIEL J., *Analysis of Ar(1s5) Metastable Populations in High Pressure Argon-Helium Gas Discharges*. AFIT/ENP/DS/17S-025. Faculty Advisor: Dr. David E. Weeks. Sponsor: DEJTO. [CDE]
- ESHEL, BEN, *Linear and Nonlinear Spectroscopy of Optically-Thick Argon and Argon-Helium Plasmas in Radio-Frequency Dielectric-Barrier Discharges*. AFIT/ENP/DS/17J-011. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]
- GONZALES, ASHLEY E., *Kinetics of Graphite Oxidation in Reacting Flow from Imaging Fourier Transform Spectroscopy*. AFIT/ENP/DS/17M-093. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]
- HALUSKA, NATHAN D., *Cascade and Two-Photon Lasing from Two-Photon Excitation of Cesium 62D*. AFIT/ENP/DS/17S-026. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO. [CDE]
- IMHOF, ERIC A., *Development of Compact, Deployable Sensors using Cold Atom Interference*. AFIT/ENP/DS/17J-073. Faculty Advisor: Dr. Glen P. Perram. Sponsor: AFRL/RV.
- KANANEN, BRANT T., *Luminescence in Lithium Borates*. AFIT/ENP/DS/17S-027. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.
- LOTT, GORDON E., *Three-Dimensional Imaging of Cold Atoms in a Magneto-Optical Trap with a Light Field Microscope*. AFIT/ENP/DS/17S-029. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RV.
- MARTIN, JACOB A., *Passively Estimating Index of Refraction for Specular Reflectors using Polarimetric Hyperspectral Imaging*. AFIT/ENP/DS/16D-016. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: DTRA. [CTISR]
- MATTERS, DAVID A., *Nuclear Structure of ^{186}Re* . AFIT/ENP/DS/16D-017. Faculty Advisor: Dr. John W. McClory. Sponsor: DNDO.
- O'KEEFE, DANIEL S., *Oblique Longwave Infrared Atmospheric Compensation*. AFIT/ENP/DS/17S-030. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFRL/RV. [CTISR]

5.3.2. MASTER'S THESES

- ARIDA, MARVIN-RAY., *Cavity Perturbation Technique of 10 GHz Cylindrical Resonator for Measuring Dielectric Properties of Materials at Very High Temperatures*. AFIT/ENP/MS/17M-086. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RX.
- BRICKEY, JAMES F., *Radiation Effects in Graphene Field Effect Transistors (GFET) on Hexagonal Boron Nitride (hBN)*. AFIT/ENP/MS/17J-009. Faculty Advisor: Lt Col Michael R. Hogsed. Sponsor: AFRL/RV. [CSRA]
- CHALAOPAK, KASIDIT V., *Rapid Location and Characterization of Radioactive Sources using an Autonomous Unmanned Aerial Vehicle*. AFIT/ENP/MS/17M-090. Faculty Advisor: Dr. Justin A. Clinton. Sponsor: DTRA.

GOUGH, BRADY M., *Characterization of Instantaneous Nonlinear Optical Refraction and Absorption in a Platinum Acetylide Organic Chromophore, E1-BTFOH*. AFIT/ENP/MS/17M-094. Faculty Advisor: Maj Manuel R. Ferdinandus. Sponsor: AFRL/RD.

HALLADA, FRANCIS D., *The Fresnel Zone Light Field Spectral Imager*. AFIT/ENP/MS/17M-095. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: N/A. [CDE/CTISR]

HAWS, DEREK W., *Using Principal Component Analysis to Improve Fallout Characterization*. AFIT/ENP/MS/17M-096. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

HOEFFNER, ZACHARY W., *A Computational Study: The Effect of Hypersonic Plasma Sheaths on Radar Cross Section for Over the Horizon Radar*. AFIT/ENP/MS/17M-097. Faculty Advisor: Maj Charlton D. Lewis. Sponsor: NASIC.

LANARI, ANN M., *Numerical Wave Optics Investigation of Optical Scatter from Statistically Rough Surface*. AFIT/ENP/MS/17M-099. Faculty Advisor: Maj Samuel D. Butler. Sponsor: AFOSR.

LENKER, RONALD C., *Characterization of Neutron and Proton Exposure on the Radiation Resistant Bacterium, deinococcus radiodurans*. AFIT/ENP/MS/17M-100. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: AFOSR.

LOGAN, JULIE V., *Rotating Scatter Mask for Gamma Source Imaging*. AFIT/ENP/MS/17M-101. Faculty Advisor: Lt Col Buckley E. O'Day. Sponsor: DTRA.

MOFFETT, KAZ A., *Optimization of a Positron Annihilation Lifetime Spectrometer to Measure Negative Point Vacancies in Hydrothermally Grown Single-Crystal Thorium Dioxide*. AFIT/ENP/MS/17M-102. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DNDO.

ROSS, JOHN S., *Total Electron Count Variability and Stratospheric Ozone Effects on Solar Backscatter and LWIR Emissions*. AFIT/ENP/MS/17M-103. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: N/A. [CDE/CSRA]

SCHULMEISTER, TAYLOR R., *Modeling the White Sands Missile Range Fast Burst Reactor using a Discrete Ordinates Code, PENTRAN*. AFIT/ENP/MS/17M-104. Faculty Advisor: Lt Col James R. Fee, Jr. Sponsor: AFTAC.

SHELBY, CLINTON A., *Tumbler-Snapper Atmospheric Nuclear Test Series Streak Film Analysis*. AFIT/ENP/MS/17M-105. Faculty Advisor: Dr. John W. McClory. Sponsor: NNSA.

THOMAS, SARAHKATIE, *Transient Nonlinear Optical Properties of Thin Film Titanium Nitride*. AFIT/ENP/MS/17M-106. Faculty Advisor: Maj Manuel R. Ferdinandus. Sponsor: AFOSR.

THORP, ETHAN D., *RbHe Potential Energy Surface Sensitivity Study*. AFIT/ENP/MS/17M-107. Faculty Advisor: Maj Charlton D. Lewis. Sponsor: MDA.

VIENS, MADILYNN E., *Liquid Crystal Performance Limitations due to Thermal Loading and Oblique Incident Angles*. AFIT/ENP/MS/17M-108. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RX.

WILSON, JACOB A., *Measuring the Nonlinear Performance of Indium Gallium Phosphide using the Z-Scan and Intensity Variation Methods*. AFIT/ENP/MS/17J-013. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: Raytheon Space and Airborne System.

WURST, NATHAN P., *Improved Atmospheric Characterization for Hyperspectral Exploitation*. AFIT/ENP/MS/17J-014. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/RX. [CDE]

5.3.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BAILEY, WILLIAM F.,

Associate Professor Emeritus of Physics, Department of Engineering Physics, AFIT Appointment Date: 1978 (AFIT/ENP); BS, United States Military Academy, 1964; MS, The Ohio State University, 1966; PhD, Air Force Institute of Technology, 1978. Dr. Bailey's research interests center on weakly ionized gases and reactive kinetics with special applications to semiconductor processing in gas discharges, shock characterization in ionized flows, and solutions of the inhomogeneous electron kinetic equation. Dr. Bailey has published over 20 papers in refereed conference proceedings and international journals and chaired over 25 theses and dissertations. He is a member of Tau Beta Pi, Sigma Pi Sigma, and Sigma Xi. Tel. 937-255-3636 x4501, email: William.Bailey@afit.edu

BARTLETT, KEVIN S., Lt Col,

Adjunct Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, University of California, Los Angeles, 1997; MS, Air Force Institute of Technology, 2004; PhD, SUNY-Albany, 2013. Lt Col Bartlett's research covers a wide range of topics in the atmospheric sciences to include problems in numerical weather prediction, dust, turbulence and thunderstorm modeling, as well as lightning, radar and satellite exploitation for space launch, Hypersonic flight, UAV, directed energy and general aviation operations. Before joining AFIT he was Commander, Detachment 1, 18th Weather Squadron, and Staff Weather Officer to the 3rd Infantry and 10th Mountain Divisions in Iraq 2008 and deployed to Afghanistan as the Chief Meteorologist for NATO and US Forces in 2014. He is a member of the American Meteorological Society, the Air Weather Association, and the American Geophysical Union.

BICKLEY, ABIGAIL, A.

Research Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2017 (AFIT/ENP); BA, Dartmouth College, 2000; PhD, University of Maryland, 2004. Dr. Bickley's expertise is in nuclear forensics and radiation transport. Her current research focuses on the characterization of radiological and nuclear samples for nuclear forensics signature identification and software development of statistical analysis tools for nuclear forensics applications. In addition, Dr. Bickley is examining neutral particle transport in the space environment. Before joining AFIT, she was on the faculty of Michigan State University and worked in nuclear treaty monitoring. Dr. Bickley is a member of the American Physical Society (APS) and American Chemical Society (ACS). Tel. 937-255-3636 x4555, email: Abigail.Bickley@afit.edu

BOSE-PILLAI, SANTASRI R.

Research Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2011 (AFIT/ENP); BE, Electrical Engineering, Jadavpur University (India), 2000; MS, Electrical Engineering, New Mexico State University, 2005; PhD, Electrical Engineering (with emphasis on Optics), New Mexico State University, 2008. Dr. Bose-Pillai's research interests are in propagation and imaging through the atmosphere, generation of partially coherent sources, telescope pointing and tracking and laser communications through free space. At AFIT, she has been working on remote characterization of atmospheric turbulence using imaging and other optical techniques. She has also been investigating methods for generation of different types of partially coherent sources. Dr. Bose-Pillai has more than fifty journal and conference publications to her credit. Prior to joining AFIT, she was a Visiting Assistant Professor in the Physics and Optical Engineering Department at Rose-Hulman Institute of Technology, Terre Haute, IN. She is a senior member of SPIE and a regular member of OSA and DEPS. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4903, email: Santasri.Bosepillai.ctr@afit.edu

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Milo W. Hyde, Santasri R. Bose-Pillai, and Ryan A. Wood, "Synthesis of non-uniformly correlated partially coherent sources using a deformable mirror," *Applied Physics Letters*, Vol. 111, No. 10, 101106 (5 pp.), Sep 2017, doi: 10.1063/1.4994669. [CDE]

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- Xifeng Xiao, David G. Voelz, Santasri R. Bose-Pillai, and Milo W. Hyde, “Modeling random screens for predefined electromagnetic Gaussian–Schell model sources,” *Optics Express*, Vol. 25, No. 4, pp. 3656-3665, Feb 2017, doi: 10.1364/OE.25.003656. [CDE]
- M. W. Hyde IV, S. Bose-Pillai, X. Xiao, and D. G. Voelz, “A fast and efficient method for producing partially coherent sources,” *Journal of Optics*, Vol. 19, No. 2, 025601 (6 pp.), Feb 2017, doi:10.1088/2040-8986/19/2/025601. [CDE]
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INVENTION DISCLOSURES

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BURGI, KENNETH, W., Maj,

Assistant Professor of Optical Engineering, Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, Michigan Technological University, 2002; MS, Michigan Technological University, 2010; PhD, Air Force Institute of Technology, 2016. Maj Burgi's research focus is primarily focused on the development of methods to control reflectively scattered light from rough surfaces. These methods could be used to reconstruct images of objects without direct line-of-sight using scattered light. As a former instructor pilot, Maj Burgi has deployed three times in support of Operation Enduring Freedom and Operation Iraqi Freedom. He has flown 1,295 combat flight hours in 363 combat sorties in the C-17 and MC-12 aircraft. He has published two referred journal articles and two conference publications. Maj Burgi is a member of SPIE and the current Deputy Department Head. Tel. 937-255-3636 x4696, email: Kenneth.Burgi@afit.edu

REFEREED JOURNAL PUBLICATIONS

Burgi, Kenneth; Ullom, Jessica; Marciniak, Michael; Oxley, Mark. 2016. "Reflective Inverse Diffusion." Appl. Sci. 6, No. 12: 370.

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BURGGRAF, LARRY W.,

Professor of Engineering Physics and Chemical Physics, Department of Engineering Physics, AFIT Appointment Date: 1994 (AFIT/ENP); BA, Chemistry, Olivet Nazarene University, 1968; MS, Chemistry, The Ohio State University, 1971; MA, Applied Mathematics, University of West Florida, 1977; PhD, Chemistry, University of Denver, 1981; Post-doctoral Associate, Computational Chemistry, Iowa State University, 1993. Dr. Burggraf conducts experimental and theoretical research in physical chemistry and materials chemistry including radiation biophysics, exotic atom chemistry, positron spectroscopy, surface and cluster spectroscopy, excitonic nanomaterials, atomic force microscopy, gamma spectroscopy and gamma imaging to solve DOD, DHS and DOE problems in WMD non-proliferation. Theoretical research to model surfaces, clusters, nanomaterials and exotic-atom molecules applies quantum mechanics modeling to interpret experimental results. Dr. Burggraf has authored more than 55 refereed archival publications. He holds one patent. He has successfully advised 45 Master's students, eight PhD students, and is currently advising one MS and one PhD student. Tel. 937-255-3636 x4507, email: Larry.Burggraf@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Characterization of Nanoscale Deformation in Polymer Nanocomposite using Positron Annihilation Spectrometry." Sponsor: AFRL/RX. Funding: \$35,000.

"Efficient Predictions of Excited States for Nanomaterials using ACES 3 & 4; 2017 Bridge; CCM." Sponsor: USA ERDC. Funding: \$150,000 – Burggraf 50%, Lutz 50%.

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"Predictive coupled cluster isomer orderings for some SinCm (m, n ≤ 12) clusters: A pragmatic comparison between DFT and complete basis limit coupled-cluster benchmarks," J.N. Byrd, J.J. Lutz, Y. Jin, D.S. Ranasinghe, J.A. Montgomery Jr, A. Perera, X.F. Duan, L.W. Burggraf, B.A. Sanders, R.J. Bartlett, J. Chem. Phys. 145(2), 024312 (2016).

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

“The Closo-Si₁₂C₁₂ Molecule from Cluster to Crystal: Structure and Properties of Closo-Si₁₂C₁₂ Siloxane Polymers,” American Chemical Society 253rd National Meeting, April, 2017, San Francisco, CA, *X.F. Duan and L.W. Burggraf*.

“Simulating Defect Spin Qubits using SIMOMM/GAMESS” GAMESS7557SSEMAG Palindromic Birthday Theory Symposium, Kauai, HI Jan 2017, *J.J. Lutz and L.W. Burggraf*

BUTLER, SAMUEL D., Maj,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Applied Physics (Computer Science Emphasis), Brigham Young University, 2004; MS, Physics, Air Force Institute of Technology, 2010; PhD, Physics, Air Force Institute of Technology, 2015. Maj Butler’s research is primarily focused on development of optical scatter models for use in remote sensing applications, particularly in the IR. He has also previously been involved in munitions development, quantum mechanical scattering, cryptography, and quantum information. Maj Butler has published two refereed journal articles and eight conference presentations. He has also deployed to Afghanistan as a deputy IG in support of Operation Enduring Freedom in 2011, and to Southwest Asia in 2016. Maj Butler is a member of SPIE and the AFIT chapter co-advisor of SPIE. AFIT research center affiliation(s): CDE and CTISR. Tel. 937-255-3636 x4385, email: Samuel.Butler@afit.edu

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Butler, S. D., J. A. Ethridge, S. E. Nauyoks, and M. A. Marciniak. “Experimentally validated modification to Cook-Torrance BRDF model for improved accuracy,” *Proc. SPIE*, 1040214 (2017). [CDE/CTISR]

Lanari, A. M., S. D. Butler, M. A. Marciniak, and M. F. Spencer. “Wave optics simulation of statistically rough surface scatter,” *Proc. SPIE*, 1040215 (2017). [CDE]

CAYLOR, MICHAEL, J.,

Associate Director, Center for Technical Intelligence Studies & Research, and Research Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2017 (AFIT/ENP); BS, Aerospace Engineering, University of Notre Dame, 1981; MS, Aerospace Engineering, University of Notre Dame, 1983; MS, Engineering Management, Florida Institute of Technology, 1985; PhD, Aerospace Engineering, University of Notre Dame, 1993;. Dr. Caylor’s current research interests include remote sensing and small satellite engineering. AFIT research center affiliation(s): CTISR. Tel. 937-255-3636 x4565, email: Michael.Caylor@afit.edu

CLINTON, JUSTIN A.,

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REFEREED JOURNAL PUBLICATIONS

A.W. Decker, S.R. McHale, J.A. Clinton, J.W. McClory, and M. Millett, “Verification and Validation of MCNP6.1 Neutron Protection Factor Estimates Using the WSMR Fast Burst Reactor,” *Journal of Radiation Effects, Research and Engineering*, Vol. 35, No. 1, pp. 43-48, April 2017.

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William J. Erwin, Edward Cazalas, John W. McClory, Justin A. Clinton, James R. Fee, Andrew W. Decker, “Modeling Prompt Gamma Spectra at Varying Distances from an Unshielded Fast Fission Reactor,” presented at the *16th International Symposium on Reactor Dosimetry* in Santa Fe, NM on 9 May 2017.

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FEE, JAMES R. Jr., Lt Col,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Purdue University, 1997; MS, Air Force Institute of Technology, 2002; PhD, Air Force Institute of Technology, 2015. Lt Col Fee’s research is primarily focused on computational simulation of nuclear weapon effects with a focus in electromagnetic pulse. He has also previously managed radiation hardened microelectronics programs for satellite and missile systems. Lt Col Fee has published one refereed journal article and one conference presentation. He also deployed to Iraq as an Intelligence Advisor in support of Operation New Dawn. Lt Col Fee is the faculty advisor and member of the American Nuclear Society and additionally holds a Master of Military Operational Art and Science from Air University (2012). Tel. 937-255-3636 x4438, email: James.Fee@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Computational Methods for Nuclear Treaty Monitoring.” Sponsor: AFTAC. Funding: \$47,000.

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J.R. Fee Jr., J. C. Petrosky, and B. F. Akers, “Reestablishing an Air Burst EMP Simulation Capability,” *Journal of Radiation Effects, Research and Engineering* Vol. 34, No. 1, December 2016.

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William J. Erwin, Edward Cazalas, John W. McClory, Justin A. Clinton, James R. Fee, Andrew W. Decker, “Modeling Prompt Gamma Spectra at Varying Distances from an Unshielded Fast Fission Reactor,” presented at the *16th International Symposium on Reactor Dosimetry* in Santa Fe, NM on 9 May 2017.

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

D Smith, P Collins, J Fee, J Petrosky, A Terzuoli, and C Yardim, “Artificial Ionospheric Scintillation Effects on Communication Signals in the V and W Bands,” Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017), Firenze, IT, 26-30 March 2017.

T.C. Schulmeister, J. R. Fee Jr, B. Singleton, G.E. Sjoden, “Modeling the White Sands Missile Range Fast Burst Reactor Using a Discrete Ordinates Code, PENTRAN,” 2017 HEART Conference in Dever, CO (25 Apr 2017).

T.C. Schulmeister and J. R. Fee Jr, “Modeling the White Sands Missile Range Fast Burst Reactor Using a Discrete Ordinates Code, PENTRAN,” 2017 ISRD Conference in Santa Fe, NM (9 May 2017).

D Smith, B Shelters, D Hesser, P Collins, J Fee, J Petrosky, A Terzuoli, C Yardim, “Effects of Ionospheric Scintillation on V and W Band Signals,” *Proceedings of the 2017 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI)*, San Diego, CA, 9-14 July 2017.

FERDINANDUS, MANUEL R., Maj,

Assistant Professor of Optical Sciences, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, Seattle University, 1999; MS, Rochester Institute of Technology, 2007; PhD, University of Central Florida, 2014. Maj Ferdinandus performs research into nonlinear optics, optical limiting, infrared laser sources and hyperspectral target detection. Previously he has worked in space operations and satellite system acquisition. He has published two refereed journal articles and seven conference presentations. Maj Ferdinandus is a member of the Optical Society of America. AFIT research center affiliation(s): CDE and CSRA. Tel. 937-255-6565 x4339, email: Manuel.Ferdinandus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Organic Chromophores for Sensor Hardening.” Sponsor: AFOSR. Funding: \$3,016.

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Ferdinandus, M. R., et al. (2017). “Analysis of beam deflection measurements in the presence of linear absorption.” *Optical Materials Express* 7(5): 1598-1605.

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Reed, J., Ferdinandus, M. R., et al. (2017). Ultrafast Transient Nonlinear Dynamics of Two-Layer Graphene Sheets. CLEO: QELS Fundamental Science, Optical Society of America (accepted).

FIORINO, STEVEN T.,

Director, Center for Directed Energy, and Associate Professor of Atmospheric Physics, Department of Engineering Physics, AFIT Appointment Date: 2003 (AFIT/ENP); BS, Geography (Climatology), The Ohio State University, 1987; BS, Meteorology, Florida State University, 1989; MS, Atmospheric Dynamics, The Ohio State University, 1993; PhD, Physical Meteorology, Florida State University, 2002. Dr. Fiorino’s research interests include retrieving environmental parameters via microwave remote sensing; developing signal processing algorithms to fuse meteorological data collection with non-weather ISR platforms; evaluating uncertainty in high-energy laser engagement due to atmospheric effects; and improving microphysical characterizations for nuclear fallout, transport, and dispersion. He has published broadly in meteorological, directed energy, and military journals. Dr. Fiorino is a member of the American Meteorological Society, American Institute of Aeronautics and Astronautics, the Directed Energy Professional Society, Society of Photo-Instrumentation Engineers (SPIE), and additionally holds a Master of Military Operational Art and Science from Air University (2003). AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4506, email: Steven.Fiorino@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

- “Wave Optics of Deep Atmospheric Turbulence: From Underlying Physics towards Predictive Modeling, Mitigation and Exploitation.” Sponsor: AFOSR. Funding: \$180,000. [CDE]
- “Airborne Aero-optics Lab Beam Control Collection and Evaluation.” Sponsor: DEJTO. Funding: \$53,080. [CDE]
- “AFIT Research in Support of ONR’s US-India OSD-DRDO Collaborations.” Sponsor: ONR. Funding: \$680,000 – Fiorino 25%, Sritharan 25%, Akers 25%, Reeger 25%. [CDE]
- “Directed Energy and Remote Sensing Research, Development and Prototype Demonstration.” Sponsor: Raytheon. Funding: \$50,000. [CDE]
- “Wavefront Measurement through Scintillation with Speckle.” Sponsor: AFRL/RD. Funding: \$100,000. [CDE]
- “2017 AFIT Center for Directed Energy DOD HPCMP HPC Internship Program (HIP).” Sponsor: HPCMP. Funding: \$48,000. [CDE]
- “Weather Effects for Integrated HEL / KE Weapons Capabilities Analyses.” Sponsor: AFRL/RD. Funding: \$100,000. [CDE]
- “CFLOS - 4D Weather Cubes for HyDRA.” Sponsor: AFRL/RD. Funding: \$150,000. [CDE]
- “2017 AFIT Center for Directed Energy Summer Intern (DESI) Program.” Sponsor: DEJTO. Funding: \$60,000. [CDE]
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- “CY2017 HEL JTO AP TAWG Product Development.” Sponsor: DEJTO. Funding: \$400,000. [CDE]
- “CY2017 HEL JTO AP TAWG Research and Analysis.” Sponsor: DEJTO. Funding: \$375,000. [CDE]

SPONSOR FUNDED EDUCATIONAL PROJECTS

- “High Energy Laser End to End Operational Simulation (HELEEOS) Short Course.” Sponsor: AFTAC. Funding: \$8,543. [CDE]

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- Schmidt, J., Fiorino S.T., J. Burley, and B. Elmore, “Multi-spectral Weather Cubes for atmospheric plume characterization,” in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), San Francisco CA, (OSA, 27 June 2017). [CDE]

- McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, "Analysis of Turbulence Anisotropy with a Hartmann Sensor," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, San Francisco CA, (OSA, 27 June 2017). [CDE]
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- Wurst, N.P., J. Meola, and S.T. Fiorino, "Improved Atmospheric Characterization for Hyperspectral Exploitation," *Proceedings of SPIE*, Vol. 10198, 101980B, Anaheim, CA, 11 April 2017. [CDE]
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- Van Zandt, N.R., M.W. Hyde, S.R. Bose-Pillai, and S.T. Fiorino, "Simulating Time-Evolving Non-Cross-Spectrally Pure Schell-Model Sources," 2017 IEEE Aerospace Conference, Big Sky, MT, March 2017. [CDE]
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- McCrae, J.E. and S.T. Fiorino, "Comparison between Wave Optics and Scaling Law Models for Coherent Laser Arrays," *UK/US Directed Energy Workshop*, Swindon, UK, 12-15 June 2017. [CDE]
- Bowers, J. and S.T. Fiorino, "Assessing the trade space for Techniques, Analysis, Calibration, and Standards, for High Energy Laser Sensors (TACoSHELS) program," *UK/US Directed Energy Workshop*, Swindon, UK, 12-15 June 2017. [CDE]
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- Schmidt, J.E., S.T. Fiorino, B.J. Elmore, J.L. Burley, and K.J. Keefer, "Evaluation of Probabilistic Climatology as a Determiner for HEL System Performance," *Directed Energy Professional Society 19th Annual DE Symposium*, Huntsville, AL (February 2017). [CDE]
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Van Zandt, N.R., S.T. Fiorino, J. McCrae, and D. Kunkel, "Imaging and Tracking Modeling including Earth Reflection and Multiple Scattering," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 2016. [CDE]

INVENTION DISCLOSURES

Fiorino, Steven T., McCrae, Jack E., Schmidt, Jason, Zuraski, Steven M., Figlewski, Nathan M., Beecher, Elizabeth A., "Design for an Electro-Optic Testbed Utilizing a Dynamic Range Gated Rayleigh Beacon for Atmospheric Turbulence Profiling." filed 11 Jul 17, Air Force Docket No. ADF-1721.

FRANZ, ANTHONY L., Lt Col,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, United States Air Force Academy, 1992; MS, Air Force Institute of Technology, 1997; PhD, University of Maryland, 2007. Lt Col Franz's research focuses on lasers and optics. His recent work has focused on developing light weight diffractive optics for use on satellites and novel approaches for imaging and hyperspectral imaging systems. Before joining AFIT, he was a physics faculty member at the Air Force Academy for eight years and deployed to Iraq and Afghanistan. He has also worked in nuclear treaty monitoring and infrared missile engagement modeling and simulation. Lt Col Franz is a member of the American Association of Physics Teachers (AAPT), the American Physical Society (APS), and the International Society for Optics and Photonics (SPIE). AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x4429, email: Anthony.Franz@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Plenoptic Cameras for 3D Video." Sponsor: Undisclosed. Funding: \$7,150. [CTISR/CSRA]

REFEREED JOURNAL PUBLICATIONS

Francis D. Hallada, Anthony L. Franz, Michael R. Hawks. *Fresnel zone plate light field spectral imaging*. Optical Engineering 56(8), 081811 (2017). [CTISR]

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Francis D. Hallada, Anthony L. Franz, Michael R. Hawks, "Fresnel zone plate light field spectral imaging simulation," in Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIII, David W. Messinger, Miguel Velez-Reyes, Editors, Proceedings of SPIE Vol. 10198 (SPIE, Bellingham, WA 2017), 1019804. [CTISR]

GILES, NANCY C.,

Professor of Physics and Head, Department of Engineering Physics, AFIT Appointment Date: 2009 (AFIT/ENP); BS, University of North Carolina at Chapel Hill, 1981; PhD, North Carolina State University, 1987. Dr. Giles' research focuses on solid-state physics: photoluminescence (PL), absorption, Raman, and magnetic resonance (EPR) spectroscopy leading to identification of point defects in semiconducting and optical materials; PL excitation and time-resolved PL spectroscopies; nonlinear optical materials; laser-host materials; and scintillators. She is the author of 182 archival publications in refereed journals. Before joining AFIT, she was a physics faculty member at West Virginia University for 19 years. Her current work includes studies of scintillator materials for improved detection of nuclear radiation, wide band-gap semiconductors for photorefractive applications, and infrared non-linear optical materials for infrared countermeasures. Dr. Giles is a member of the Optical Society of America, American Physical Society, and Materials Research Society. Tel. 937-255-3636 x4601, email: Nancy.Giles@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Characterization of Point Defects in Semiconducting Oxide Crystals." Sponsor: AFOSR. Funding: \$11,220.

“Performance-Modifying Defects in Birefringent and Photorefractive Crystals.” Sponsor: AFOSR. Funding: \$10,120.

“Next Generation Nonlinear Crystals for High Power Lasers Years 2, 3 (Follow-on to Proposal #21016-221).”
Sponsor: AFRL/RD. Funding: \$25,000.

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“Electron paramagnetic resonance study of neutral Mg acceptors in β -Ga₂O₃ crystals,” B. E. Kananen, L. E. Halliburton, E. M. Scherrer, K. T. Stevens, G. K. Foundos, K. Chang, and N. C. Giles, Applied Physics Letters 111, article No. 072102 (Aug 2017).

“Gallium vacancies in β -Ga₂O₃ crystals,” B. E. Kananen, L. E. Halliburton, K. T. Stevens, G. K. Foundos, and N. C. Giles, Applied Physics Letters 110, article No. 202104 (5 pages) (May 2017).

“Defect-related optical absorption bands in CdSiP₂ crystals,” E. M. Scherrer, B. E. Kananen, E. M. Golden, F. K. Hopkins, K. T. Zawilski, P. G. Schunemann, L. E. Halliburton, and N. C. Giles, Optical Materials Express, Vol. 7, pp. 658-664 (March 2017).

“Dual role of Sb ions as electron traps and hole traps in photorefractive Sn₂P₂S₆ crystals,” B. E. Kananen, E. M. Golden, S. A. Basun, D. R. Evans, A. A. Grabar, I. M. Stoika, J. W. McClory, N. C. Giles, and L. E. Halliburton, Optical Materials Express, Vol. 6, pp. 3992-3999 (Dec 2016)

“Sn vacancies in photorefractive Sn₂P₂S₆ crystals: An EPR study of an optically active hole trap,” E. M. Golden, S. A. Basun, A. A. Grabar, N. C. Giles, D. R. Evans, and L. E. Halliburton, Journal of Applied Physics, Vol. 120, article No. 133101 (Oct 2016).

GROSS, KEVIN C.,

Director, Center for Technical Intelligence Studies & Research, and Associate Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Wright State University, 1998; MS, Wright State University, 2001; PhD, Air Force Institute of Technology, 2007. Dr. Gross’ main interests are remote sensing, spectroscopy, and radiative transfer, and his research is focused on the remote sensing of chemically evolving systems in the battlespace (detonation fireballs, muzzle flashes, rocket and jet engine plumes, smokestack effluents, etc.) using hyperspectral, radiometric and high-speed imagery techniques. He is developing hyperspectral imaging and spectral retrieval algorithms for quantitative combustion and flow field diagnostics. He is also leading a new effort to develop polarimetric hyperspectral imaging for improved target detection and robust material identification. He has 28 archival publications in peer reviewed journals and has secured over \$4M in external funding. He has successfully chaired 10 MS students, four PhD student, and is currently advising two PhD students and two MS students. He is a member of the Optical Society of America (OSA), SPIE, and the Combustion Institute. AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4558, email: Kevin.Gross@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-INT Fusion for Anomaly Detection.” Sponsor: Undisclosed. Funding: \$34,829 – Gross 25%, McBee 25%, Oxley 25%, Hopkinson 25%. [CTISR]

“Fuel Injection Diagnostics in Hypersonic Flow via Hyperspectral Imaging.” Sponsor: AFOSR. Funding: \$44,895. [CTISR]

“Fieldable Fireball In-situ and Remote Emission Spectroscopy Sensor Suite (F2IRES3).” Sponsor: Spectral Sciences. Funding: \$24,469. [CTISR]

“Remote Sensing Research Support ((RS)²).” Sponsor: Undisclosed. Funding: \$170,000 – Gross 4%, Oxley 36%, Steward 24%, Hopkinson 24%. [CTISR]

“Open Skies IR Target Study.” Sponsor: NASIC. Funding: \$118,000 – Gross 5%, Hawks 75%, Marciniak 10%, Steward 5%. [CTISR]

“Developing Physics-Based Machine Learning Algorithms to Exploit Hyperspectral Imagery.” Sponsor: AFRL/R.Y. Funding: \$50,000 – Gross 33%, Merkle 33%, Borghetti 33%. [CTISR]

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Daniel Baseley, Luke Wunderlich, Grady Phillips, Kevin Gross, Glen Perram, Stuart Willison, Rebecca Phillips, Matthew Magnuson, Sang Don Lee, Willie F. Harper Jr., “Hyperspectral analysis for standoff detection of dimethyl methylphosphonate on building materials,” *Building and Environment*, Vol 108, pp 135–142 (2016). [CTISR]

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Amy Kerst, Kevin C. Gross, Evan P. Oren, Jeffrey R. Komives, Michael Rhoby, and Timothy Ombrello. “Preliminary Investigation of a Scramjet Flowfield with Hyperspectral Imaging Augmented by Large Eddy Simulation,” 33rd AIAA Aerodynamic Measurement Technology and Ground Testing Conference, AIAA AVIATION Forum, (AIAA 2017-3554), Denver, CO, 5-9 June 2017. [CTISR]

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Michael R. Rhoby, Amy M. Kerst, Kevin C. Gross, Timothy M. Ombrello, “Hyperspectral Imaging Diagnostics of a Scramjet Combustor Cavity,” presented at the 10th U.S. National Combustion Meeting of the Combustion Institute, College Park, MD, April 23-26, 2017. [CTISR]

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Jacob A. Martin, Kevin C. Gross, “Estimating Index of Refraction for Specular Reflectors Using Passive Polarimetric Hyperspectral (P-HSI) Radiance Measurements,” accepted for publication in *Optical Engineering*, 22 Jun 2017. [CTISR]

HAWKS, MICHAEL R.,

Research Assistant Professor of Optical Engineering (through Perduco), Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Astrophysics, Michigan State University, 1991; MS, Engineering Physics, AFIT, 1993; PhD, Optical Sciences, AFIT, 2006. Dr. Hawks’ main research interests include electro-optic and infrared (EO/IR) remote sensing. Specific application areas include monocular passive ranging and hyperspectral and polarimetric imaging. He previously taught at the United States Air Force Academy and has conducted research in chemical lasers, space object identification, chem/bio agent detection, infrared countermeasures, nuclear detonation detection, and other remote sensing applications at the Air Force Research Laboratory and other assignments. He has received 12 research grants, chaired nine MS committees and published 35 technical papers and reports. He is a member of the Optical Society of America and SPIE and is a retired USAF Lt Col. AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4828, email: Michael.Hawks.ctr@afit.edu

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F.D. Hallada, A.L. Franz, M.R. Hawks, “Fresnel zone plate light field spectral imaging,” *Opt Eng* 56(8), 081811 (2017). [CTISR]

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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M. R. Hawks and B. J. Steward, “IR Signatures of Non Afterburning Aircraft,” Air Force Institute of Technology, Wright-Patterson AFB, OH, 2016 (DTIC No. AD1020325). [CTISR]

HENGESOLD, ROBERT L.,

Professor Emeritus of Physics, Department of Engineering Physics, AFIT Appointment Date: 1961 (AFIT/ENP); AB, Thomas More College, 1956; MS, University of Cincinnati, 1961; PhD, University of Cincinnati, 1965. Dr. Hengesold’s research areas center on experimental solid state physics, semiconductor physics, optical diagnostics, and electron and laser spectroscopy. He is the author of over 100 archival publications and over 215 presentations at technical meetings. He has served as advisor on over 17 doctoral dissertations and 80 master’s theses. He is currently carrying out studies of (1) depth resolved cathodoluminescent spectroscopy of materials suitable for neutron absorbing semiconductor solid state detectors and (2) optical characterization of compound semiconductor materials and superlattice structures for mid-infrared diode lasers and detectors. This work involves collaborative efforts with the Directed Energy and Sensors Directorates at AFRL and DTRA. Dr. Hengesold received the Air University Commander’s Award for Faculty Achievement in 1982, the Gage H. Crocker Outstanding Professor Award in 1996, the Outstanding Professional Achievement Award from the Affiliate Society Council of the Engineering and Science Foundation of Dayton in 1997, and the General Bernard A. Schriever Award in 1999. He was elected a Fellow of the American Physical Society in 2008. Tel. 937-255-3636 x4502, email: Robert.Hengesold@afit.edu

HERR, NICHOLAS, C., Capt,

Assistant Professor of Materials Science, Department of Engineering Physics, AFIT, Appointment Date: 2016 (AFIT/ENP); BS, United States Air Force Academy, 2008; MS, Air Force Institute of Technology, 2010; PhD, Air Force, 2016. Capt Herr’s research focuses on high-power laser damage of carbon composites, remote sensing, and atomic force microscopy.

REFEREED JOURNAL PUBLICATIONS

Grady T. Phillips, William A. Bauer, Charles D. Fox, Ashley E. Gonzales, Nicholas C. Herr, Ryan C. Gosse, and Glen P. Perram, “Mass removal by oxidation and sublimation of porous graphite during fiber laser irradiation,” Optical Engineering, 56, 011013, Jan 2017.

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HOGSED, MICHAEL R., Lt Col,

Assistant Professor of Engineering Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Baylor University, 1997; MS, Oklahoma State University, 1999; PhD, Air Force Institute of Technology, 2005. Lt Col Hogsed’s research focuses on semiconductor device characterization and radiation effects on advanced microelectronic materials and devices. He has published three refereed journal articles. Currently under

investigation are hexagonal boron nitride (h-BN) and germanium tin ($\text{Ge}_{1-x}\text{Sn}_x$) materials, as well as graphene field effect transistors. Lt Col Hogsed also has 10 years' experience in the Air Force nuclear enterprise as an analyst and S&T manager for a variety of nuclear matters, to include treaty monitoring, weapon employment planning factors, and counterproliferation intelligence. Tel. 937-255-3636 x4547, email: Michael.Hogsed@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Irradiation of Thin Film Systems." Sponsor: AFRL/RV. Funding: \$15,014 – Hogsed 75%, McClory 25%.

REFEREED JOURNAL PUBLICATIONS

K. Bole, E. Johnson, W. Shedd, M. Hogsed, N. Kaminski, C. O'Daniel, C. Eichert, B. Poling, and W. Gouty, "Comprehensive Radiation Study of Commercial Gallium Nitride Radio Frequency Solid State Power Amplifiers (SSPA)," *Journal of Radiation Effects, Research and Engineering*, Vol. 35, No. 1, pp. 29-34 (2017).

JENNIGES, JANELLE V., Maj,

Assistant Professor of Space Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Meteorology-Climatology, University of Nebraska - Lincoln, 2005; MBA, University of Phoenix, 2009; MS, Applied Physics, Air Force Institute of Technology, 2011; PhD, Physics, Utah State University, 2015. Maj Jenniges' research covers a wide range of topics in the space physics to include the improved specification of ionospheric space weather models, the structure of the high-latitude electric fields, and the transition of cutting-edge research to operational forecast products. Before her assignment at AFIT, Maj Jenniges served as a forecaster in the 21st Operational Weather Squadron in Germany and as a Staff Weather Officer in 17th Air Force during the standup of Air Forces Africa. She was also the flight commander of the Space Weather Operations Center in Omaha, NE. She is a member of Tau Beta Pi National Honor Society, the Golden Key National Honor Society, and the American Geophysical Union. Tel. 937-255-3636 x4646, email: Janelle.Jenniges@afit.edu

LEWIS, C. DAVID, II, Maj,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS & BA, Physics & Chemistry, Duke University, 2005; MS, Applied Physics, Air Force Institute of Technology, 2009; PhD, Physics, Air Force Institute of Technology, 2011. Maj Lewis' primary research interests focus on computationally modeling quantum mechanical, electrodynamical, and aeronautical phenomenon for applications to various classes of lasers, hypersonic/plasma/EM interactions, interaction of microwaves with electronics, chemical/biological agent neutralization and ionospheric prediction. Before joining AFIT, Maj Lewis has served in a number of scientific roles including assignments at AFRL Sensors Directorate and the Defense Threat Reduction Agency (DTRA). At AFRL, he was a lead researcher on electronic attack techniques to disrupt/disable surveillance radars, small UAVs, and IEDs. At DTRA, he was chief scientist for offensive counter-WMD advanced technologies where he brought together directed energy, access denial technologies, and counter-communication techniques to develop highly asymmetrical capabilities to hold at risk chemical and biological production, storage facilities, and the means to employ those weapons. Additionally, Maj Lewis served a deployment tour with the Joint Special Operations Command as an Operations Officer for an Army special operations unit in the Middle East. He is a member of Tau Beta Pi and Sigma Pi Sigma. Tel. 937-255-3636 x4695, email: Charlton.Lewis@afit.edu

REFEREED JOURNAL PUBLICATIONS

C.D. Lewis and D.E. Weeks, Theoretical Cross Sections of the Inelastic Fine Structure Transition $M(^2P_{1/2}) + \text{Ng} \leftrightarrow M(^2P_{3/2}) + \text{Ng}$ for $M = \text{K, Rb, and Cs}$, and $\text{Ng} = \text{He, Ne, and Ar}$, *J. Phys. Chem. A*, 121, April 2017, pp 3340-3351.

LEWIS, DOUGLAS R., LTC,

Assistant Professor of Biodefense Science, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Biology, USAF Academy 1991; MS, Genetics, Pennsylvania State University 1995; PhD, Biodefense, George Mason University 2012. LTC Lewis' previous research focused on genetic components of the insect immune system, genetic response to laser induced damage, peptide capture of biological agents, genetic identification of smallpox, and the organizational factors which have influenced the development of the US Biodefense program. Before joining AFIT, he served 16 years in the US Air Force and five years in the US Army to include assignments as an aircraft maintenance officer and as an Assistant Professor of Biology at the Air Force Academy. He

also served in counter-WMD positions with the Defense Intelligence Agency (DIA), Air Staff, as an US/UK exchange scientist and with the Defense Threat Reduction Agency (DTRA). LTC Lewis' current research is investigating the genetic components of extreme radiation resistance in bacteria. His other interest is investigating the possibility of developing a biological collection network based upon native collection entities. Tel. 937-255-3636 x4569, email: Douglas.Lewis@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Study of Bio-Corrosion of Selected Model Materials using XPS and Other Selected Methods." Sponsor: AFRL/RX. Funding: \$40,000 – Lewis 90%, Felker 10%.

LOPER, ROBERT D.,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, University of Dayton, 1994; MS, University of Texas at Dallas, 1998; MTS, United Theological Seminary, 2011; PhD, Air Force Institute of Technology, 2013. Dr. Loper's research interests are in computational physics, centering on noble gas laser systems, and space physics, centering on solar astrophysics, magnetospheric physics, and the near-Earth space environment. Dr. Loper is a member of Tau Beta Pi and Sigma Pi Sigma. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4333, email: Robert.Loper@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Anthony Gavrieladas, Vern Schlie, Robert Loper, Michael Hawks, and Glen Perram, "Unstable resonators for high power diode pumped alkali lasers," Proc SPIE 10090-57, Photonics West, Feb 2017.

MARCINIAK, MICHAEL A.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1999 (AFIT/ENP); BS, St. Joseph's College, 1981; BSEE, University of Missouri, 1983; MSEE, Air Force Institute of Technology, 1987; PhD, Air Force Institute of Technology, 1995. Dr. Marciniak's research interests include various aspects of light-matter interaction, including (1) polarimetric scatterometry of nanostructured materials, such as photonic crystals, plasmonic materials, and optical meta-materials; (2) bidirectional reflectance distributions for optical signatures; and (3) high-energy laser damage assessment. He has published 30 refereed and 73 other publications and chaired 9 PhD and 52 MS thesis committees. He holds one patent. He is a retired Lt Col, USAF, with 22 years of service. AFIT research center affiliation(s): CDE, CSRA, and CTISR. Tel. 937-255-3636 x4529, email: Michael.Marciniak@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Discontinuous Phase Surfaces for Low-Profile Infrared Optics." Sponsor: AFOSR. Funding: \$50,400. [CDE]

"Modeling of a High-Temperature Transient RF Measurement System." Sponsor: AFRL/RX. Funding: \$15,000.

"Scattering Effects of Human Skin and Hair." Sponsor: 711 HPW. Funding: \$50,000. [CTISR]

"Spectral, Polarimetric and Directionally Dependent Metrology of Infrared Metamaterials." Sponsor: Undisclosed. Funding: \$65,540. [CTISR]

"Engineering Approach to Turbine-Engine Plume IR Signature." Sponsor: AFRL/STO. Funding: \$13,949. [CTISR]

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Burgi, K.W., Marciniak, M.A., Oxley, M.E. and Nauyoks, S.E., "Measuring the reflection matrix of a rough surface," Applied Sciences Vol. 7, No. 568, pp. 1-15 (May 2017). [CDE]

Burgi, K.W., Ullom, J.M., Marciniak, M.A. and Oxley, M.E., "Reflective Inverse Diffusion," Applied Sciences Vol. 6, No. 370, pp. 1-17 (Nov 2016). [CDE]

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Burgi, K.W. and Marciniak, M.A., “Reflective inverse diffusion method for dynamic compensation of small optical system perturbations,” *Proc. SPIE 10347, 10347-20* (2017). [CDE]

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Lanari, A., Butler, S.D., Marciniak, M.A. and Spencer, M.F., “Wave optics simulation of statistically rough surface scatter,” *Proc. SPIE 10402, 1040215(1-9)* (2017). [CDE/CTISR]

Adomanis, B.M., Burckel, D.B. and Marciniak, M.A., “Design of infrared meta-surfaces for low-profile optics using COMSOL Multiphysics®.” [CDE]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Adomanis, B.M., Burckel, D.B. and Marciniak, M.A., “Design and fabrication of meta-surface lenses in MWIR,” presented at 2016 Quantum Meta-photonics and Metamaterials MURI Review held on 7-9 November 2016 in Arlington, VA. [CDE]

MATHEWS, KIRK A.,

Professor Emeritus of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 1987 (AFIT/ENP); BS, California Institute of Technology, 1971; MS, Air Force Institute of Technology, 1982; PhD, Air Force Institute of Technology, 1983. Dr. Mathews’ research interests center on computational methods for neutral particle radiation transport and modeling and analysis of nuclear phenomena and measurements, including enrichment cascade modeling, high altitude radiation transport, blast and shock, nuclear thermal radiation, deconvolution of radiation spectra, and statistical analysis of nuclear measurements. Dr. Mathews has published 20 papers in refereed journals and 21 conference proceedings and chaired 35 theses and 13 dissertations. He is a member of the American Nuclear Society and Tau Beta Pi.

MCCLORY, JOHN W.,

Associate Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Physics, Rensselaer Polytechnic Institute, 1984; MS, Physics, Texas A&M University, 1993; PhD, Nuclear Engineering, Air Force Institute of Technology, 2008. Dr. McClory’s expertise is in radiation effects, nuclear physics, and nuclear weapon effects. His research includes determining the effect of space and nuclear weapon radiation on electronic and structural materials. It also includes the interaction of radiation with matter and the use of nuclear reactions to inform nuclear forensics techniques. He has advised 14 PhD students (five current) and 32 MS students (two current), received 17 research grants, and published 81 journal articles during his time on the AFIT faculty. He is a member of the IEEE Nuclear and Plasma Sciences Society, American Nuclear Society, and Materials Research Society. AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x7308, email: John.McClory@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENP Research in Support of Defense Threat Reduction Agency Nuclear Technologies.” Sponsor: DTRA. Funding: \$150,000 – McClory 50%, Petrosky 50%.

“Modification of Boron Carbide for Direct Neutron Detection Applications.” Sponsor: AFRL/RX. Funding: \$30,000.

“Support for the US Nuclear Detonation Detection System.” Sponsor: DOE/NNSA. Funding: \$50,000 – McClory 50%, Singleton 50%.

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- A. M. Hurst, R. B. Firestone, B. W. Sleaford, D. L. Bleuel, M. S. Basunia, F. Bečvář, T. Belgya, L. A. Bernstein, J. J. Carroll, B. Detwiler, J. E. Escher, C. Genreith, B. L. Goldblum, M. Krtićka, A. G. Lerch, D. A. Matters, J. W. McClory, S. R. McHale, Zs. Révay, L. Szentmiklosi, D. Turkoglu, A. Ureche, and J. Vujic, “Developments in capture-gamma libraries for nonproliferation applications,” *European Physical Journal (EPJ) Web of Conferences*, issue 146, 09008 (4 pages), Sep 2017.
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MCCRAE, JACK E., Jr.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2013 (AFIT/ENP); BS, Physics, Massachusetts Institute of Technology, 1984; MS, Physics (Optics), Air Force Institute of Technology, 1993; PhD, Physics, Air Force Institute of Technology, 1997. Dr. McCrae’s research interests include optics, lasers, quantum and non-linear optics, quantum computing, laser radar, atmospheric propagation, and imaging. He is a retired USAF Col with 27 years of service. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4739, email: Jack.Mccrae@afit.edu

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Hyde IV, M. W., J E. McCrae, and G. A. Tyler, “Target-based coherent beam combining of an optical phased array fed by a broadband laser source,” Journal of Modern Optics, Vol. 64, Iss. 20, 2017. doi:10.1080/09500340.2017.1343403. [CDE]

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NAUYOKS, STEPHEN E.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2010 (AFIT/ENP); BS, Applied Mathematics, 2002; MS, Applied Mathematics, New Jersey Institute of Technology, Newark, NJ, 2004; PhD, Physics, Texas Christian University, Fort Worth, TX, 2009. Dr. Nauyoks has been modifying a CASI system to be able to run full polarimetric scatterometry analysis using lasers at variable wavelengths of unique materials with nano and micron sized structures. Dr. Nauyoks is a member of the Society of Photo-Instrumentation Engineers (SPIE). AFIT research center affiliation(s): CDE.

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NAVA, OMAR A., Maj,

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, United States Air Force Academy, 2005; BS, Naval Postgraduate School, 2006; MS, Southern Methodist University, 2010; MS, Air Force Institute of Technology, 2011; PhD, University of California Los Angeles, 2016. Maj Nava's research interests cover a variety of topics in atmospheric science to include problems in numerical weather prediction, tropical meteorology, mesoscale processes, and space physics. He has advised three MS students during his time on the AFIT faculty. Before joining AFIT, he was the Chief of Weather Operations at the Joint Space Operations Center in Vandenberg AFB, CA. He has seven archival publications and presentations and a member of the American Meteorological Society and American Geophysical Union. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4518, email: Omar.Nava@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Methodology for Assessing Sensor Performance in the Global Assimilation of Ionospheric Measurements Model." Sponsor: Undisclosed. Funding: \$328,490 – Nava 50%, Stenger 50%.

“Space Weather Impacts on HF Propagation.” Sponsor: AFRL/RV. Funding: \$33,750. [CSRA]

O'DAY, BUCKLEY E., LTC,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Civil Engineering, United States Military Academy, 1996; MIM, Master of International Management, University of Maryland University College, 2005; MS, Nuclear Engineering, Air Force Institute of Technology, 2009; PhD, Nuclear Science and Engineering, Massachusetts Institute of Technology, 2015. LTC O'Day's research interests cover a variety of topics in nuclear physics and nuclear engineering to include nuclear weapon effects, nuclear nonproliferation, nuclear counter proliferation, radiation health physics, and radiation detection. LTC O'Day is a basic branch Infantry Officer and a Nuclear Counter proliferation officer. He has advised one PhD students and four MS student received two research grant, and published two journal articles during his time on the AFIT faculty. He is a member of the American Nuclear Society and a research affiliate with the Department of Nuclear Science and Engineering at the Massachusetts Institute of Technology. Tel. 937-255-3636 x4609, email: Buckley.O'Day@afit.edu

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PERRAM, GLEN P.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1989 (AFIT/ENP); BS, Cornell University, 1980; MS, Air Force Institute of Technology, 1981; PhD, Air Force Institute of Technology, 1986. Dr. Perram's research interests include high power chemical lasers, optically pumped gas phase lasers, laser-material interactions, hyperspectral imaging, reaction kinetics, atomic and molecular spectroscopy, environmental science, photochemistry, optical diagnostics, and remote sensing. He has advised 36 PhD and 49 MS students, received 48 research grants, and published over 90 journal articles during his 28 years on the AFIT faculty. Dr. Perram is a fellow of the Directed Energy Professional Society and a Registered Professional Engineer in the State of Ohio. AFIT research center affiliation(s): CDE and CTISR. Tel. 937-255-3636 x4504, email: Glen.Perram@afit.edu

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“In-Process Monitoring of Additive Manufacturing. Phase II. Selective Laser Melting and E-Beam Manufacture.” Sponsor: NASA (WSU and MLPC). Funding: \$118,820. [CDE]

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PETROSKY, JAMES C.,

Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2000 (AFIT/ENP); BA, Engineering Physics/Computer Science, Millersville University of Pennsylvania, 1984; MS, Engineering Physics, Rensselaer Polytechnic Institute, 1992; PhD, Engineering Physics, Rensselaer Polytechnic Institute, 1995. Dr. Petrosky has expertise in radiation effects on electronic devices, EMP, experimental design, radiation detection, and nuclear weapon effects. His research spans narrow and wide band gap materials using combinations of electrical, optical, and absorption spectroscopy to gain information on the damaging effects of ionizing and non-ionizing radiation. Experimental techniques include I-V(T), C-V(T), photoluminescence spectroscopy, Hall Effect, x-ray and UV photo spectroscopy; applications of measurement techniques in harsh environments/in-situ measurements and obtaining real-time data. Applications include electronic switches and actuators, RF/IR sensors, force transducers, and electronics controls for use in the space and nuclear weapons environment. Dr. Petrosky has successfully chaired eight PhD students, 45 Master’s students, and mentored and supported six post-doctoral researchers. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4562, email: James.Petrosky@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Nuclear Survivability Experimentation, Modeling, and Data Verification.” Sponsor: AFNWC. Funding: \$100,000 – Petrosky 35%, McClory 25%, Reeder 25%, Rutledge 15%.

“Support Activities to Homeland Security.” Sponsor: DHS. Funding: \$150,000.

“Advanced Structural Measurements of Single Crystals.” Sponsor: AFRL/R.Y. Funding: \$20,000.

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PHILLIPS, GRADY T.,

Research Assistant Professor of Engineering Physics (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, Physics, Wofford College, 1990; BA, Mathematics, Wofford College, 1990; MS, Physics, Clemson University, 1993; PhD, Applied Physics, Air Force Institute of Technology, 2006. Dr. Phillips’ research interests include remote sensing encompassing spectral signatures from laser/material interactions, hyperspectral imagery, and environmental monitoring, and experimental research utilizing laser physics, spectroscopy, chemical kinetics, and flow dynamics to advance technologies in high power chemical lasers, gas phase lasers, and optical diagnostics. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4643, email: Grady.Phillips.ctr@afit.edu

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RICE, CHRISTOPHER A.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Electrical Engineering, Cedarville University, 2004; MS, Electrical Engineering, Air Force Institute of Technology, 2006; PhD, Applied Physics, Air Force Institute of Technology, 2012. Dr. Rice is interested in topic areas related to high energy lasers, remote sensing, and optical diagnostics. His work on specific research topics currently include atmospheric propagation of diode pumped alkali lasers; diode pumped alkali and rare gas laser gain construction; aerosol measurement and validation; modeling, simulation, and validation of directed energy simulations; and remote sensing. AFIT research center affiliation(s): CDE and CTISR. Tel. 937-255-6565 x4375, email: Christopher.Rice@afit.edu

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“Perram, Glen P., Rice, Christopher A., Haluska, Nathan D., “Diode Pumped Alkali Laser Extended to Novel Wavelengths via Two-Photon Pumping,” Air Force Docket No. AFD-1768. [CDE]

RIES, HEIDI R.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1999 (AFIT/ENP); Dean for Research, Graduate School of Engineering and Management (AFIT/ENR); Interim Dean, Graduate School of Engineering and Management (2013); BS, Physics, The Ohio State University, 1982; MS, Physics, The Ohio State University, 1984; PhD, Applied Physics, Old Dominion University, 1987. Dr. Ries serves as AFIT’s chief research officer, primary liaison to the Air Force Research Laboratory, and served as Interim Dean during FY13. Dr. Ries’ research interests include radiation effects, nonlinear optical materials, electron paramagnetic resonance spectroscopy, and laser processing of materials. Prior to joining the AFIT faculty, Dr. Ries served as Director of the Center for Materials Research at Norfolk State University in Norfolk, Virginia, and Associate Director of the Applied Research Center at the Jefferson Center for Research and Technology Research Park in Newport News, Virginia. Dr. Ries was elected to the ASEE Engineering Research Council Board of Directors in 2008 and served a two-year term as Secretary/Treasurer (2011-2013). She has served on the Engineering and Science Foundation of Dayton Board since 2005 and as its Chair since 2015. Dr. Ries serves as a peer evaluator and team chair for Higher Learning Commission accreditation processes. She was recognized by the Dayton Daily News as one of the region’s 2009 Ten Top Women, and was the Air Force’s civilian winner of the 2011 Department of Defense Women's History Month Foreign Language and Science, Technology, Engineering and Math (STEM) Role Model Award. Tel. 937-255-3636 x4544, email: Heidi.Ries@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFRL-AFIT MOA Partnership Agreement.” Sponsor: AFOSR. Funding: \$280,458.

SINGLETON, BRIANA J., Lt Col,

Assistant Professor of Nuclear Engineering, Deputy Department Head, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, University of Miami (FL), 2000; MS, Air Force Institute of Technology, 2008; PhD, Air Force Institute of Technology, 2014. Lt Col Singleton’s current research focuses on active optical materials, in particular rare-earth doped fibers and their response to radiation exposure. Radiation environments studied are those applicable to the Air Force and DOD operational environments. Her previous assignments include testing units with Air Combat Command and the Defense Threat Reduction Agency. Prior to her current AFIT assignment, she was assigned to the Air Force Technical Applications Center as the deputy division chief for atmospheric research.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

T.C. Schulmeister, J. R. Fee Jr, B. Singleton, G.E. Sjoden, “Modeling the White Sands Missile Range Fast Burst Reactor Using a Discrete Ordinates Code, PENTRAN,” 2017 HEART Conference in Denver, CO (25 Apr 2017)

STENGER, ROBERT A., Lt Col,

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Texas A&M University, 1994; MS, Air Force Institute of Technology, 2000; PhD, Naval Postgraduate School, 2013. Lt Col Stenger’s research interests cover a variety of topics in atmospheric science to include problems in numerical weather prediction, tropical meteorology, and satellite radiance correction. Before joining AFIT he was Deputy Director, Office of Mission Engineering, System Engineering Directorate at the National Reconnaissance Office. He has four archival publications and presentations. He is a member of the American Meteorological Society. Tel. 937-255-3636 x4505, email: Robert.Stenger@afit.edu

REFEREED JOURNAL PUBLICATIONS

Stenger, R. A., and R. L. Elsberry, 2013: Outer vortex wind structure changes during and following tropical cyclone secondary eyewall formation. *Tropical Cyclone Research and Review*, 2, 1-11.

Elsberry, R. L., and R. A. Stenger, 2008: Advances in understanding of tropical cyclone wind structure change. *Asia-Pacific J. Atmos. Sci.*, 44, 11-24.

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Stenger, R. A., and R. L. Elsberry 2008: Examining tropical cyclone structure variability using HWind analyses. 28th Conf. on Hurricane and Tropical Meteorology, Orlando, FL, Amer. Meteor. Soc., 13C.3.

STEWART, BRYAN J.,

Research Assistant Professor of Optical Engineering, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Optical Sciences & Engineering, University of Arizona, 2004; MS, Applied Physics, Air Force Institute of Technology, 2006; PhD, Optical Sciences & Engineering, Air Force Institute of Technology, 2011. Dr. Stewart’s current research interests include infrared and electro-optical remote sensing, physics-based sensor and scene modeling, and algorithm development primarily for application to technical intelligence problems. Additional interests include characterization of battlespace combustion (e.g. muzzle flash, detonations, and rocket plumes), methods for assessing on-orbit sensor performance, and machine learning. He has 14 archival publications and presentations. Before joining AFIT, he spent over nine years at the National Air and Space Intelligence Center (NASIC) where he most recently led R&D activities as a Principal Intelligence Analyst in the Persistent Infrared Squadron. AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x4639, email: Bryan.Stewart@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Persistent Infrared Scientific and Analytical Support.” Sponsor: NASIC. Funding: \$200,000 – Stewart 90%, Gross 10%. [CTISR]

“Stormy Haystack.” Sponsor: NGA. Funding: \$450,000 – Stewart 40%, Hawks 50%, Gross 10%. [CTISR]

“National IR Detection and Tracking.” Sponsor: AFRL/RV. Funding: \$100,000 – Stewart 60%, Hawks 30%, Gross 10%. [CTISR]

“Wide Area EO/IR Sensor Simulation for ISR Applications.” Sponsor: AFRL/RV. Funding: \$67,500. [CSRA]

“Sensor Data Fusion for Improved Target Detection and Location.” Sponsor: AFRL/RV. Funding: \$67,500. [CSRA]

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M. R. Hawks and B. J. Steward, “Telescope parameter trade studies for LWIR camera,” Air Force Institute of Technology, Wright-Patterson AFB, OH, June 2017 (DTIC No. AD1035034). [CSRA/CTISR]

B. J. Steward and M. R. Hawks. “End-to-End Model Enhancements and Hypothetical Detection Scenarios” Air Force Institute of Technology, Wright-Patterson AFB, OH, October 2016 (DTIC No. AD1020340). [CTISR]

M. J. Schwaab, B. J. Steward, and R. Greendyke, “Comparison of Burn Rate Models to Reaching Chemistry Model for HMX,” International Mechanical Engineering Congress & Exposition, IMECE2016-68555, Phoenix, AZ, 15 November 2016. [CTISR]

B. J. Steward and M. R. Hawks. “End-to-End Model Enhancements and Hypothetical Detection Scenarios,” Air Force Institute of Technology, Wright-Patterson AFB, OH, October 2016 (DTIC No. AD1020340). [CTISR]

M. J. Schwaab, R. Greendyke, and B. J. Steward. “Comparison of Finite Chemistry Model to Mixture Pressure Dependent Burn Rate Model for HMX,” Tri-Service Energetic Materials Basic Science Review, Arlington, VA, August 2016. [CTISR]

M. R. Hawks and B. J. Steward, “IR Signatures of Non Afterburning Aircraft,” Air Force Institute of Technology, Wright-Patterson AFB, OH, June 2016 (DTIC No. AD1020325). [CTISR]

TSENG, H. ROSE, Maj,

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, University of California at Los Angeles (UCLA), 2004; MS, Naval Postgraduate School, 2010; PhD, UCLA, 2016. Maj Tseng’s research interests include future climatological changes, the influence of aerosols on precipitation and tropical cyclones, and the Arctic sea ice decline, as these topics pertain to future political, societal and environmental impacts. Prior to her PhD studies, Maj Tseng served as Commander, Detachment 1, 607th Weather Squadron at Camp Red Cloud, Republic of Korea. Maj Tseng has given a number of talks regarding her research on the effects of black carbon on precipitation to include the University of California (Carbon Neutrality Initiative) and the Pardee RAND Graduate School (LA Policy Symposium). Maj Tseng also serves as Board Advisor for Women Veteran Issues for The BREATH Center in San Clemente, CA. Maj Tseng served a deployment tour as USAF Joint Meteorological and Oceanographic Officer- Afghanistan and NATO Headquarters Resolute Support Chief Meteorological Officer from April- October 2017 in Kabul, Afghanistan. Tel. 937-255-3636 x4520, email: Hsien-Liang.Tseng@afit.edu

TUTTLE, RONALD F.,

Associate Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2001 (AFIT/ENP); BS, Chemical Engineering, University of Missouri (Columbia), 1968; MS, Nuclear Engineering, University of Missouri (Columbia), 1970; PhD, Nuclear Engineering, University of Missouri (Columbia), 1980. Dr. Tuttle’s research areas include applications of active and passive remote sensing, spectroscopy, diagnostics, and signals processing to problems in intelligence collection and exploitation. Other areas of interest include nuclear weapon effects and space nuclear power systems modeling and mechanics of aerosols. He has published in both unclassified and classified refereed archival journals and conference proceedings. Dr. Tuttle served as Director, Center for Technical Intelligence Studies and Research (CTISR), AFIT, until Aug 2012. Tel. 937-255-3636 x4536, email: Ronald.Tuttle@afit.edu

WEEKS, DAVID E.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1993 (AFIT/ENP); BA, Physics, Colgate University, 1983; MS, Physics, Georgia Institute of Technology, 1985; PhD, Physics, University of Arkansas, 1989. Dr. Weeks' research interests include the development of time dependent wave packet methods to model the quantum mechanics of simple chemical reactions and compute associated state to state reactive scattering matrix elements. Of particular interest are new methods that incorporate non-adiabatic coupling between electronic and nuclear degrees of freedom. New research interests include fiber laser modeling and the development of plasma models to improve the operation of noble gas laser systems. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4561, email: David.Weeks@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Theoretical Models of Absorption and Emission in Thulium Doped Fiber Lasers." Sponsor: AFRL/RD. Funding: \$15,000. [CDE]

REFEREED JOURNAL PUBLICATIONS

C.D. Lewis and D.E. Weeks, Theoretical Cross Sections of the Inelastic Fine Structure Transition $M(^2P_{1/2}) + Ng \leftrightarrow M(^2P_{3/2}) + Ng$ for $M = K, Rb,$ and $Cs,$ and $Ng = He, Ne,$ and $Ar,$ J. Phys. Chem. A, 121, April 2017, pp 3340-3351.

D.J. Emmons and D.E. Weeks, Kinetics of High Pressure Argon-Helium Pulsed Gas Discharge, J. Appl. Phys., 121, May 2017, pp. 203301, 1-11.

B. Eshel, J.A. Cardoza, D.E. Weeks, and G.P. Perram, Role of Adiabaticity in Controlling Alkali-Metal Fine-Structure Mixing Induced by Rare Gasses, Phys. Rev. A, 95, 20 April 2017, pp. 042708, 1-10.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. Han, M.C. Heaven, D.J. Emmons (DS-17S), G.P. Perram, D.E. Weeks, and W.F. Bailey, "Pulsed discharge production of ArMetastables," Proc. SPIE 9729 (2016) 97290D.

WOLF, PAUL J.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1994 (AFIT/ENP), and Associate Dean for Academic Affairs, Graduate School of Engineering and Management (AFIT/EN); BS, Regis College, 1978; MS, Air Force Institute of Technology, 1979; PhD, Air Force Institute of Technology, 1985. Dr. Wolf serves as the Associate Dean for Academic Affairs responsible for administrative leadership for all academic matters in the Graduate School and serves as AFIT's accreditation liaison to the Higher Learning Commission and ABET. Dr. Wolf's current scholarly interests include emergent behaviors of complex systems, foundations of quantum mechanics, and existential threat analyses. Dr. Wolf has made experimental contributions to atomic/molecular spectroscopy, reactive and non-reactive collision kinetics, laser-based thin film deposition processes, ionospheric and atmospheric chemistry, and environmental monitoring. Prior to joining the AFIT faculty in 1994, Dr. Wolf served as Director/Principal Investigator of the Materials Physics Division at the F.J. Seiler Research Laboratory (USAF, CO), Assistant Professor of Physics in the Physics Department at the U.S. Air Force Academy, and Research Director for Impulse Laser Effects at the Defense Nuclear Agency. He has published over 20 papers. Tel. 937-255-3636 x4560, email: Paul.Wolf@afit.edu

YEO, YUNG KEE,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1984 (AFIT/ENP); BS, Seoul National University, 1961; PhD, University of Southern California, 1972. Dr. Yeo's research interests are in the area of solid state physics, especially characterization of the electrical and optical properties of elemental, compound, ternary, and quaternary semiconductors using techniques such as Hall-effect measurement, deep level transient spectroscopy, electroluminescence, and photoluminescence. Dr. Yeo has published around 120 articles in archival journals and several technical reports, presented around 220 papers at professional conferences, and holds one patent. He is a reviewer for the Applied Physics Letters, Journal of Applied Physics, Journal of Electronic Materials, and Air Force Office of Scientific Research (AFOSR) proposal. He is currently funded by the AFOSR to study Si- and Ge-based semiconductors such as GeSn and GeSiSn. This work involves collaborative effort with the Arizona State

University, University of Delaware, Kangwon National University, and Taiwan National University. He has directed the research of seven post-doc fellows, five visiting research faculty members, 16 PhD students and 26 MS students. He received the Ezra Kotcher Award for 1990, the Gage H. Crocker Outstanding Professor Award for 1992, and the General Bernard A. Schriever Award for 1997. Tel. 937-255-3636 x4532, email: Yung.Yeo@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Investigation of the Optical and Electrical Properties of Optoelectronic Materials and Devices in the Ge-Si-Sn System.” Sponsor: AFOSR. Funding: \$149,900.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

“Optical and electrical properties of $\text{Ge}_{1-y}\text{Sn}_y$ and $\text{Ge}_{1-x-y}\text{SixSn}_y$ direct bandgap semiconductors grown on Si and Ge-buffered Si substrates,” Y.K. Yeo, T.R. Harris, M.-Y. Ryu, B. Wang, and J. Kouvetakis, 20th International Vacuum Congress (IVC-20), Busan, Korea, 2016 (Invited, EMP/ASDD-04-1-I-W).

“Investigation of hydrogen inductively coupled plasma treatment effect for $\text{Ge}_{0.938}\text{Sn}_{0.062}/\text{Ge}/\text{Si}$ film using photoreflectance spectroscopy, Hyun Jun Jo, Jong Su Kim, Mee Yi Ryu, Yung Kee Yeo, and John Kouvetakis. (February 2017).

5.4. DEPARTMENT OF MATHEMATICS AND STATISTICS

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5.4.1. MASTER'S THESES

CORDELL, IAN S., *Engineering Change Orders and their Impact on DOD Acquisition Contracts*. AFIT/ENC/MS/17M-180. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

D'AMICO, CORY N., *A Longitudinal Study and Color Rating System of Acquisition Cost Growth*. AFIT/ENC/MS/17M-181. Faculty Advisor: Dr. Edward D. White. Sponsor: AFCAA.

GRIFFITH, JOHN R., *The Air Force Fitness Test: Creating New Fitness Assessment Charts using Waist to Height Ratios*. AFIT/ENC/MS/17M-191. Faculty Advisor: Dr. Edward D. White. Sponsor: HQ USAF/A1.

OVIATT, CAITLIN M., *Perception vs. Reality: Improving Mission Commander Decision-Making Capabilities by use of Heart Rate Zone Feedback in Training Environments*. AFIT/ENC/MS/17M-152. Faculty Advisor: Dr. Edward D. White. Sponsor: 711 HPW/RH.

TRUELLE , RYAN C., *Using Multiple and Logistic Regression to Estimate the Median Will-Cost and Probability of Cost and Schedule Overrun for Program Managers*. AFIT/ENC/MS/17M-231. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

5.4.2. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AKERS, BENJAMIN F.,

Associate Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2011 (AFIT/ENC); BS, Pennsylvania State University, 2003; MA, University of Wisconsin - Madison, 2005; PhD, University of Wisconsin-Madison, 2008. Dr. Akers' research interests include nonlinear waves, applied mathematics, fluid mechanics, and numerical analysis. Dr. Akers' current research considers the stability and existence of traveling water waves as well as the fluid flows induced by high energy lasers. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4522, email: Benjamin.Akers@afit.edu

REFEREED JOURNAL PUBLICATIONS

Akers, B. and Reeger, J., "Three dimensional overturned traveling water waves," *Wave Motion*, Vol 68, pp 210-217, 2017.

Fee, J. R. Jr., Petrosky, J. C., Bailey, W. F., and Akers, B. F., "Reestablishing an Air burst EMP simulation capability," *Journal of Radiation Research and Engineering (JRERE)*, Vol. 34, No. 12, pp. 53-60, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Akers, B., "Atmospheric Propagation Sciences for the APSHELs Program," Air Force Institute of Technology, 1 June 2017. [CDE]

Akers, B., "Overturned Interfacial Traveling Waves," Banff International Research Station, Casa Mathematica Oaxaca, Oaxaca, Mexico, 19 June 2017.

ARMSTRONG, ANDREW M., Capt,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, Michigan Technological University, 2008; MS, Air Force Institute of Technology, 2010; MS, University of Texas at San Antonio, 2011; PhD, Air Force Institute of Technology, 2016. Capt Armstrong's research interests include wavelet analysis, astrostatistics, machine learning, big data, and computational statistics. Tel. 937-255-3636 x7403, email: Andrew.Armstrong@afit.edu

BAKER, WILLIAM P.,

Associate Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1986 (AFIT/ENC); BA, University of California at Irvine, 1969; MA, University of California at Irvine, 1970; PhD, Northwestern University, 1987. Dr. Baker's research interests include asymptotic and perturbation methods, wave propagation and scattering theory, applied mathematics, functional analysis, low observables, and numerical analysis. Dr. Baker's current research is in thermal dynamics of high speed wear, vibrational dynamics of thermally loaded materials, and dynamics and control of satellite structures. Dr. Baker is a Master Navigator with prior military assignments in flight test, satellite communications, cruise missile, and radar analysis. Tel. 937-255-3636 x4517, email: William.Baker@afit.edu

REFEREED JOURNAL PUBLICATIONS

Easterday, O., Palazotto, A., Baker, W., and Branam, R., "Damping Properties of Coatings at Elevated Temperatures," *Surface and Coatings Technology*, Vol. 321, pp. 186-199, 2017.

BEMROSE, TRAVIS J., Maj,

Instructor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, University of Idaho, 2003; MS, University of Texas at San Antonio, 2012. Maj Bemrose's research interest include Hilbert space frame theory, compressed sensing, numerical methods, and modeling and simulation. His current research is on the Paulsen problem and equiangular frames. He has papers on unconditional convergence bounds for frames, introducing the concept of weaving frames, and cruise missile training simulators. Tel. 937-255-3636 x4619, email: Travis.Bemrose@afit.edu

BOOKS AND CHAPTERS IN BOOKS

Bemrose, T., Casazza, P. G, Cheng, D., Haas, J., and Van Nguyen, H., "Computing the Distance Between Frames and Between Subspaces of a Hilbert Space." *Frames and Other Bases in Abstract and Function Spaces*. I. Pesenson, Q. T. Le Gia, A. Mayeli, H. Mhaskar, and D.-X. Zhou, eds., Springer, New York, NY, June 2017, pp. 81-99.

BULUTOGLU, DURSUN A.,

Associate Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2004 (AFIT/ENC); BS, University of Maryland at College Park, 1996; PhD, University of California, Berkeley, 2001. Dr. Bulutoglu's research interests include design of experiments and combinatorial problems in statistics. His papers are on finding GMA (generalized minimum aberration) factorial designs by enumerating all non-isomorphic orthogonal arrays. The tools he uses for enumerating orthogonal arrays are integer programming, constraint programming, and isomorphism rejection. Tel. 937-255-3636 x4704, email: Dursun.Bulutoglu@afit.edu

FATHEDDIN, PARISA,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, Belmont University, 2007; PhD, University of Tennessee, Knoxville, 2014. Dr. Fatheddin's research interests include stochastic partial differential equations, large deviations and applications of modern probability theory to wireless networks and problems related to optics. Tel. 937-255-3636 x4729, email: Parisa.Fatheddin@afit.edu

REFEREED JOURNAL PUBLICATIONS

Fatheddin, P. and Gustafsson, J., "Generation of a sequence of correlated phase screens," *Optics Communications*, Vol. 391, pp. 100-105, May 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fatheddin, P., "Asymptotic Behavior of a Class of SPDEs," Probability Seminar, Louisiana State University, Baton Rouge, LA, 15 March 2017.

Fatheddin, P., "Asymptotic Behavior of a Class of SPDEs," Combinatorics and Probability Seminar, Ohio State U., Columbus, OH, 23 March 2017.

FICKUS, MATTHEW C.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2004 (AFIT/ENC); BS, University of Maryland, Baltimore County, 1995; MS, University of Maryland, Baltimore County, 1997; PhD, University of Maryland, College Park, 2001. Dr. Fickus' research interests include applied harmonic analysis, frame theory, and compressed sensing. Tel. 937-255-3636 x4513, email: Matthew.Fickus@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fickus, M., Jasper, J., Mixon, D. G., and Watson, C. E., "A brief introduction to equi-chordal and equi-isoclinic tight fusion frames," *Proceedings of SPIE Optics and Photonics: Wavelets and Sparsity XVII*, 103940T, San Diego, CA, 7 August 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fickus, M., “Some recent advances on equiangular tight frames,” Joint Mathematics Meetings 2017, Special Session on “Mathematics of Signal Processing and Information,” Atlanta, GA, 7 Jan 2017.

Fickus, M., “Hadamard equiangular tight frames,” American Mathematical Society Spring Southeastern Sectional Meeting, Special Session on “Frame Theory,” College of Charleston, Charleston, SC, 11 March 2017.

GEYER, ANDREW J., Lt Col,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, North Dakota State University, 2000; MS, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2014. Lt Col Geyer’s research interests include design of experiments, combinatorial optimization problems in statistics, statistical performance metrics, and statistical classification techniques. The tools he uses are integer programming, constraint programming, graph isomorphism rejection, and multivariate statistical analysis. Lt Col Geyer has served as a weather officer in F-16, AH-64, OH-58D, and CH-47 flying units as well in units supporting US Army and Special Operations ground forces. Tel. 937-255-3636 x4584, email: Andrew.Geyer@afit.edu

REFEREED JOURNAL PUBLICATIONS

Geyer, A. J., Hall, S. N., and Moore, J. T., “Operations-Focused Optimized Theater Weather Sensing Strategies,” *Military Operations Research*, Vol. 21, No. 3, pp. 51-71, 2016.

Gallagher, J. R., Haac, B. E., Geyer, A. J., Mabedi, C., Cairns, B. A., and Charles, A. G., “Injury Characteristics and Outcomes in Elderly Trauma Patients in Sub-Saharan Africa,” *World Journal of Surgery*, Vol. 40, No. 11, pp. 2650-2657, Nov 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Haac, B. F., Gallagher, J. R., Mabedi, C., Geyer, A. J., and Charles, A. G., “Injury Characteristics, Risk Factors and Outcomes Following Falls in Sub-Saharan Africa,” The Academic Surgical Congress 2017, Las Vegas, NV, 7-9 February 2017.

JORDAN, JEREMY D., Lt Col,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT, Appointment Date: 2016 (AFIT/ENC); BA, Aurora University, 2001; MS, Air Force Institute of Technology, 2007; PhD, Air Force Institute of Technology, 2012. Lt Col Jordan’s research interests include combinatorial optimization, decision analysis, network theory and big data analysis. Lt Col Jordan has served as an operations research analyst for operational testing and human research as well as an international program manager for the Air Force Office of Scientific Research. Tel. 937-255-3636 x4669, email: Jeremy.Jordan@us.af.mil

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Jordan, J.D., “Operations Research and Data Analytics in the Defense Sector,” University of Florida, Industrial & Systems Engineering Graduate Seminar, Gainesville, FL, 20 April 2017.

KAPPEDAL, RYAN D., Lt Col,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, United States Air Force Academy, 1999; MS, Air Force Institute of Technology, 2008; PhD, University of Washington, 2014. Lt Col Kappedal was a visiting fellow at the University of Chicago’s Data Science for Social Good Fellowship summer of 2015 and a visiting scientist at Lawrence Livermore National Labs summer of 2016. His research interests include Machine Learning, Big Data, Statistical Genetics, Neuroscience (MRI imaging), Compressed Sensing, Seismic Detection, Gravimetric Detection, and Imagery Feature Selection. He has served as an intelligence officer at various levels and deployed twice in support of Operation Iraqi Freedom. Tel. 937-255-3636 x4630, email: Ryan.Kappedal@afit.edu

LAIR, ALAN V.,

Professor of Mathematics and Head, Department of Mathematics and Statistics, AFIT Appointment Date: 1982 (AFIT/ENC); BA, North Texas State University, 1970; MS, Texas Tech University, 1972; PhD, Texas Tech University, 1976. Dr. Lair's research interests include parabolic and elliptic partial differential equations, functional analysis, applied mathematics, and nonlinear diffusion. He has published several papers on the properties of solutions of various nonlinear partial differential equations. Tel. 937-255-3636 x4519, email: Alan.Lair@afit.edu

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, *International Scholarly Research Notices: Mathematical Analysis*.

MAGNUS, AMY L.,

Research Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2017 (AFIT/ENC); BSEE, Rochester Institute of Technology, 1990; MSEE, Air Force Institute of Technology, 1995; PhD, Air Force Institute of Technology, 2003. Dr. Magnus conducts research in distributed intelligence, i.e., the mature work that emerges from human computers teams. Her research combines multiple disciplines including information fusion, near & remote sensing, data analytics, and artificial intelligence. Dr. Magnus works the seam between sensory organization and natural language processing translating signals to symbols and symbols into stories. Her concepts in artificial intelligence research define the computational differences between training and learning; they demonstrate how autonomy can be examined as an oscillating signal. Dr. Magnus has published 16 articles, chaired two MS thesis committees, and is writing a book on human and computer intelligence. She is a retired Major, USAF, with extensive experience in data fusion and information operations. AFIT research center affiliation(s): CCR and CSRA. Tel. 937-255-3636 x4454, email: Amy.Magnus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Distributed Intelligence and the Nature of Mature Work." Sponsor: AFOSR. Funding: \$149,865 – Magnus 90%, Oxley 10%. [CCR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Magnus, Amy L., "The Mathematics of Spin," Professional Development Lecture, National Museum of the USAF, Dayton, OH, July 2017.

Magnus, Amy L., "Active Consent," Second Annual Global Brain Health and Performance Summit, Columbus, OH, April 2017.

Magnus, Amy L., "Parallel Learning Opportunities in STEAM Education: Count like a Computer," Ohio Educational Technology Conference, Columbus, OH, February 2017.

Magnus, Amy L., "Moments of Autonomy," 2nd Annual University of Cincinnati Sensors Community Retreat: Innovation, Technology & Workforce, Cincinnati, OH, January 2017.

Magnus, Amy L., "Collaborative Computations," Interactive Program, Air Force Research Laboratory Maker Hub, Grand Opening, Wright Brothers Institute, Dayton, OH, October 2016.

Magnus, Amy L., "Moments of Autonomy," Women in STEMM Leadership, Institute Research Symposium, Wright State University, Dayton, OH, October 2016.

MIXON, DUSTIN G., Maj,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2012 (AFIT/ENC); BS, Central Washington University, 2004; MS, Air Force Institute of Technology, 2006; MA, Princeton University, 2010; PhD, Princeton University, 2012. Maj Mixon's research interests include applied harmonic analysis, frame theory, compressed sensing, signal processing, and mathematical data science. He has served as an Air Force analytical scientist for three years modeling biological responses to radiofrequency radiation.

SPONSOR FUNDED RESEARCH PROJECTS

"Sampling Strategies for Smarter Sensing." Sponsor: AFOSR. Funding: \$38,150.

REFEREED JOURNAL PUBLICATIONS

Bandeira, A. S., Mixon, D. G., and Moreira, J., "A conditional construction of restricted isometries," *International Mathematics Research Notices*, Vol. 2017, No. 2, pp. 372-381, 2017.

Cahill, J., Mixon, D. G., and Strawn, N., "Connectivity and irreducibility of algebraic varieties of finite unit norm tight frames," *SIAM Journal on Applied Algebra and Geometry*, Vol. 1, No. 1, pp. 38-72, 2017.

BOOKS AND CHAPTERS IN BOOKS

Mixon, D. G., "Unit norm tight frames in finite-dimensional spaces, in: Finite Frame Theory: A Complete Introduction to Overcompleteness," *Proceedings of Symposia in Applied Mathematics* Vol 73, K. A. Okoudjou ed., American Mathematical Society, Providence, RI. 2016, pp. 68-93.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Mixon, D. G., "Packings in real projective spaces," SPIE Optics and Photonics, Wavelets and Sparsity XVII, San Diego, CA, 7 August 2017.

Mixon, D. G., "Open problems in finite frame theory: Packings in projective spaces," SIAM Conference on Applied Algebraic Geometry, Georgia Institute of Technology, Atlanta, GA, 3 August 2017.

Mixon, D. G., "Equiangular tight frames from association schemes," SIAM Conference on Applied Algebraic Geometry, Minisymposium on Algebra and Geometry in Frame Theory, Georgia Institute of Technology, Atlanta, GA, 31 July 2017.

Mixon, D. G., "Probably certifiably correct k-means clustering," 2017 Meeting of the International Linear Algebra Society, Minisymposium on Random Matrix Theory for Networks, Iowa State University, Ames, IA, 26 July 2017.

Mixon, D. G., "Explicit restricted isometries," 2017 Meeting of the International Linear Algebra Society, Minisymposium on Compressed Sensing and Matrix Completion, Iowa State University, Ames, IA, 24 July 2017.

Mixon, D. G., "Packings in real projective spaces," Foundations of Computational Mathematics, Workshop on Computational Harmonic Analysis and Compressive Sensing, University of Barcelona, Barcelona, Spain, 18 July 2017.

Mixon, D. G., "A semidefinite relaxation of k-means clustering," The Norbert Wiener Center Seminar, University of Maryland, College Park, MD, 1 May 2017.

OXLEY, MARK E.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1987 (AFIT/ENC); BS, University of the Cumberland, 1978; MS, Purdue University, 1980; PhD, North Carolina State University, 1987. Dr. Oxley's research interests include partial differential equations, free and moving boundary value problems, finite-time extinction problems, functional analysis, optimization, artificial neural networks, wavelet analysis, classifier fusion, information fusion and evaluation of fusion techniques, receiver operating characteristic (ROC) curves, and ROC manifolds. AFIT research center affiliation(s): ANT and CTISR. Tel. 937-255-3636 x4515, email: Mark.Oxley@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Fusion in Exploitation of Sensing Technology.” Sponsor: AFOSR. Funding: \$64,635 – Oxley 50%, Schubert Kabban 50%.

REFEREED JOURNAL PUBLICATIONS

Burgi, K., Marciniak, M., Oxley, M., and Nauyoks, S., “Measuring the Reflection Matrix of a Rough Surface,” *Applied Sciences*, Vol. 7, No. 6, pp. 568, 2017.

Burgi, K., Ullom, J., Marciniak, M., and Oxley, M., “Reflective Inverse Diffusion,” *Applied. Sciences*, Vol. 6, No. 12, pp. 370, 2016.

Vaughan, S. L., Mills, R. F., Peterson, G. L., Grimaila, M. L., Rogers, S. K., Oxley, M. E., and Patterson, R. E., “A dual-process Qualia Modeling Framework (QMF),” *Biologically Inspired Cognitive Architectures*, Vol. 17, pp. 71-85, 2016.

Wardell, D. C., Mills, R. C., Peterson, G. L., and Oxley, M. E., “A Method for Revealing and Addressing Security Vulnerabilities in Cyber-physical Systems by Modeling Malicious Agent Interactions with Formal Verification,” *Procedia Computer Science*, Vol. 95, pp. 24-31, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Schubert Kabban, C.M., Venzin, A.M, and Oxley, M.E., “Event induced bias in label fusion,” Proc. *SPIE*, Vol. 10200, Signal Processing, Sensor/Information Fusion, and Target Recognition XXVI, 102000G, Anaheim, CA, 2 May 2017.

Oxley, M.E. and Schubert Kabban, C.M., “Fusion Within a Classification System Family,” Proc. *SPIE*, Vol. 10200, Signal Processing, Sensor/Information Fusion, and Target Recognition XXVI, 102000H, Anaheim, CA, 2 May 2017.

Oxley, M.E. and Ternovskiy, I.V., “Fusion of Cyber Sensors on a Network for Improved Detection and Classification,” *Proc. SPIE*, Vol. 10185, Cyber Sensing 2017, 101850H, Anaheim, CA, 4 May 2017.

PATENT APPLICATIONS

Vaughan, S. L., Mills, R. F., Rogers, S. K., Peterson, G. L., Oxley, M. E., and Patterson, R. E., “Machine learning by construction of a Qualia Modeling Agent - method and apparatus, May 2017, Air Force invention number AFD-1680, Patent Pending U.S. Serial Nos. 62/506,034 and 62/506,040. [ANT]

QUINN, DENNIS W.,

Professor Emeritus of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1974 (AFIT/ENC); BA, Mathematics, University of Delaware, 1969; MS, Applied Mathematics, University of Delaware, 1971; PhD, Applied Mathematics, University of Delaware, 1973. Dr. Quinn's fields of expertise include numerical methods, finite elements, finite differences, integral equation methods, numerical analysis, functional analysis, system identification, and applied mathematics. Dr. Quinn has advised several MS students in modeling toxic chemical exposure. Dr. Quinn has published papers dealing with integral and finite element solutions of acoustic problems, using the telegrapher's equation to model lightning, using the method of characteristics in cancer risk assessment, using the diffusion equation to model diffusion through the skin in pharmacokinetic modeling, and using the boundary element method for moving boundary problems.

REEGER, JONAH A., Maj,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2013 (AFIT/ENC); BS, Mathematical Sciences, United States Air Force Academy, 2007; MA, Computational and Applied Mathematics, Rice University, 2009; PhD, Applied Mathematics, The University of Colorado, Boulder, 2013. Maj Reeger's primary research interests include Taylor series and Padé approximation methods, multi-step methods, optimization and optimal control, radial basis functions, pseudospectral methods, and the Painlevé equations. He has served as an Air Force analytical scientist on the acquisition of an experimental infrared satellite. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x3320, email: Jonah.Reeger@afit.edu

REFEREED JOURNAL PUBLICATIONS

Reeger, J. A., Fornberg, B., and Watts, M. L., "Numerical quadrature over smooth, closed surfaces," *Proceedings of the Royal Society A*, Vol. 472: 20160401, October 2016.

Akers, B. and Reeger, J., "Three dimensional overturned traveling water waves," *Wave Motion*, Vol. 68, pp. 210-217, 2017.

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Humphreys, C. J., Cobb, R. G., Jacques, D., and Reeger, J. A., "Dynamic Re-Plan of the Loyal Wingman Optimal Control Problem," AIAA Guidance, Navigation, and Control Conference, AIAA Science and Technology Forum and Exposition 2017. GNC-28, Aerospace Robotics Guidance and Navigation. Grapevine, TX, 12 January 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Reeger, J. A. and Akers, B. F., "Three-dimensional traveling waves in vortex sheets," 2nd IMA Conference on Nonlinear Waves and Coherent Structures. University of East Anglia, Norwich, Norfolk, UK, 22 June 2017.

REYNOLDS, DANIEL E.,

Assistant Professor Emeritus of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 1974 (AFIT/ENC); AB, University of Rochester, 1965; MS, Air Force Institute of Technology, 1971; MS, Wright State University, 1983. Dr. Reynolds' research interests include management cybernetics, learning theory, and exploring ways computer graphics can support statistical and mathematical education. In 1989, Dr. Reynolds received Tau Beta Phi's Outstanding Professor Award.

SCHUBERT KABBAN, CHRISTINE M.,

Associate Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2010 (AFIT/ENC); BA, University of Dayton, 1992; MBA, Wright State University, 1994; MS, Wright State University, 1995; PhD, Air Force Institute of Technology, 2005. Dr. Schubert Kabban's research interests include classification techniques, diagnostic testing, ROC curve theory and extensions, human performance, information fusion, modeling and prediction, NDE methods, network analysis, regression and regression extensions, survey design and analysis, and general biostatistics. Dr. Schubert Kabban's current research is in evaluating the performance of classification systems and information-fused systems via ROC methodology, sequential strategies for classification, structural health monitoring of airframes, as well as epidemiological applications to disease prediction and medical diagnostics. Tel. 937-255-3636 x4549, email: Christine.SchubertKabban@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Sequencing Information for Efficient, Accurate Classification.” Sponsor: AFOSR. Funding: \$31,842.

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Mohd-Zaid, F., Schubert Kabban, C. M., Deckro, R., and White, E., “Parameter Specification for the Degree Distribution of Simulated Barabasi-Albert Graphs,” *Physica A: Statistical Mechanics and its Applications*, Vol. 465, No. 1, pp. 141-152, January 2017.

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Schubert Kabban, C. M., Venzin, A. M., and Oxley, M.E., “Event Induced Bias in Label Fusion SPIE Defense and Security Symposium: Signal Processing, Sensor/Information Fusion, and Target Recognition XXV, Anaheim, CA, 9-13 April 2017.

Mohd-Zaid, M. F. and Schubert Kabban, C. M., “Mixture Network Model (MNM) for Empirical Network Characterization and Simulation,” NetSci 2017 International School and Conference on Network Science, Indianapolis, IN, 19-23 June 2017.

Barker, S. B., Barker, R. T., McCain, N. L., and Schubert, C. M., “Association between a canine-assisted activity and college students’ perceived family supports and stressors,” International Society for Anthrozoology (ISAZ) 2017 Conference, Davis, CA, 22-25 June 2017.

Schubert Kabban, C. M., “Sequencing Information for Efficient, Accurate Classification,” AFOSR Information and Networks: Science of Information, Computation, Learning, and Fusion Program Review, Colorado Springs, CO, 26-28 June 2017.

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Schubert, C. M., Wilk, A. R., and McClish, D. K., “Sample Size and Confidence Interval planning for estimating the optimal thresholds in a sequence of diagnostic tests,” Joint Statistical Meetings (JSM) 2017, Baltimore, MD, 29 Jul – 3 Aug, 2017.

McClish, D. K., Wilk, A. R., and Schubert, C. M., “Choosing Between the BP and BN Sequential Strategies,” Joint Statistical Meetings (JSM) 2017, Baltimore, MD, 29 Jul – 3 Aug, 2017..

Nunnally, B. A., Schubert, C. M., and Batterton, K. A., “Does correlation matter: The influence of correlation on diagnostic test performance at the optimal point,” Joint Statistical Meetings (JSM) 2017, Baltimore, MD, 29 Jul – 3 Aug, 2017.

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SEYMOUR, RICHARD S., Lt Col,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2015 (AFIT/ENC); BS, US Air Force Academy, 2000; MS, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2015. Lt Col Seymour's research interests include stochastic process model acceptance techniques and parameter estimation problems. Lt Col Seymour's current research considers the adequacy of a semi-Markov process with respect to the observed data used to fit the process. Tel. 937-255-3636 x4398, email: Richard.Seymour@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Millar, J., Hodson, D., and Seymour, R., “Deriving LVC State Synchronization Parameters from Interaction Requirements,” Proceedings of the 20th IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications, London, UK, 21-23 Sept 2016.

SRITHARAN, SIVAGURU S.,

Provost & Vice Chancellor, AFIT Appointment Date: 2015 (AFIT/CL). BSc (Hons.) University of Sri Lanka 1977; MS, University of Washington, 1979; PhD, University of Arizona, 1982. Dr. Sritharan's research includes control theory, stochastic analysis, functional analysis, and numerical analysis of aerodynamics at all range of Mach numbers and electromagnetics. Dr. Sritharan's current research focuses on mathematical and computational issues relevant to hypersonics, directed energy weapons and autonomy. AFIT research center affiliation(s): CDE. Tel. 937-255-6565 x3315, email: Sivaguru.Sritharan@afit.edu

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Mohan, M. T. and Sritharan, S. S., “Ergodic Control of Stochastic Navier-Stokes equation with Levy noise,” *Communications on Stochastic Analysis*, Vol. 10, No. 3, pp. 389-404, 2016.

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EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, Communications on Stochastic Analysis

Member of the Editorial Board, International Journal of Analysis

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Sritharan, S. S., “Advances in Modern Mathematical Fluid Mechanics,” Wright State University, Department of Mathematics and Statistics Seminar, Dayton, OH, Summer and Fall, 2017.

Sritharan, S. S., “Harmonic Analysis of Euler equations of Fluid Dynamics,” Wright State University, Department of Mathematics and Statistics Seminar, Dayton, OH, 19 September 2017.

Sritharan, S. S., “Harmonic Analysis of Navier-Stokes equations of fluid dynamics,” Wright State University, Department of Mathematics and Statistics Seminar, Dayton, OH, 26 September 2017.

Sritharan, S. S., “Kalman Filtering: Past, Present and Future,” University of Toledo, College of Engineering Seminar, Toledo, OH, 5 April 2017

Sritharan, S. S., “Rigorous Aspects of Compressible Fluid Dynamics,” University of Toledo, Department of Mathematics and Statistics Seminar, Toledo, OH, 5 April 2017.

UBER, RICHARD P., Capt,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT, Appointment Date: 2016 (AFIT/ENC); BGS, University of Nebraska Omaha, 2006; MS, Texas A&M University, 2010; PhD, Air Force Institute of Technology, 2016. Capt Uber’s current research interests are electromagnetic wave scattering, partial differential equations, and computational modeling and machine translation. He has served as an Operations Research Analyst for Headquarters Air Education and Training Command and a Mandarin Language Instructor at the Defense Language Institute Foreign Language Center. Tel. 937-255-3636 x6004, email: Richard.Uber@afit.edu

REFEREED JOURNAL PUBLICATIONS

Uber, R. and Wood, A., “Finite-Element Boundary Integral Simulation of Transient Electromagnetic Scattering from Multiple Cavities,” *IEEE Transactions on Antennas and Propagation*, Vol. 65, No. 6, pp. 3267-3272, 2017.

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Uber, R. and Wood, A., “Small Incident Angle Transient Scattering from Cavities,” *Applied Computational Electromagnetics* (ACES), 2017 International ACES Symposium, Florence, Italy, 26-30 March 2017.

WHITE, EDWARD D., III,

Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 1998 (AFIT/ENC); BS, University of Tampa, 1990; MAS, Ohio State University, 1991; PhD, Texas A&M University, 1998. Dr. White’s research interests include design of experiments, categorical data analysis, biostatistics, and model building. Tel. 937-255-3636 x4540, email: Edward.White@afit.edu

REFEREED JOURNAL PUBLICATIONS

Brown, G. E. and White, E. D., “An Investigation of Nonparametric Data Mining Techniques for Acquisition Cost Estimating,” *Defense Acquisition Research Journal*, Vol. 24, No. 2, pp. 302-332, April 2017.

Maupin, G. M., Tvaryanas, A. P., White, E. D., and Lysfjord, H. J., “Risk Factors for Incident Postdeployment Mental Health Conditions among U.S. Air Force Medical Service Personnel,” *Military Medicine*, Vol. 182, No. S1, pp. 251–257, March 2017.

Boehmke, B., Jackson, R., Johnson, A. White, E., Weir, J., and Gallagher, M. “Measuring U.S. Air Force Installation Support Activities via Data Envelopment Analysis,” *Military Operations Research*, Vol. 22, No. 1, pp. 39–58, 2017.

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WOOD, AIHUA W.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1994 (AFIT/ENC); BS, Peking University, 1984; MS, University of Connecticut, 1988; PhD, University of Connecticut, 1990. Dr. Wood's research interests include partial differential equations, electromagnetic wave propagation, and Boltzmann equations. Tel. 937-255-3636 x4272, email: Aihua.Wood@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Launching Equity in the Academy across the Dayton Entrepreneurial Region (LEADER) FY-2017." Sponsor: NSF (WSU). Funding: \$4,000.

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REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Wood, A., "A linear sampling method for through-the-wall radar detection," Computing and Electromagnetics, CEM17, Barcelona, Spain, 22 June 2017.

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Uber, R. and Wood, A., "Small Incident Angle Transient Scattering from Cavities," *Applied Computational Electromagnetics* (ACES), 2017 International ACES Symposium, Florence, Italy, 26-30 March 2017

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, *Advances in Applied Mathematics and Mechanics*

5.5. DEPARTMENT OF OPERATIONAL SCIENCES

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5.5.1. DOCTORAL DISSERTATIONS

ATKINSON, ANDREW D., *Wavelet-Based Simulation Model Validation of Functional Data*. AFIT/ENS/DS/17S-034. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

HANKS, ROBERT W., *Robust Goal Programming and Risk Assessment using Cardinality-Constrained and Strict Robustness via Alternative Uncertainty Sets*. AFIT/ENS/DS/17S-035. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM. [COA]

MESSER, ADAM J., *On the Development of Robust Anomaly Detection Algorithms with Limited Labeled Data*. AFIT/ENS/DS/17S-040. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: HQ USAF/A9.

ROBERTS, MATTHEW D., *Development and Investigation of an Air Transportation Operations Safety Climate Scale*. AFIT/ENS/DS/17S-042. Faculty Advisor: Dr. Matthew A. Douglas. Sponsor: AMC.

ROBINSON, PAUL D., *Duality Behaviors of the Quantile Regression Model Estimation Problem*. AFIT/ENS/DS/17S-043. Faculty Advisor: Dr. James W. Chrissis. Sponsor: ARCYBER.

STORM, SCOTT M., *Validation of Discrete and Functional Simulation Responses over Experimental Regions using Response Surfaces*. AFIT/ENS/DS/17S-044. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

WHITE, ANTHONELLI, *Determinants of Individual-level Demand Forecasting Performance*. AFIT/ENS/DS/17S-045. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AFSC. [COA]

5.5.2. MASTER'S THESES

ALATAWI, NAIF H., *RSAF F-15 Reparable Items Capacity Planning & Execution*. AFIT/ENS/MS/17S-033. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

ATKINSON, JOHN D., *Diffusion of Autonomous Vehicles as an Organizational Innovation*. AFIT/ENS/MS/17M-112. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: N/A. [COA]

BAKER, DOMINIC G., *Determining Field Requirements of the Air Force Supply System: A Delphi Study*. AFIT/ENS/MS/17M-113. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFSC.

BARKALOW, ALLISON M., *Identifying Factors that Affect the Retention Behaviors of Aircraft Maintenance (21A) and Munitions and Missile Maintenance (21M) Officers*. AFIT/ENS/MS/17J-016. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: HQ USAF/A4. [COA]

BENSON, BENJAMIN, *An Initial Ambient Noise Database Based on National Park Service Data*. AFIT/ENS/MS/17M-114. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

BERTRAM, ROBERTO H., *Spectrometric Oil Analysis Program Enhancements for the Argentine Air Force*. AFIT/ENS/MS/17M-115. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: Argentine Air Force Material General Directorate.

BINGOL, GUNDUZ, *Simulation of Aircraft Sortie Generation under an Autonomic Logistics System*. AFIT/ENS/MS/16D-052. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: TuAF.

BURNETT, JONATHON M., *Building Character: Positive Psychology & the Air Force Core Values*. AFIT/ENS/MS/17M-116. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: N/A.

CABALLERO, WILLIAM N., *On Proportionate and Truthful International Alliance Contributions: An Analysis of Incentive Compatible Cost Sharing Mechanisms to Burden Sharing*. AFIT/ENS/MS/17M-117. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: JWAC.

CARLSON, NATHAN J., *Multiple Criteria Decision Making on the Load Planning Process to Enhance Cargo Compartment Utilization*. AFIT/ENS/MS/17M-118. Faculty Advisor: Col Adam D. Reiman. Sponsor: N/A.

CORBETT, STUART, *Agent-Based Modeling to Analyze the Tactical Employment of a Small Advanced Capability Missile*. AFIT/ENS/MS/17M-119. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin.

COX, TRAVIS L., *The use of Data Mining and Network Algorithms for Chemical Warfare Agent Interdiction*. AFIT/ENS/MS/17M-120. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: USSOCOM.

CREAN, RYAN C., *Benchmarking DOD use of Additive Manufacturing and Quantifying Costs*. AFIT/ENS/MS/17M-121. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC. [COA]

CROUCH, DANIEL W., *Improving Minuteman III Maintenance Concepts*. AFIT/ENS/MS/17M-122. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFGSC. [COA]

DEFRANK, JOSHUA D., *A Condition Based Maintenance Approach to Forecasting B-1 Aircraft Parts*. AFIT/ENS/MS/17M-123. Faculty Advisor: Capt Michael P. Kretser. Sponsor: HQ USAF/A4.

DILLARD, DOUGLAS A., *Reduction Methods of Wind Tunnel Testing Data Requirements*. AFIT/ENS/MS/17M-124. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

FAIRMAN, CHRISTIANA R., *Intermodal Shipment Planning Over the USPACOM Distribution Network: An Analysis of the Tradeoff Space*. AFIT/ENS/MS/17M-126. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM.

FARLEY, KEVIN J., *An Experimental Design and Approach to a Response Surface Validation of an Environmental Weapons Effects Model*. AFIT/ENS/MS/17J-025. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: DTRA.

FERGUSON, MATTHEW D., *A Scenario-Based Parametric Analysis of Stable Marriage Approaches to the Army Officer Assignment Problem*. AFIT/ENS/MS/17M-128. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: AHRC.

FRANZEN, COURTNEY N., *Survival Analysis of US Air Force Rated Officer Retention*. AFIT/ENS/MS/17M-129. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

FREEBORN, CODY S., *An Analysis of Forecasting Methods on Supply Discrepancy Reporting*. AFIT/ENS/MS/17M-130. Faculty Advisor: Capt Michael P. Kretser. Sponsor: AFIMSC.

GUTIERREZ, ROBERT J., *A Tabulated Vector Approach for Log-Based Anomaly Detection*. AFIT/ENS/MS/17M-131. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: ARCYBER. [COA]

HOYT, GREG E., *An Investigation Into the Indicators of a Successful Total Force Association*. AFIT/ENS/MS/17M-133. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: N/A. [COA]

HUGHES, KELSIE L., *Supply Base Reduction Efforts Regarding Laboratory Reagents within Hospital Networks*. AFIT/ENS/MS/17M-134. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AFMOA.

HUSTON, RYAN W., *Blended Military Retirement and the Potential Impacts on Retention and Recruiting*. AFIT/ENS/MS/17M-135. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

JAMESON, GARRETT L., *Refugees in Urban Environments: Social, Economic, and Infrastructure Impacts*. AFIT/ENS/MS/17M-136. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: USSOCOM.

JENKINS, PHILLIP R., *Using Markov Decision Processes with Heterogeneous Queueing Systems to Examine Military MEDEVAC Dispatching Policies*. AFIT/ENS/MS/17M-137. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: MEPD.

- KLAUS, AUSTIN M., *Process Design and Economics for the Production of Algal Biomass: Algal Biomass Production in Closed Bioreactor Systems and Processing through Dewatering for Downstream Conversion*. AFIT/ENS/MS/17M-138. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFRL/RX.
- KLINE, ALEXANDER G., *Real-Time Heuristic Algorithms for the Static Weapon-Target Assignment Problem*. AFIT/ENS/MS/17M-139. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: JWAC.
- LEIBY, BENJAMIN D., *A Conditional Logistic Regression Predictive Model of World Conflict Considering Neighboring Conflict and Environmental Security*. AFIT/ENS/MS/17M-140. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: JS/J7.
- LEIGHTON, JASON M., *Common Support Equipment and its Impact on Aircraft Availability*. AFIT/ENS/MS/17M-141. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC.
- LIM, GAYLEEN A., *Quantifying Aircraft Maintenance Personnel Time use, Management Perspective, and the Impact of Personnel Availability on Time Distribution*. AFIT/ENS/MS/17M-142. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AFMC.
- MASON, MICHAEL P., *Cost Versus Risk: The Policy of Nuclear Weapon Maintenance of Tritium Based Limited Life Components*. AFIT/ENS/MS/17M-143. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.
- MUNIZ, MEGAN L., *Analyzing the Critical Supply Chain for Unmanned Aircraft Systems*. AFIT/ENS/MS/17M-149. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: JWAC.
- NGUYEN, HAI-DANG, *Use of Artificial Neural Networks to Classify CB-DNA Fingerprints by Radio of Origin*. AFIT/ENS/MS/17M-150. Faculty Advisor: Dr. John O. Miller. Sponsor: AFRL/RV.
- O'NEAL, BRENDAN M., *Aircraft Availability Metric Refinement Based on a 9-Tiered Sub-metric Indication*. AFIT/ENS/MS/17M-151. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: AFMC.
- PHILLIPS, MARIA S., *A System Dynamics Model Investigating the Efficacy of Non-Kinetic Policy Strategies on the Diffusion of Democratic Ideologies in China*. AFIT/ENS/MS/17M-153. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.
- POTTS, GREGORY D., *Simulation Modeling and Analysis of Deployed F-16 Operations and Logistics Support*. AFIT/ENS/MS/17M-154. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC. [COA]
- REBOULET, AMANDA M., *Organizational Strategic Basing Framework with Infusion of Multi-Dimensional Uncertainty*. AFIT/ENS/MS/17S-068. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: N/A. [COA]
- SANDERS, CORY E., *Development of a Fuel Efficiency Motivation Survey*. AFIT/ENS/MS/17M-303. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: AMC.
- SCHUH, ERIK B., *Examining Regionalization Efforts to Develop Lessons Learned and Consideration for Department of Defense Medical Facilities*. AFIT/ENS/MS/17M-156. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: N/A.
- SCHULTE, KATLYN A., *Resilience Analysis of Distribution Networks In Response to Regional Disruption, as Applied to the USPACOM Area of Responsibility*. AFIT/ENS/MS/17M-157. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM.
- SCHWEMMER, JOSEPH R., *Optimal Design of a Hexakis Icosahedron Vacuum Based Lighter than Air Vehicle*. AFIT/ENS/MS/17M-158. Faculty Advisor: Dr. James W. Chrissis. Sponsor: AFOSR.
- SMITH, JESSICA A., *Supply Chain Transformation: An Information Technology Perspective*. AFIT/ENS/MS/17S-065. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: HQ USAF/A4. [COA]

SUMMERS, DANIEL S., *An Approximate Dynamic Programming Approach for Comparing Firing Solutions in a Networked Air Defense Environment*. AFIT/ENS/MS/17M-159. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: AFRL/RD.

VINCENT, AARON T., *Maintenance Officer Initial Skills Training Timeline*. AFIT/ENS/MS/17M-160. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: HQ ACC/A4. [COA]

WEST, KIMBERLY S., *Approximate Dynamic Programming for the United State Air Force Officer Manpower Planning Problem*. AFIT/ENS/MS/17M-162. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: HQ USAF/A1.

WILLIAMS, RANDI D., *Optimal Location of Integrated Air Defense Radars and Interceptor Batteries within a Game Theoretic Framework*. AFIT/ENS/MS/17J-052. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: JWAC.

WILLIAMS, RUSSELL H., *Predicting Failure Rates for the B-1B Bomber*. AFIT/ENS/MS/17M-163. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFGSC. [COA]

WITHAM, BRET N., *2018 Military Retirement Options: An Expected Net Present Value Decision Analysis Model*. AFIT/ENS/MS/17M-164. Faculty Advisor: Maj Heidi M. Tucholski. Sponsor: N/A.

ZIMMERMAN, JAMIE T., *Application of Enlisted Force Retention Levels and Career Field Stability*. AFIT/ENS/MS/17M-167. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

5.5.3. GRADUATE RESEARCH PAPERS

BLAND, JESSICA S., *How can the UK Ministry of Defense More Effectively Convey the Role and Importance of An Independent Nuclear Deterrent?* AFIT/ENS/MS/17J-017. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: UK Ministry of Defense.

BREDESEN, DAVID T., *More With Less: Increasing The Strategic Airlift Fleet Capability Through Optimized Planning Factors*. AFIT/ENS/MS/17J-018. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 618 AOC. [COA]

DAVIS, JEFFREY C., *Mobility Air Force Aircrew Flight Training Requirements Validation Through the use of Line Oriented Safety Audit Data*. AFIT/ENS/MS/17J-019. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AMC.

DAWSON, JEREMY D., *Deterring the Russian Tactical Nuclear Arsenal*. AFIT/ENS/MS/17J-020. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: N/A. [COA]

DIAZ, CHRISTOPHER J., *Using Social Media to Measure Deterrence*. AFIT/ENS/MS/17J-021. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

DIERDORF, JEFFREY M., *Airlift at Risk: Modeling Operations in a European Contested, Denied, Operationally Limited Environment*. AFIT/ENS/MS/17J-022. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: EUCOM.

EVANS, JASON B., *Guam Tankers: A Quantitative Analysis of KC-135s at Andersen AFB*. AFIT/ENS/MS/17J-024. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: AMC.

FRENCH, JONATHAN M., *Organizing Major Commands for Today's Cyber Security Challenges*. AFIT/ENS/MS/17J-026. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AMC. [COA]

GAMEL, JUSTIN L., *Modernizing USAF Escalation Control*. AFIT/ENS/MS/17J-027. Faculty Advisor: Maj Heidi M. Tucholski. Sponsor: N/A.

GILLET, BRANDON G., *Cost Comparison of Military versus Commercial Airlift*. AFIT/ENS/MS/17J-028. Faculty Advisor: Dr. William A. Cunningham Sponsor: AMC.

HALL, TERRY L., *How Can the United States Better Contribute to NATO'S Dual Capable Aircraft Mission?* AFIT/ENS/MS/17J-029. Faculty Advisor: Dr. Adam B. Lowther. Sponsor: EUCOM.

HARRIS, JASON O., *Total Force Integration: A Look at the Integrated Wing Pilot Program at Seymour-Johnson AFB, NC.* AFIT/ENS/MS/17J-030. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: AFSOC.

JONES, ELIZABETH M., *The Culture of Deterrence.* AFIT/ENS/MS/17J-032. Faculty Advisor: Col Adam D. Reiman. Sponsor: AFGSC.

LOUIE, ALAN K., *Nuclear Weapons Capabilities Required for the 21st Century.* AFIT/ENS/MS/17J-033. Faculty Advisor: Dr. William A. Cunningham. Sponsor: N/A.

MCKEOWN, BARRY V., *Evaluating the Effect of Aircrew Flight Events on AMC Aircraft Safety Incidents.* AFIT/ENS/MS/17J-036. Faculty Advisor: Lt Col Jason R. Anderson. Sponsor: AMC.

MORRIS, BRODERICK S., *An Analysis of the Defense Logistics Agency's Forward Stocking Initiatives at Albany and Barstow Distribution Depots and the Impact on Logistics Response Time.* AFIT/ENS/MS/16D-047. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: N/A.

NOLAN, STEVEN T., *An Intrinsic Case Study Analysis of Air Force Company Grade Officers as High-Potential Officers.* AFIT/ENS/MS/17J-039. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: SAF.

OWENS, JOHN D., *The Nuclear Bomber Force in the 21st Century.* AFIT/ENS/MS/17J-040. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

PARISE, NICHOLAS A., *Chutes Over Pope: Air Mobility Support to GRF Airborne Readiness Training.* AFIT/ENS/MS/17J-041. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: 18AF/A3D.

PARKER, JACOB R., *Tanker Force Nuclear Structure: Are We Properly Organized, Trained, and Equipped?* AFIT/ENS/MS/17J-042. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: 18AF/CC.

PARRISH, JEFFREY M., *United States Nuclear Deterrence Policy: Past, Present, and Future.* AFIT/ENS/MS/17J-043. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: HQ USAF/A3. [COA]

PEDERSEN, JEFFREY J., *Assessment of MAF Pilot Overabsorption: Expansion of the 1999 Rated Summit Intent.* AFIT/ENS/MS/17J-044. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AMC. [COA]

RIDLEY, MICHAEL E., *Cascadia Subduction Zone Earthquake Basing and Supply Delivery Strategy Based on Current Planning and Historical Event Analysis.* AFIT/ENS/MS/17J-045. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: FEMA. [COA]

RIGOLLET, MATTHIEU A., *Increasing Pilot Production by Applying Elements of 'Lean Production Theory' and 'Value Stream Analysis' to the Current Specialized Undergraduate Pilot Training Syllabi.* AFIT/ENS/MS/17J-046. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AMC.

RIGOLLET, TAYLOR S., *One Size Does Not Fit All: Removing Unnecessary Barriers To Entry In The Pilot Community.* AFIT/ENS/MS/17J-047. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: JCS/J4. [COA]

VANN, RAYMUNDO M., *Developing a Process for Determining the Optimal Nuclear Weapons Posture.* AFIT/ENS/MS/17J-050. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: HQ USAF/A10.

WELLS, MICHAEL W., *Reduced-Engine Taxi: A Cost-Savings Exploration.* AFIT/ENS/MS/17J-051. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: USAFA. [COA]

ZENNER, AMANDA L., *An Analysis of E-3A Component's End of Lifecycle Spare Parts Reclamation.* AFIT/ENS/MS/17J-055. Faculty Advisor: Dr. Kevin J. Gaudette. Sponsor: LWS.

5.5.4. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AHNER, DARRYL K.,

Associate Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2010 (AFIT/ENS); Director, Scientific Test and Analysis (STAT) for Test and Evaluation (T&E) Center of Excellence, Appointment Date: 2012; BS, Mechanical Engineering, United States Military Academy, 1990; MS, Applied Mathematics, Rensselaer Polytechnic Institute, 1999; MS, Operations Research & Statistics, Rensselaer Polytechnic Institute, 1999; PhD, Systems Engineering, Boston University, 2005. Dr. Ahner's research interests include dynamic programming applications, queueing applications, mathematical control theory and model predictive control of complex systems, test design, combat modeling algorithm development, and models for supply chain management. Dr. Ahner is a licensed Professional Engineer in the Commonwealth of Virginia. Dr. Ahner is Vice President-Professional Development, Military Operations Research Society. Tel. 937-255-6565 x4708, email: Darryl.Ahner@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Test and Evaluation Center of Excellence.” Sponsor: OSD DASD (DT&E). Funding: \$360,520

“Subject Matter Expertise Support to AFRL/RyAA.” Sponsor: AFRL/Ry. Funding: \$96,000.

“Experimental Design and Analysis Methodology Development.” Sponsor: NASIC. Funding: \$270,352 – Ahner 50%, Parson 50%.

“Scientific Test and Analysis Techniques for Automatic Test and Analysis.” Sponsor: NAVSEASysCMD. Funding: \$500,000 – Ahner 50%, Parson 50%.

“F-35 Scientific Test and Analysis Techniques Test Support.” Sponsor: AFLCMC. Funding: \$23,000 – Ahner 50%, Parson 50%.

“Department of Homeland Security, Science and Technology Directorate.” Sponsor: DHS. Funding: \$515,000 – Ahner 50%, Parson 50%.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Short Courses Delivery for AFRL/RyAA.” Sponsor: AFRL/Ry. Funding: \$90,000 – Ahner 60%, Weir 20%, Boehmke 20%.

“COE-S 310: Experimental Design and Analysis I.” Sponsor: NASIC. Funding: \$14,000.

REFEREED JOURNAL PUBLICATIONS

Saie, Ca. M., and Ahner, D.K., “Investigating the dynamics of nation-building through a system of differential equations,” *Journal of the Operational Research Society*, DOI: 10.1057/s41274-017-0256-x, 2017.

Millar, J., Hodson, D., Peterson, G., and Ahner, D.K., “Consistency and Fairness in Real-Time Distributed Virtual Environments: Paradigms and Relationships,” *Journal of Simulation, Special issue on Data-driven and Large-scale Distributed Simulation*, pp. 1-8, 2016.

Millar, J., Hodson, D., Peterson, G., and Ahner, D.K., “Optimizing Update Scheduling Parameters for Distributed Virtual Environments Supporting operational Tests,” *Concurrency and Computation: Practice and Experience (CCPE), Special Issue on Trends and Advances in Collaboration Technologies and Systems*, DOI: 10.1002/cpe.4156/abstract, 2017.

Garee, M.J., Hill, R.R., Ahner, D., Czarnecki, G., “Fragment capture simulation for MANPADS test arena optimization,” *Journal of Simulation*, Vol. 11, No. 2, pp. 75–86, 2017.

Hill, R.R., Ahner, D., Morrill, D., Talafuse, T. “Applying Statistical Engineering to the Development of a Ballistic Impact Flash Model,” *Quality Engineering*, Vol. 11, No. 2, pp. 181-189, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hoecherl, J. C., Robbins, M. and Ahner, D., “Approximate dynamic programming algorithms for United States Air Force officer sustainment,” Winter Simulation Conference, Washington DC, 11-14 Dec 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Darryl K. Ahner, “Efficient, Effective & Innovative Automated Software Test for the Acquisition Process,” IEEE Software Technology Conference, Gaithersburg, MD, 27 Sep 2017.

Darryl K. Ahner, Nicholas Shallcross, Jennifer Thompson, “Conflict Evolution, Prediction, and Country Assessment using Open Source Data,” 85th Military Operations Research Society Symposium, West Point, N.Y., 19-22 Jun 2017.

Alexander Kline and Darryl K. Ahner, “Improved Heuristic Algorithms for the Weapon-Target Assignment Problem,” 85th Military Operations Research Society Symposium, West Point, N.Y., 19-22 Jun 2017.

Raymond Hill, Darryl Ahner, and Douglas Dillard, “Examining Potential Reductions in Wind Tunnel Testing Data Requirements,” 85th Military Operations Research Society Symposium, West Point, N.Y., 19-22 Jun 2017.

Nicholas Cabellaro, Brian Lunday, and Darryl Ahner, “On Truthful, Stable and Proportionate International Alliance Burden Sharing,” 85th Military Operations Research Society Symposium, West Point, N.Y., 19-22 Jun 2017.

James Wisnowski, James Simpson and Darryl Ahner, “Implementation Guidance for Automated Software Testing,” 85th Military Operations Research Society Symposium, West Point, N.Y., 19-22 Jun 2017.

Darryl K. Ahner and Meredith Jessup, “Why Elections are Hard: A Game Theoretic Examination of Complex Strategic Interactions among Multiple Political Candidates,” 17th Applied Stochastic Models and Data Analysis International Conference with Demographics Workshop, London, U.K., 8 Jun 2017.

Darryl K. Ahner and William Rowell, “T&E of Weapon System Cyber Security Capabilities,” 2017 Cyber Security Workshop, Belcamp, MD, 28 Mar 2017.

Joseph C. Hoecherl, Matthew J. Robbins, Raymond R. Hill, and Darryl K. Ahner, “Approximate Dynamic Programming Algorithms for United States Air Force Officer Sustainment,” 2016 Winter Simulation Conference, Washington D.C., 11-14 Dec 2016.

Nicholas Shallcross and Darryl Ahner, “Predicting Future World Conflict Using Factor Sample Paths,” INFORMS Annual Meeting, Nashville, TN, 13-16 Nov 2016.

Darryl K. Ahner, “Test and Evaluation of Autonomous Systems,” 33rd International Test and Evaluation Symposium Proceedings, Reston, VA, 5 Oct 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Ahner, D.K., “Better Buying Power, Developmental Testing, and Scientific Test and Analysis Techniques,” *International Test and Evaluation Journal*, Vol. 37, No. 4, 2016.

Rowell, W. and Ahner, D.K., “Improving the T&E Workforce’s Understanding of the New Approach to Developing Warfighting System Cyber Requirements,” *International Test and Evaluation Journal*, Vol. 38, No. 3, 2017.

ANDERSON, JASON R., Lt Col,

Assistant Professor of Logistics and Supply Chain Management and Deputy Department Head, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); Program Manager of Advanced Study of Air Mobility (ASAM) and School for Advanced Nuclear Deterrence Studies (SANDS), 2016; BS, Operations research, United States Air Force Academy, 2000; MS, Masters of Science and Administration, Central Michigan University, 2007; MS, Masters of Logistics and Supply Chain Management, Air Force Institute of Technology, 2013; PhD, Logistics and Supply Chain Management, Air Force Institute of Technology. Lt Col Anderson’s research interests include supply chain management risk and optimization, transportation modes, inventory, forecasting, research methods, leadership, and sourcing. Tel. 937-255-6565 x4533, email: Jason.Anderson@afit.edu

REFEREED JOURNAL PUBLICATIONS

Anderson, J. R., Ogden, J. D., Cunningham, W. A., & Schubert-Kabban, C., “An exploratory study of hours of service and its safety impact on motorists,” *Transport Policy*, Vol. 53, pp. 161-174, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Lt Col Jason Anderson, Dr. Jeffrey Ogden, Dr. Benjamin Hazen, Dr. Robert Overstreet, “Driving Legally Fatigued: A Classification Approach to Hours of Service,” Western Decision Science Institute, Vancouver, B.C., Canada, 4-8 Apr 2017.

BAUER, KENNETH W.,

Professor of Operations Research, Department of Operational Sciences; Program Chair, PhD, Operations Research, Department of Operational Sciences, AFIT Appointment Date: 1996 (AFIT/ENS); Director, Sensor Fusion Laboratory; BS, Miami University (Ohio), 1976; MEA, University of Utah, 1980; MS, Air Force Institute of Technology, 1981; PhD, Purdue University, 1987. Dr. Bauer’s research interests include pattern recognition, applied multivariate statistics, and statistical aspects of neural networks; all are usually within the specific application area of automatic target recognition and more recently hyper-spectral imaging processing. AFIT research center affiliation(s): COA and CTISR. Tel. 937-255-6565 x4328, email: Kenneth.Bauer@afit.edu

REFEREED JOURNAL PUBLICATIONS

Bellucci, J.P. and Bauer, K.W., “The use of nested desirability functions and quality indices for multi-response robust parameter design problems,” *Quality Engineering*, Vol. 29, Issue 4, pp. 573-587, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Messer, Adam J. and Kenneth W. Bauer, “Method of sensitivity analysis in anomaly detection algorithms for hyperspectral images,” SPIE, volume 10198: Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIII, 101980U, Anaheim, CA, 9-13 Apr 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

R. J. Gutierrez, K. W. Bauer, B. C. Boehmke, C. M. Saie, T. J. Bihl, “Using Tabulated Vectors and Embedded Analytics for Efficient Cyber Data Mining,” 2017 Military Operations Research Society Symposium, West Point, NY, 19-22 Jun 2017.

Bradley C. Boehmke, Trevor J. Bihl, Robert J. Gutierrez, Kenneth W. Bauer, Cade M. Saie, "Big Cyber Data Analysis: Developing Embedded Analytics Methods for Efficient Cyber Data Mining," IEEE National Aerospace & Electronics Conference, Dayton, OH, 27-30 Jun 2017.

BOEHMKE, BRADLEY C.,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; AFIT Appointment Date: 2017 (AFIT/ENS); Director, Data Science Lab; Director of Research, Center for Operational Analysis; BS, North Dakota State University, 2003; MS, Air Force Institute of Technology, 2011; PhD, Air Force Institute of Technology, 2015. Dr. Boehmke's research focuses on developing tools and processes that allow supply chain and operations research analysts in the defense industry to extract more insights from their data. AFIT research center affiliation(s): COA.

SPONSOR FUNDED RESEARCH PROJECTS

"Logistics Data Environment." Sponsor: AF/A4. Funding: \$550,000 – Boehmke 50%, Hartman 25%, Weir 25%. [COA]

"IMSC Analytic Support." Sponsor: AFISMC. Funding: \$235,000 – Boehmke 50%, Hartman 25%, Weir 25%. [COA]

"V-22 Data Analytics." Sponsor: NAVAIR. Funding: \$170,000 – Boehmke 50%, Hartman 25%, Weir 25%. [COA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Logistics Distance Learning Program." Sponsor: HAF A4. Funding: \$92,000 – Boehmke 50%, Joo 50%.

REFEREED JOURNAL PUBLICATIONS

Griffith, D.A., Boehmke, B.C., Hazen, B.T. Johnson, A.W., "Embedded analytics: Improving decision support for humanitarian logistics operations," *Annals of Operations Research*, DOI: 10.1007/s10479-017-2607-z.

Hazen, B.T., Weigel, F.K., Ezell, J.D., Boehmke, B.C. Bradley, R.V., "Toward understanding outcomes associated with data quality improvement," *International Journal of Production Economics*, Vol. 193, pp. 737-747, 2017.

Boehmke, B.C. & Hazen, B.T., "The future of supply chain information systems: The open source ecosystem," *Global Journal of Flexible Systems Management*, Vol. 18, No. 2, pp. 163-186, 2017.

Boehmke, B.C., Jackson, R.A., Johnson, A.W., Weir, J.D., White, E.D. & Gallagher, M.A., "Measuring U.S. Air Force installation support activities via data envelopment analysis," *Military Operations Research*, Vol. 22, No. 1, pp. 39-58, 2017.

Boehmke, B.C., Montgomery, R.T., Ogden, J.A. & Freels, J.K., "Kraljic Matrix: An R package for implementing the Kraljic Matrix to strategically analyze a firm's purchasing portfolio," *Journal of Open Source Software*, Vol. 2, No. 10, 2017.

Boehmke, B.C. & Freels, J.K., "Learning Curve: An implementation of Crawford's and Wright's learning curve production functions," *Journal of Open Source Software*, Vol. 2, No. 13, 2017.

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Boehmke, B.C., Gutierrez, R.J., Bauer, K.W., Bihl, T.J., "Big Cyber Data Analysis: Embedded Analytic Methods for Efficient Cyber Data Mining," National Aerospace & Electronics Conference, Dayton, OH, 27-30 Jun 2017.

Gutierrez, R.J., Bauer, K.W., Boehmke, B.C., Bihl, T.J., "Anomaly Detection: Using a Tabulated Vector Approach and Embedded Analytics for Efficient Data Mining," 85th Military Operations Research Symposium, West Point, NY, 19-22 Jun 2017.

BOOKS AND CHAPTERS IN BOOKS

Boehmke, B.C., “Data Wrangling with R,” Robert Gentleman, Kurt Hornik, and Giovanni Parmigiani, (eds.), Springer International Publishing, Cham, Switzerland, DOI: 10.1007/978-3-319-45599-0.

BREITBACH, TIMOTHY W., Maj,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Logistics Division Chief, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BA, University of Notre Dame, 2005; MS, Air Force Institute of Technology, 2012; PhD, Massachusetts Institute of Technology, 2017. Dr. Breitbach’s research interests include supply chain finance and data analysis, humanitarian logistics and the role of supply chains in international development, inventory management and resource allocation.

Tel. 937-255-3636 x4458, email: Timothy.Breitbach@afit.edu

CHRISSIS, JAMES W.,

Associate Professor Emeritus, Department of Operational Sciences, AFIT Appointment Date: 1987 (AFIT/ENS); BS, University of Pittsburgh, 1975; MS, Virginia Polytechnic Institute and State University, 1977; PhD, Virginia Polytechnic Institute and State University, 1980. Dr. Chrissis’s research interests include mathematical programming, optimization, engineering design optimization, simulation-driven optimization, and integer modeling. Dr. Chrissis has been a member of the faculties of Virginia Tech and the University of South Florida. He is a member of the Institute for Operations Research and Management Sciences (INFORMS), the Military Operations Research Society (MORS), The American Institute for Aeronautics and Astronautics (AIAA), and Sigma Xi. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4606, email: James.Chrissis@afit.edu

INVENTION DISCLOSURES

Palazotto, Anthony N., Chrissis, James, Schwemmer, Joseph R., “Four Foot Hexakis Icosahedron Vacuum Lighter than Air Vehicle,” filed 13 Jul 17, Air Force Docket No. ADF-1723.

CUNNINGHAM, WILLIAM A.,

Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, MS in Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 1994 (AFIT/ENS); BS, Business Administration, Missouri Southern State College, 1976; MS, Economics, Oklahoma State University, 1979; PhD, Economics, University of Arkansas, 1986. Dr. Cunningham’s research interests include strategic mobility, cost/benefit analysis, econometric modeling, costing, privatization and A-76 studies, modal choice, network analysis, location analysis, supply chain management, and RFID. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4283, email: William.Cunningham@afit.edu

REFEREED JOURNAL PUBLICATIONS

Cunningham, W.A., Anderson, J.R., Ogden, J.D., Schubert-Kabban, C., “An Exploratory Study of Hours of Service and Its Safety Impact on Motorists,” *Transport Policy*, Vol. 53, pp. 161-174, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

William A. Cunningham, “Basic Supply Chain Management Concepts,” Logistics Officers Association Annual Conference, Washington, D.C., 4 Oct, 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Review Board, Journal of Transportation Management

DECKRO, RICHARD F.,

Distinguished Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 1994 (AFIT/ENS); Joint Warfare Analysis Center Chair of Applied Operations Research, and Director, Future Operations Investigation Laboratory, BSIE, State University of New York at Buffalo, 1972; MBA & DBA, Decision Sciences,

Kent State University, 1976. Dr. Deckro's research, teaching, and consultation interests include the areas of information operations and information assurance, behavioral modeling including social network analysis, counter insurgency and irregular warfare, applied mathematical programming and optimization, scheduling, network models, project and program management, modeling and analysis, space applications, campaign modeling, reconstruction and stabilization, measures of effectiveness and assessment, technology selection and management, advanced manufacturing methods, multi-criteria decision making, and decision analysis. Dr. Deckro is a Fellow of the Military Operations Research Society. AFIT research center affiliation(s): CSRA. Tel. 937-255-6565 x4325, email: Richard.Deckro@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Transitioning the Production of Carbon Nanotubes from Development to Economic Viability." Sponsor: Undisclosed. Funding: \$50,000 – Deckro 33%, Stone 33%, Tucholski 33%.

"JWAC AFIT Interaction." Sponsor: JWAC. Funding: \$150,000 – Deckro 30%, Ahner 23%, Lunday 23%, Swenson 25%. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Fairul Mohd-Zaid, Christine M. Schubert Kabban, Richard F. Deckro, Edward D. White, "Parameter Specification for the Degree Distribution of Simulated Barabási–Albert Graphs," *Physica A: Statistical Mechanics and its Applications*, Vol. 465, No. 1, pp. 141-152, 2017.

EDITORSHIPS IN PROFESSIONAL JOURNALS

1st Editor Emeritus, Military Operations Research

DOUGLAS, MATTHEW A., Col,

Dean of Students, Graduate School of Engineering and Management and Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2014 (AFIT/ENS); BS, Mathematics, Angelo State University, 1996; MS, Logistics Management, Air Force Institute of Technology, 2003; PhD, Marketing, University of North Texas, 2009. Col Douglas's research interests include behavioral aspects of supply chain and safety management, leading transformation, and ethics and decision-making. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4737, email: Matthew.Douglas@afit.edu

REFEREED JOURNAL PUBLICATIONS

Douglas, M.A. & Swartz, S.M., "Knights of the road: Safety, ethics, and the professional truck driver," *Journal of Business Ethics*, Vol. 142, No. 3, pp. 567-588, 2017.

Swartz, S.M., Douglas, M.A., Roberts, M.D., & Overstreet, R.E., "Leavin' on my mind: The influence of safety climate on truck drivers' job attitudes and intentions to leave," *Transportation Journal*, Vol. 56, No. 2, pp. 184-209, 2017.

Douglas, M.A. & Swartz, S.M., "Career stage and truck drivers' regulatory attitudes," *International Journal of Logistics Management*, Vol. 27, No. 3, pp. 686-706, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Roberts, M.D., & Douglas, M.A., "The moderating effect of employee perceptions of a joint management system on safety climate and performance," Council of Supply Chain Management Professionals Academic Research Symposium, Atlanta, GA, 24-27 Sep 2017.

Douglas, M.A., Overstreet, R.E., & Hazen, B.T., "Management innovation diffusion in supply chains: Organizational dependence and outcomes," Production and Operations Management Society International Conference, Tel Aviv, Israel, 27-29 Jun 2017.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Journal of Defense Analytics and Logistics

Editorial Advisory Board, International Journal of Logistics Management

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Kossick, W.C. & Douglas, M.A., “Developing and advising Afghan Air Force sustainment capability: Four axioms of air advising,” *Exceptional Release*, Sp17, pp. 32-39, 2017.

Douglas, M.A. & Kossick, W.C., “Sustaining Afghan air power: Make, buy, or both?” *Defense AT&L*, Vol. 46, No. 2, pp. 38-43, 2017.

HARTMAN, PAUL L.,

Director, Center for Operational Analysis, Department of Operational Sciences, AFIT Appointment Date: 2015 (AFIT/ENS); BS, Business Administration, University of Maryland, 1990; MS, Logistics Management, Air Force Institute of Technology, 1997; MA, International Affairs, University of Dayton, 1998; PhD, Logistics, Air Force Institute of Technology, 2013. Dr. Hartman’s research interests include multi-domain command and control; data creation, storage, management, and analysis; speed of data, effects-based data collection and analysis; modeling and simulation; and solving complex acquisition, maintenance, operations and supply chain problems. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4521, email: Paul.Hartman@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Operational Requirements for the Mechanical Equipment & Subsystem Integrity Program (MECSIP).” Sponsor: AFLCMC. Funding: \$61,376 – Hartman 50%, Hartman 50%. [COA]

“Modernization of the AFRL Enterprise Business System Program Office (EBS PO) Capabilities.” Sponsor: AFRL/RC. Funding: \$130,000. [COA]

“COA Mission Objective Support.” Sponsor: USAF A4C. Funding: \$50,000. [COA]

REFEREED JOURNAL PUBLICATIONS

Pulles, Niels J. and Hartman, Paul L., “Likeability and its effect on outcomes of interpersonal interaction,” *Industrial Marketing Management*, Vol. 66, pp. 56-63, 2017. [COA]

Hartman, P., Ogden, J., Wirthlin, J. and Hazen, B., “Nearshoring and Reshoring and Insourcing - Oh My! Moving Beyond the Total Cost of Ownership Conversation,” *Business Horizons*, Vol. 60, No. 2, pp. 363-373, 2017. [COA]

Hartman, P.L., Ogden, J.A. and Hazen, B.T., “Bring it Back? An Examination of the Insourcing Decision,” *International Journal of Physical Distribution and Logistics Management*, Vol. 47, No. 2/3, pp. 198-221, 2017. [COA]

HAZEN, BENJAMIN T., Maj,

Assistant Professor, Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2015 (AFIT/ENS); BS, Business Administration, Colorado Christian University, 2004; MA, Organizational Leadership, Gonzaga University, 2006; MBA, California State University, 2007; PhD, Management, Auburn University, 2012. Maj Hazen’s research interests include closed loop supply chains, sustainability, data science, innovation, and supply chain management/information systems interface. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4337, email: Benjamin.Hazen@afit.edu

REFEREED JOURNAL PUBLICATIONS

- Boone, C. A., Skipper, J. B., & Hazen, B. T., "A framework for investigating the role of big data in service parts management," *Journal of Cleaner Production*, Vol. 153, pp. 687-691, 2017.
- Hartman, P. L., Ogden, J. A., & Hazen, B. T., "Bring it back? An examination of the insourcing decision," *International Journal of Physical Distribution & Logistics Management*, Vol. 47, No. 2/3, pp. 198-221, 2017.
- Hazen, B. T., Boone, C. A., Wang, Y., & Khor, K. S., "Conceptualizing and measuring perceived quality of remanufactured products: Construct and measure development," *Journal of Cleaner Production*, Vol. 142, pp. 716-726, 2017.
- Hazen, B. T., Mollenkopf, D. A., & Wang, Y., "Remanufacturing for the circular economy: An examination of consumer switching behavior," *Business Strategy and the Environment*, Vol. 26, No. 4, pp. 451-464, 2017.
- Luo, Z., Dubey, R., Gunasekaran, A., Childe, S. J., Papadopolous, T., Hazen, B. T., & Roubaud, D., "Sustainable production framework for cement manufacturing firms: A behavioral perspective," *Renewable and Sustainable Energy Reviews*, Vol. 78, pp. 495-502, 2017.
- Mani, V., Delgado, C., Hazen, B. T., & Patel, P., "Mitigating supply chain risk for sustainability using big data knowledge: Evidence from the manufacturing supply chain," *Sustainability*, Vol. 9, pp. 1-21, 2017.
- Mishra, D., Gunasekaran, A., Papadopoulos, T., & Hazen, B. T., "Green supply chain performance measures: A review and bibliometric analysis," *Sustainable Production & Consumption*, Vol. 10, pp. 85-99, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Hartman, P. L., Ogden, J. A., & Hazen, B. T., "Don't turn around? Strategic considerations for making the insourcing decision," Decision Sciences Institute Annual Meeting, Washington, DC, 18-20 Nov 2017.
- Wu, Y. & Hazen, B. T., "Enhancing healthcare delivery networks' performance with inter-firm dynamic capabilities that fit information processing requirements," Decision Sciences Institute Annual Meeting. Washington, DC, 18-20 Nov 2017.
- Golicic, S. L. & Hazen, B. T., "Socially sustainable supply chain management across developing economies," Academy of Marketing Science World Marketing Conference. Christchurch, NZ, June 27-July 1, 2017.
- Johnson, A., Carnavale, S., Boehmke, B., & Hazen, B. T., "A theoretical framework for understanding mission critical logistics," Decision Sciences Institute Annual Meeting, Austin, TX, 19-22 Nov 2016.
- White, A., Ogden, J. Douglas, M., Hazen, B. T., & Shubert Kabban, C., "Developing a forecasting climate scale: Qualitative analysis and pre-test assessment," Decision Sciences Institute Annual Meeting. Austin, TX, 19-22 Nov 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor-in-Chief, Journal of Defense Analytics and Logistics

Senior Associate Editor, International Journal of Physical Distribution & Logistics Management

Associate Editor, Global Journal of Flexible Systems Management

Guest Editor, International Journal of Production Research

Guest Editor, International Journal of Physical Distribution & Logistics Management

Guest Editor, Sustainability

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Boehmke, B. C. & Hazen, B. T., “The future of supply chain information systems: The open source ecosystem,” *Global Journal of Flexible Systems Management*, Vol. 18, No. 2, pp. 163-168, 2017.

Hartman, P. L., Ogden, J. A., Wirthlin, J. R., & Hazen, B. T., “Nearshoring and reshoring and insourcing: Moving beyond the total cost of ownership conversation,” *Business Horizons*, Vol. 60, pp. 363-373, 2017.

HILL, RAYMOND R.,

Professor of Operations Research, Department of Operational Sciences; Program Chair, Graduate Test and Evaluation Certificate, Director, Science of Test Research Laboratory, Department of Operational Sciences, AFIT Appointment Dates: 1997 (AFIT/ENS); BS, Mathematics, Eastern Connecticut State University, 1983; MS, Operations Research, Air Force Institute of Technology, 1988; PhD, Industrial and Systems Engineering, The Ohio State University, 1996. Dr. Hill’s research interests include applied statistics and data analytics, in particular the application of design of experiments methodologies to test and evaluation; mathematical optimization, in particular the use of heuristic search methods for addressing particularly hard problems; and applied simulation modeling and analysis with particular interests in the area of agent-based modeling and the validation of such models. Tel. 937-255-6565 x7469, email: Raymond.Hill@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“The Science of Test: Advanced Test and Evaluation in Support of the DOD Test and Evaluation Enterprise.” Sponsor: DOT&E. Funding: \$377,324 – Hill 25%, Stone 25%, Freels 25%, Hodson 25%.

“Experimental Design Methods for Dynamical Systems.” Sponsor: AFRL/RQ. Funding: \$75,000.

REFEREED JOURNAL PUBLICATIONS

Hill, R. R., “The Test and Evaluation Workforce and a Base of Sand Issue,” *The ITEA Journal*, Vol. 38, No. 2, 123-127, 2017.

Storm, S., Hill, R. R., Pignatiello, J. J., White, E. and Vining, G. G., “F-Statistic for Model Validation over Experimental Regions using Least Squares Response Surfaces,” *International Journal of Experimental Design and Process Optimization*, Vol. 5, No. 3, pp. 133- 150, 2017.

Atkinson, A. D., Hill, R. R., Pignatiello, J. J., Vining, G. G, and White, E. D., “Dynamic Model Validation Metric Based on Wavelet Threshold Signals,” *Journal of Verification, Validation and Uncertainty Quantification*, Vol. 2, No. 2, pp. 021002-1 – 021002-10, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ciarallo, F. W., K. K. Ward, and R. R. Hill, “Modeling Airline Boarding for Improved Efficiency and Passenger Experience,” Industrial and Systems Engineering Research Conference, Pittsburgh, PA, 20-23 May 2017.

Chicken, E., R. R. Hill, and J. J. Pignatiello Jr., “Statistical Functional Process Monitoring using Clustered Data,” Industrial and Systems Engineering Research Conference, Pittsburgh, PA. 20-23 May 2017.

Miller, J. R., J. A. Blake, D. D. Hodson, J. O. Miller, and R. R. Hill, “Sources of Unresolvable Uncertainties in Weakly Predictive Distributed Virtual Environments,” Winter Simulation Conference, T. M. K. Roeder, P. I. Frazier, R. Szechman, E. Zhou, T. Huschka, and S. E. Chick, eds, Washington DC, 11-14 Dec 2016.

Weimer, C., J.O. Miller and R. R. Hill, “Agent-Based Modeling: An Introduction and Primer,” Winter Simulation Conference, T. M. K. Roeder, P. I. Frazier, R. Szechman, E. Zhou, T. Huschka, and S. E. Chick, eds, Washington DC, 11-14 Dec 2016.

Hoecherl, J. C., M. J. Robbins, R. R. Hill and D. K. Ahner, "Approximate Dynamic Programming Algorithms for United States Air Force Officer Sustainment," Winter Simulation Conference, T. M. K. Roeder, P. I. Frazier, R. Szechman, E. Zhou, T. Huschka, and S. E. Chick, eds, Washington DC, 11-14 Dec 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hill, R. R., Ahner, D., Dillard, D. and Montgomery, D. C., "Examining Potential Reductions in Wind Tunnel Testing Data Requirements," Quality and Productivity Research Conference, Storrs, CT, 13-15 Jun 2017.

Hill, R. R., Ahner, D., Dillard, D. and Montgomery, D. C., "Examining Potential Reductions in Wind Tunnel Testing Data Requirements," Military Operations Research Society Symposium, West Point, NY, 19-22 Jun 2017.

Hill, R. R., Lunday, B., and Ferguson, M., "A Scenario-Based Parametric Analysis of Stable Marriage Approaches to the Army Officer Assignment Problem," Military Operations Research Society Symposium, West Point, NY, 19-22 Jun 2017.

BOOKS AND CHAPTERS IN BOOKS

Hill, R. R. and A. Tolk, "A History of Military Computer Simulation," In Advances in Modeling and Simulation: Seminal Research from 50 Years of Winter Simulation Conferences, A. Tolk, J. Fowler, G. Shao and E. Yucesan, (eds.), Springer-Verlag, Berlin, Germany, 2017.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Military Operations Research

Associate Editor, Journal of Defense Modeling and Simulation

Associate Editor, Journal of Simulation

Associate Editor, Quality Engineering

Associate Editor, International Journal of Mathematics in Operations Research

Associate Editor, Naval Research Logistics

JOHNSON, ALAN W.,

Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, PhD, Logistics, Department of Operational Sciences, AFIT Appointment Date: 2004 (AFIT/ENS); BS, Mechanical Engineering, Montana State University, 1982; MS, Systems Management, Air Force Institute of Technology, 1989; PhD, Industrial and Systems Engineering, Virginia Polytechnic Institute and State University, 1996. Dr. Johnson's research interests include space logistics, strategic mobility, discrete-event simulation, logistics management, reliability and maintainability, and discrete optimization and heuristics. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4703, email: Alan.Johnson@afit.edu

REFEREED JOURNAL PUBLICATIONS

Maywald, J., Reiman, A., Johnson, A., and Overstreet, R., "The Myth of Strategic and Tactical Airlift," *Air and Space Power Journal*, Vol. 31, No. 1, pp. 61-71, 2017.

Boehmke, B.C., Jackson, R.A., Johnson, A.W., White, E.D., Weir, J.D. & Gallagher, M.A., "Measuring U.S. Air Force installation support activities via data envelopment analysis," *Military Operations Research*, Vol. 22, No. 1, pp. 39-58, 2017.

Rodewald, J., Colombi, J., Oyama, K. and Johnson, A., “Methodology for simulation and analysis of complex adaptive supply network structure and dynamics using information theory,” *Entropy*, Vol. 18, No. 10, p. 367, 2016.

Boehmke, B., Johnson, A., White, E., Weir, J. and Gallagher, M., “The Influence of Operational Resources and Activities on Indirect Personnel Costs: A Multilevel Modeling Approach,” *Engineering Economist*, Vol. 61, No. 4, pp. 289-312, 2016.

Rodewald, J., Colombi, J., Oyama, K., and Johnson, A., “Confidence Investigation of Discovering Organizational Network Structures Using Transfer Entropy,” *Complex Adaptive Systems*, Cihan H. Dagli, Editor in Chief, Conference Organized by Missouri University of Science and Technology Los Angeles, CA, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Leighton, J., Johnson, A. and J. Skipper, “Common Support Equipment Serviceability Effects on Aircraft Availability,” IISE Annual Conference and Expo, Pittsburgh, PA, 20 -23 May 2017.

Maywald, J., Reiman, A., Johnson, A., and Overstreet, R., “Reducing Airlift Inefficiency through Aircraft Selection Modeling,” Western Decision Sciences Institute Conference, Vancouver, BC, 4-8 Apr 2017.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board, *International Journal of Operations Research and Information Systems*

JOO, SEONG-JONG,

Associate Professor of Logistics & Supply Chain Management, Department of Operational Sciences; Co-Director, Distance Learning Program, MS, Logistics & Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BS, Korea Air Force Academy (Seoul, Korea), 1982; MBA, Saint Louis University, 1992; PhD, Saint Louis University, 1995. Dr. Joo’s research interests include sourcing strategies, inventory control, shipping and transportation management, and performance measurement and benchmarking. Tel. 937-255-6565 x4761, email: Seong-Jong.Joo@afit.edu

REFEREED JOURNAL PUBLICATIONS

Joo, S., Stoeberl, P.A., Liao, K., & Ke, K., “Measuring the comparative performance of branches of a credit union for benchmarking,” *Benchmarking: An International Journal*, Vol. 24, No. 6, pp. 1663-1674, 21-25 Jul 2017.

Joo, S., Min, H., & Smith, C., “Benchmarking freight rates and procuring cost-attractive transportation services,” *The International Journal of Logistics Management*, Vol. 28, No. 1, pp. 194-205, 2017.

Lee, Y., Joo, S., & Park, H., “An application of data envelopment analysis for Korean banks with negative data,” *Benchmarking: An International Journal*, Vol. 24, No. 4, pp. 1052-1064, 2017.

Joo, S. & Yun, G., “Examining the influence of information system ratings on the performance of 3PL companies,” *International Journal of Logistics Systems and Management*, Vol. 26, No. 3, pp. 316 – 328, 2017.

Overton, K., Joo, S., & Stoeberl, P. A., “Benchmarking public school performance by unionized status,” *Benchmarking: An International Journal*, Vol. 23, No. 7, pp. 1626-1642, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Joo, S. & Min, H., “Designing an optimal facility layout: A case of a plastic molding company,” 46th Annual Meeting of the Western Decision Sciences Institute, Vancouver, BC, Canada, 4-8 Apr 2017.

Lee, Y. & Joo, S., “A sensitivity analysis of performance measurement in the product line management,” 46th Annual Meeting of the Western Decision Sciences Institute, Vancouver, BC, Canada, 4-8 Apr 2017.

Joo, S. & Yun, G., “Analyzing and benchmarking truckload shipping rates using data envelopment analysis,” 47th Annual Meeting of the Decision Sciences Institute, Austin, TX, 19-21 Nov 2016.

Lee, C. & Joo, S., “Examining the comparative efficiency of correctional facility operations: An exploratory study,” 47th Annual Meeting of the Decision Sciences Institute, Austin, TX, 19-21 Nov 2016.

KRETZER, MICHAEL P., Capt,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2015 (AFIT/ENS); BS, Computer Science, Limestone College, 2005; MS, Logistics and Supply Chain Management, Air Force Institute of Technology, 2008; PhD, Logistics, Air Force Institute of Technology, 2015. Capt Kretzer’s research interests include logistics networks, systems engineering techniques: system-of-systems, design structure matrices and network clustering, social networks, Lean, and business process reengineering. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4728; email: Michael.Kretzer@afit.edu

LUNDAY, BRIAN J.,

Associate Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BS, Mechanical Engineering, U.S. Military Academy, West Point, 1992; MS, Industrial Engineering, University of Arizona, 2001; PhD, Industrial and Systems Engineering, Virginia Polytechnic Institute, 2010. Dr. Lunday’s theoretical research interests include math programming, game theoretic models, and algorithmic design for global optimization, whereas his application research interests include network design, network interdiction, network restoration, facility location, and resource allocation/assignment. Tel. 937-255-3636 x4624, email: Brian.Lunday@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Transportation and Distribution Research.” Sponsor: USTRANSCOM. Funding: \$80,000.

REFEREED JOURNAL PUBLICATIONS

Boardman, N. T., Lunday, B. J., & Robbins, M. J., “Heterogeneous Surface-to-Air Missile Defense Battery Location: A Game Theoretic Approach,” *Journal of Heuristics*. DOI:10.1007/s10732-017-9350-0, 2017.

Davis, M. T., Robbins, M. J., & Lunday, B. J., “Approximate Dynamic Programming for Missile Defense Interceptor Fire Control,” *European Journal of Operational Research*, Vol. 259, No. 3, pp. 873-886, 2017.

Hanks, R. W., Weir, J. D., & Lunday, B. J., “Robust Goal Programming using Different Robustness Echelons via Alternative Uncertainty Sets,” *European Journal of Operational Research*, Vol. 262, No. 2, pp. 636-646, 2017.

Paul, N. R., Lunday, B. J., & Nurre, S. G., “A Multiobjective, Maximal Conditional Covering Location Problem applied to the Relocation of Hierarchical Emergency Response Facilities,” *Omega*, Vol. 66, pp. 147-158, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hanks, R. W., Weir, J. D., Lunday, B. J., & Robbins, M. J., “Mapping a Decision Maker’s Risk Attitude to Robust Goal Programming Parameters,” 2017 Western Decision Sciences Institute Conference, Vancouver, Canada, 4-8 Apr 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Rettke, A. J., Robbins, M. J., & Lunday, B. J., “Approximate Dynamic Programming for the Dispatch of Military Medical Evacuation Assets,” 2017 INFORMS Computing Society, Austin, TX, 15-17 Jan, 2017.

Hanks, R. W., Weir, J. D., Lunday, B. J., & Robbins, M. J., “Risk Assessment in Robust Optimization,” 2017 INFORMS Computing Society, Austin, TX, 15-17 Jan, 2017.

Boardman, N. T., Lunday, B. J., & Robbins, M. J., "Heterogeneous Surface-to-Air Defense Battery Location: A Game Theoretic Approach," 2016 INFORMS Annual Meeting, Nashville, TN, 13-16 Nov, 2016.

Davis, M. T., Robbins, M. J., & Lunday, B. J., "Determination of Fire Control Policies via Approximate Dynamic Programming," 2016 INFORMS Annual Meeting, Nashville, TN, 13-16 Nov, 2016.

Enayaty, N., Sullivan, K., Nurre, S.G., Robbins, M.J., and Lunday, B. J., "Multi-layered Interdependent Network Flow Problem," 2016 INFORMS Annual Meeting, Nashville, TN, 13-16 Nov, 2016.

Hanks, R. W., Weir, J. D., & Lunday, B. J., "Robust Goal Programming using Norm-based Uncertainty," 2016 INFORMS Annual Meeting, Nashville, TN, 13-16 Nov, 2016.

Little, Z.C. and Lunday, B. J., "1 vs. (n-1) Modeling for Project Scheduling Intervention," 2016 INFORMS Annual Meeting, Nashville, TN, 13-16 Nov, 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board Member, Military Operations Research

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Speaker, "Vaccine Pricing via a Competitive Optimal Decision-making Framework," 2017 INFORMS Chapter Meeting at the J.B. Speed School of Business, University of Louisville, Louisville, KY, 20 Jan 2017.

MILLER, JOHN O.,

Associate Professor of Operations Research, Department of Operational Sciences; Program Chair, AFIT Appointment Date: 2002 (AFIT/ENS); Director, Combat Modeling Laboratory; BS, Biology, United States Air Force Academy, 1980; MBA, University of Missouri at Columbia, 1983; MS, Operations Research, Air Force Institute of Technology, 1987; PhD, Industrial Engineering, The Ohio State University, 1997. Dr. Miller's research interests include computer simulation, ranking and selection, agent based modeling, combat modeling, network centric warfare, high performance computing, applied statistics, and nonparametric statistics. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4326, email: John.Miller@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Millar, J.R., Blake, J.A., Hodson, D.D., Miller, J.O., "Sources of Unresolvable Uncertainties in Weakly Predictive Distributed Virtual Environments," 2016 Winter Simulation Conference, Washington D.C. 11-14 Dec 2016, ed. T.M.K. Roeder, P.I. Frazier, R. Szechtman, E. Zhou, T. Huschka, and S.E. Chick, pp. 3075-3086.

Weimer, C.W., Miller, J.O., Hill, R.R., "Agent-Based Modeling: An Introduction and Primer," 2016 Winter Simulation Conference, Washington D.C. 11-14 Dec 2016, ed. T.M.K. Roeder, P.I. Frazier, R. Szechtman, E. Zhou, T. Huschka, and S.E. Chick, pp. 65-79.

OGDEN, JEFFREY A.,

Associate Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2006 (AFIT/ENS); BS, Accounting, Weber State University, 1998; MBA with emphasis in Supply Chain Management, Arizona State University, 2000; PhD, Business Administration with emphasis in Supply Chain Management, Arizona State University, 2003. Dr. Ogden's research interests include supply chain management, supply base reduction, ERP implementation, E-marketplaces, RFID, supply chain quality, purchasing strategies, buyer-supplier relationships, supply chain interoperability, supply chain services, and qualitative research methods. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4653, email: Jeffrey.Ogden@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Research, Analysis and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center." Sponsor: AFMC/A4P. Funding: \$440,000 – Ogden 60%, Johnson 40%. [COA]

OVERSTREET, ROBERT E., Lt Col,

Military Deputy Department Head and Assistant Professor, Department of Operational Sciences; AFIT Appointment Date: 2013 (AFIT/ENS); BBA, General Business, Campbell University, 1998; MS, Logistics, Air Force Institute of Technology, 2002; PhD, Management, Auburn University, 2012. Lt Col Overstreet's research interests include leadership in the supply chain, organizational innovativeness, transportation, and humanitarian logistics, continuous process improvement, and human capital. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4590, email: Robert.Overstreet@afit.edu

REFEREED JOURNAL PUBLICATIONS

Swartz, S. M., Douglas, M. A., Roberts, M. D., and Overstreet, R. E., "Leavin' on my mind: Influence of safety climate on truck drivers' job attitudes and intentions to leave," *Transportation Journal*, Vol. 56, No. 2, pp. 184–209, 2017.

Maywald, J. D., Reiman, A. D., Johnson, A. W., and Overstreet, R. E., "The myth of strategic and tactical airlift," *Air and Space Power Journal*, Vol. 31, No. 1, pp. 61–71, 2016.

Overstreet, R. E. and Hazen, B. T., "Editorial. Tips for conducting high-quality reviews," *International Journal of Logistics Management*, Vol. 27, No. 2, pp. 1–6, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Anderson, J., Hazen, B. T., Ogden, J., Overstreet, R. E., and Roberts, M. D., "Operating legally fatigued: A typology approach to understanding hours of service," 46th Annual Meeting of Western Decision Sciences Institute, Vancouver, B.C., Canada, 4-8 Apr 2017.

Maywald, J. D., Reiman, A. D., Johnson, A. W., and Overstreet, R. E., "Reducing airlift inefficiency through aircraft selection modeling," 46th Annual Meeting of Western Decision Sciences Institute, Vancouver, B.C., Canada, 4-8 Apr, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Douglas, M. A., Overstreet, R. E., Hazen, B. T., "Management innovation assimilation: Organizational dependence and outcomes," The POMS International Conference in Israel, Tel Aviv, Israel, 27-29 Jun, 2017.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Advisory Board, Pan-Pacific Journal of Supply Chain Management

Editorial Advisory Board, Journal of Defense Analytics and Logistics

PIGNATIELLO, JOSEPH J.,

Professor of Operations Research, Department of Operational Sciences; Head, Department of Operational Sciences, AFIT Appointment Date: 2010 (AFIT/ENV), 2011 (AFIT/ENS); BS, Mathematics, University of Massachusetts; MS, Industrial and Systems Engineering, The Ohio State University, 1979; PhD, Industrial and Systems Engineering, The Ohio State University, 1982. Dr. Pignatiello serves on the editorial review boards of Quality Engineering, IIE Transactions, and the International Journal of Lean Six Sigma. He is a Fellow of both the American Society for Quality and the Institute of Industrial and Systems Engineers. Tel. 937-255-3636 x4311, email: Joseph.Pignatiello@afit.edu

REFEREED JOURNAL PUBLICATIONS

Atkinson, Andrew D., Hill, Raymond R., Pignatiello, Joseph J., Jr., Vining, G. Geoffrey, White, Edward, D., "Dynamic Model Validation Metric Based on Wavelet Threshold Signals," *Journal of Verification, Validation and Uncertainty Quantification*, Vol. 2, No. 2, pp. 021002-1-021002-10, 2017.

Storm Scott, Hill, Raymond R., Pignatiello, Joseph J., Jr., White Edward, D., and Vining, Geoffrey G., “F-Statistic for Model Validation over Experimental Regions Using Least Squares Response Surfaces,” *International Journal of Experimental Design and Process Optimisation*, Vol. 5, No. 2, pp. 133-150, 2017.

Atkinson, Andrew D., Hill, Raymond R., Pignatiello, Joseph J., Jr., White, Edward D., Chicken, Eric, and Vining, Geoffrey, G., “Wavelet ANOVA Approach to Model Validation,” *Simulation Modeling Practice and Theory*, Vol. 78, pp. 18-27, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Chicken, Eric, Hill, Raymond R., and Pignatiello, Joseph J., Jr., “Statistical Functional Process Monitoring Using Clustered Data,” 2017 Industrial and Systems Engineering Conference, Pittsburgh, PA, 20-23 May 2017.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board, Quality Engineering

Editorial Board, IIE Transactions

Editorial Advisory Board, International Journal of Lean Six Sigma

REIMAN, ADAM D., Col,

Associate Dean of the Graduate School of Engineering and Management and Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2014 (AFIT/ENS); BS, Astronautical Engineering, US Air Force Academy, 1995; MBA, Military Management, Touro University International, 2006; MS, Logistics Management, Air Force Institute of Technology, 2009; PhD Logistics, Air Force Institute of Technology, 2014. Col Reiman’s research interests include airlift metrics, routing, scheduling, and fuel efficiency; energy efficiency, supply and demand; value-focused thinking, and heuristic search algorithms. Tel. 937-255-3636 x4689, email: Adam.Reiman@afit.edu

ROBBINS, MATTHEW J., Lt Col,

Associate Professor of Operations Research, Department of Operational Sciences; Division Chief, Operations Research Division, Department of Operational Sciences, AFIT Appointment Date: 2010 (AFIT/ENS); BS, Computer Systems Engineering, University of Arkansas, 1999; MS, Operations Research, Air Force Institute of Technology, 2005; PhD, Industrial Engineering, University of Illinois at Urbana-Champaign, 2010. Lt Col Robbins' basic research interests include applied statistics, approximate dynamic programming, game theory, Markov decision processes, and simulation. His applied research interests involve problems related to defense, to include the dispatch of medical evacuation assets, the routing of military inventory, and the control of missile defense systems. Problems related to public health are also of interest, with a particular emphasis on vaccine economics. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4539, email: Matthew.Robbins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

Robbins. “Strategic Development Planning & Experimentation Support: Roadmap for Multi-Domain Modeling, Simulation, Analysis and Experimentation.” Sponsor: SDPE. Funding: \$1,000,000 – Robbins 50%, Weir 50%. [COA]

REFEREED JOURNAL PUBLICATIONS

Davis, M.T., Robbins, M.J., and Lunday, B.J., “Approximate Dynamic Programming for Missile Defense Interceptor Fire Control,” *European Journal of Operational Research*, Vol. 259, No. 3, pp. 873-886, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hoecherl, J.C., Robbins, M.J., Hill, R.R., and Ahner, D.K., "Approximate Dynamic Programming Algorithms for United States Air Force Officer Sustainment," 2016 Winter Simulation Conference, Arlington, VA, Dec 11-14, 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board Member, Military Operations Research Journal

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Robbins, M.J., Jenkins, P.R., Bastian, N.D., and Lunday, B.J., "Approximate Dynamic Programming for the MEDEVAC Dispatching Problem: Value Function Approximation Using Multiple Level Aggregation," 85th MORS Symposium, West Point, NY, Jun 19-22, 2017.

Jameson, G., Deckro, R.F., and Robbins, M.J., "Refugees in Urban Environments: Social, Legal, and Economic Integration," 2017 Air Force Operations Research Symposium, Wright-Patterson AFB, OH, May 10-11, 2017.

Rettke, A.J., Robbins, M.J., and Lunday, B.L., "Approximate Dynamic Programming for the Dispatch of Military Medical Evacuation Assets," 2017 INFORMS Computing Society Conference, Austin, TX, Jan 15-17, 2017, Austin, TX.

Hoecherl, J.C., Robbins, M.J., Hill, R.R., and Ahner, D.K., "Approximate Dynamic Programming Algorithms for United States Air Force Officer Sustainment," 2016 Winter Simulation Conference, Arlington, VA, Dec 11-14, 2016.

Boardman, N.T., Lunday, B.J., and Robbins, M.J., "Heterogeneous Surface-to-Air Missile Defense Battery Location: A Game Theoretic Approach," 2016 INFORMS National Meeting, Nashville, TN, Nov 13-16, 2016.

Davis, M.T., Robbins, M.J., and Lunday, B.L., "Approximate Dynamic Programming for Missile Defense Interceptor Fire Control," 2016 INFORMS National Meeting, Nashville, TN, Nov 13-16, 2016.

Enayaty, N., Sullivan, K., Nurre, S.G., Lunday, B.L., and Robbins, M.J., "Multi-Layered Interdependent Network Flow Problem," 2016 INFORMS National Meeting, Nashville, TN, Nov 13-16, 2016.

SCHULTZ, KENNETH L.,

Associate Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT
Appointment Date: 2011 (AFIT/ENS); BS, Economics, University of Pennsylvania, 1980; PhD, Operations Management, Cornell University, 1997. Dr. Schultz's research interests include improving operations management models by including the consideration of behavior issues, including motivation and peer pressure, in production systems and process flows. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4725, email: Kenneth.Schultz@afit.edu

EDITORSHIPS IN PROFESSIONAL JOURNALS

Senior Editor, Production and Operations Management Journal

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Speaker, "Behavioral Operations Management?" University of Nebraska, College of Business, September 2017.

Invited Speaker, "Behavioral Operations Management?" University of Cincinnati, Lindner College of Business, September 2017.

SMITH, CHRISTOHER M., LTC,

Assistant Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2016 (AFIT/ENS); BS, Systems Engineering, United States Military Academy, 1997; MS, Engineering Management, Missouri University of Science and Technology, 2002; MS Operations Research, University of Texas – Austin, 2007; PhD, Systems Engineering, University of Virginia, 2013. LTC Smith's research interests include applying decision analysis, and data science to real world problems. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4318, email: Christopher.Smith@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Big Data Platform Analysis for Cyber Security." Sponsor: ARCYBER. Funding: \$250,000 – Smith 25%, Bauer 25%, Boehmke 25%, Freels 25%. [COA]

REFEREED JOURNAL PUBLICATIONS

Smith, Christopher M., William T. Scherer, and Andrew Todd, "Stepping back from the trees to see the forest: a network approach to valuing intelligence," *Social Network Analysis and Mining*, Vol. 6, No. 1, pp. 72, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Smith, C., "Social Media Analytics," Dayton INFORMS Chapter Annual Conference, Dayton, OH, 14 Oct 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Guest Editor, Decision Analysis Journal

STEENECK, DANIEL W.,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; AFIT Appointment Date: 2016 (AFIT/ENS); BS, Virginia Tech, 2008; MS, Virginia Tech, 2009; PhD, Virginia Tech, 2014; Dr. Steeneck's research areas include mathematical modeling and optimization of supply chain and production systems, statistical modeling and parameter estimation and predictive analytics for machine failure. AFIT research center affiliation(s): COA. Tel. 937-255-6565 x4702, email: Daniel.Steeneck@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Repair Network Optimization." Sponsor: AFSC. Funding: \$220,000. [COA]

REFEREED JOURNAL PUBLICATIONS

Steeneck, D.W. and Sarin, S.C., "Determining end-of-life strategy and pricing for recoverable products," *International Journal of Production Research*, Vol. 55, No. 19, pp. 5782-57800, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bihl, T. and Steeneck D.W., "Stochastic Approximation for Learning Rate Optimization for Generalized Relevance Learning Vector Quantization," 2017 National Aerospace Electronics Conference, Dayton, OH, 27-30 Jun 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Eng Larson F., Steeneck, D.W., and Rice, J., "Retail's phantom inventory menace, or the ghosts of holiday present," *Wall Street Journal*, Dec 29, 2016.

Gettens, D., Jauffred, F., and Steeneck D.W., "IOT can drive big savings in the post-sales supply chain," *Sloan Management Review, Frontiers*. Nov 4, 2016.

Bihl, T. and Steeneck, D. W., “Stochastic Approximation for Learning Rate Optimization for Generalized Relevance Learning Vector Quantization,” National Aerospace Electronics Conference, Dayton, OH 27-30 Jun 2017.

Steeneck, D.W., “The Voice of the Machine: Improving Service Supply Chain Operations for Internet Connected Devices,” Production and Operations Management Annual Meeting, Seattle, WA, 5-8 May 2017.

STONE, BRIAN B., Maj,

Assistant Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2013 (AFIT/ENS); BS, Mathematics, Truman State University, 1999; MS, Operations Research, Air Force Institute of Technology, 2008; PhD, Industrial Engineering, Arizona State University, 2013. Maj Stone’s research interests include design of experiments, response surface methodology, statistical quality control, and regression analysis. He is a member of the Institute for Operations Research and Management Science (INFORMS), the Military Operations Research Society (MORS), and the American Society for Quality (ASQ). AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4510, email: Brian.Stone@afit.edu

TUCHOLSKI, HEIDI M., Maj,

Assistant Professor of Operations Research; Division Chief, Operations Research Division, Department of Operational Sciences, AFIT Appointment Date: 2015 (AFIT/ENS); BS, Operations Research, US Air Force Academy, 2006; MA, Economics, George Mason University, 2008; PhD, Mathematical Behavioral Sciences, University of California, Irvine, 2014. Maj Tucholski’s research interests include decision analysis, incentive theory, statistical data analysis, game theory, behavioral and experimental economics. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4319, email: Heidi.Tucholski@afit.edu

WEIR, JEFFERY D.,

Professor and Associated Department Head, Department of Operational Sciences; Director of Operations, Center for Operational Analysis; AFIT Appointment Dates: 2002 (AFIT/ENS); BS, Electrical Engineering, Georgia Institute of Technology, 1988; MBA, Embry Riddle-Aeronautical University, 1992; MS, Operations Research, Air Force Institute of Technology, 1995; PhD, Industrial & Systems Engineering, Georgia Institute of Technology, 2002. Dr. Weir’s research interests include decision analysis, large-scale optimization, deterministic optimization, applied statistics, and mathematical programming and meta-modeling and meta-learning algorithms. AFIT research center affiliation(s): COA. Tel. 937-255-3636 x4523, email: Jeffery.Weir@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Value-Driven Tradespace Exploration and Analysis for Resilient Systems.” Sponsor: USA ERDC. Funding: \$420,000. [COA]

“Air Force Inspection Agency (AFIA) Support for UEI Generator.” Sponsor: AFIA/CCR. Funding: \$20,000. [COA]

“Air Force Supply Chain Problem Item Early Detection.” Sponsor: AFRL/RX. Funding: \$225,000. [COA]

“Development of Cyber Resiliency Processes and Mitigation Solutions for Legacy Platforms.” Sponsor: AFLCMC. Funding: \$700,000 – Weir 50%, Hartman 50%. [COA]

“Development of a Quantitative Framework for Intelligence Mission Data Support Analysis.” Sponsor: AFLCMC. Funding: \$75,000. [COA]

“Global War Reserve Materiel (WRM) Management Support.” Sponsor: 635 SCOW. Funding: \$480,182 – Weir 50%, Hazen 50%. [COA]

“412th Test Wing Sortie Scheduling Modernization Effort.” Sponsor: 412 TW. Funding: \$493,936. [COA]

“Design of Experiment (DOE) and Meta-Modelling Support for the ISR Decision Support at the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$197,554. [COA]

“Joint Service Explosive Ordnance Disposal (EOD) Technology Capability Based Value Model (CBVM) Support.” Sponsor: NSWC. Funding: \$200,000. [COA]

“B2 LO Maintenance Optimization.” Sponsor: AFLCMC. Funding: \$225,000. [COA]

“Comprehensive Core Capability Risk Assessment Framework (C3RAF) Method Research.” Sponsor: AF/A9. Funding: \$250,000. [COA]

“Air Force Institute of Technology Center for Operational Analysis (AFIT/COA) Support to Acquisition Intelligence Requirements Task Force (AIRTF) for Intelligence Mission Data (IMD) Cost, Capability Analysis (CCA) (Revised).” Sponsor: OSD. Funding: \$800,000. [COA]

“Analysis/Modeling Support to War Mobilization Plans Volume 5 (WMP-5) Build.” Sponsor: AF/A3. Funding: \$303,000. [COA]

“Sliding Scale Autonomy through Physiological Rhythm Evaluations (SAPHYRE).” Sponsor: OFRN (WSU). Funding: \$109,993. [COA]

REFEREED JOURNAL PUBLICATIONS

Hanks, R, Weir, J D, and Lunday, B, “Robust goal programming using different robustness echelons via norm-based and ellipsoidal uncertainty sets,” *European Journal of Operations Research*, Vol. 262, No. 2, pp. 636-646, 2017. [COA]

McNabb, M, Weir, J D, and Hall, S, “Examining the Effects of Construction Heuristics and Problem Structure on Solution Quality of the Vehicle Routing Problem with Split Deliveries and Time Windows,” *International Journal of Metaheuristics*, Vol. 6, No. 3, pp. 234-256, 2017.

Boehmke, B.C., Jackson, R.A., Johnson, A.L, White, E.D., Weir, J.D. & Gallagher, M.A., “Effectiveness vs. Efficiency: Measuring U.S. Air Force installation support activities via data envelopment analysis,” *Military Operations Research*, Vol. 22, No. 1, pp. 39-58, 2017.

Nurre, S G and Weir, J D, “Interactive Excel-Based Gantt Chart Schedule Builder,” *INFORMS Transactions on Education*, Vol. 17, No. 3, pp. 49-57, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hanks, R, Weir, J D, Lunday, B J, Robbins, M, “Mapping a Decision Maker’s Risk Attitude to Robust Goal Programming Parameters,” Western Decision Sciences Annual Meeting, Vancouver, British Columbia, 4-8 Apr 2017. [COA]

Hanks, R, Weir, J D, and Lunday, B, “Risk Assessment using Utility Theory for Robust Goal Programming,” Institute for Operations Research and Management Sciences Computing Society Conference, Austin, TX, 15 Jan 2017. [COA]

Hanks, R, Weir, J D, and Lunday, B, “Risk Assessment in Robust Goal Programming,” Institute for Operations Research and Management Sciences Symposium, Memphis, TN, 14 Nov 2016. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Military Operations Research Journal

Associate Editor, IIE Transactions on Healthcare Systems Engineering

5.6. DEPARTMENT OF SYSTEMS ENGINEERING AND MANAGEMENT

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5.6.1. DOCTORAL DISSERTATIONS

RODEWALD, JOSHUA V., *An Information Theoretic Investigation Of Complex Adaptive Supply Networks With Organizational Topologies*. AFIT/ENV/DS/16D-029. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

STUBBS, JOHN E., *Dynamics of Chemical Degradation in Water using Photocatalytic Reactions in an Ultraviolet Light Emitting Diode Reactor*. AFIT/ENV/DS/17S-052. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA.

5.6.2. MASTER'S THESES

ALLEN, BRIAN R., *Actionable Stitched Images from an Unmanned Aerial System*. AFIT/ENV/MS/17M-168. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFCEC.

ALWABEL, ABDULRAHMAN S., *Effect of Fused Filament Fabrication Process Parameters on the Mechanical Properties of Carbon Fiber Reinforced Polymers*. AFIT/ENV/MS/17S-046. Faculty Advisor: Maj Jason K. Freels. Sponsor: OSD.

BARNES, BRANDON B., *Environmental Applications of Small Unmanned Aircraft Systems in Multi-Service Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Reconnaissance and Surveillance*. AFIT/ENV/MS/17M-170. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: ECBC.

BARRETT, DONALD A., *Development of the Architecture Cost Effectiveness Framework and Application to Open Systems Architectures*. AFIT/ENV/MS/17M-171. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRCO.

BENTZ, BRYAN R., *Reliability and Cost Impacts for Attritable Systems*. AFIT/ENV/MS/17M-172. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ.

BIERHAUS, ZACHARY S., *Feasibility and Environmental Implications of using Waste Motor Oil as Alternative Supplemental Fuel in Contingency Prime Power Generation*. AFIT/ENV/MS/17M-173. Faculty Advisor: Dr. Eric G. Mbonimpa. Sponsor: Cummons Inc.

BINGGELI, ALICIA D., *A Cost Benefit Analysis of Emerging LED Water Purification Systems in Expeditionary Environments*. AFIT/ENV/MS/17M-174. Faculty Advisor: Lt Col Clay M. Koschnick. Sponsor: NAVFAC.

BLAESS, MICHAEL J., *A Portfolio Decision Analysis Study for Improving Consequence of Facility Failure Indices*. AFIT/ENV/MS/17M-175. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: AFCEC.

BROWN, MICHAEL J., *An Evaluation of Cost and Schedule in Open Mission System Avionic Versus Historical Proprietary Designs*. AFIT/ENV/MS/17M-176. Faculty Advisor: Dr. Robert D. Fass. Sponsor: AFCAA.

BUYER, JOSEPH C., *Refining Air Force Asset Management Strategy: Connecting Air Force Infrastructure to Core Missions*. AFIT/ENV/MS/17M-177. Faculty Advisor: Lt Col Vhance V. Valencia. Sponsor: AFCEC.

CANTU, GABRIEL A., *Toxicological Differences Between Perfluoroalkyl Substances (PFAS) Isomers using Developmental Biomarkers*. AFIT/ENV/MS/17M-178. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: 711 HPW/USAFSAM.

CHAVEZ, INNA D., *Optimal Configurations for Aerosol Monitoring With Multi-Rotor Small Unmanned Aerial Systems*. AFIT/ENV/MS/17M-179. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: AFOSR.

CUHRAN, JOSEPH J., JENKINS, MATHEW K., & WALTERS, MICHAEL J., *Quantifying and Evaluating the Resilience of Optimized Space Constellations for Fire Detection*. AFIT/ENV/MS/17J-057. Faculty Advisor: Dr. John M. Colombi. Sponsor: NASIC. [CSRA]

- DANIELS, JIM H., *Analyzing Performance in Air Force Facility Maintenance and Repair*. AFIT/ENV/MS/17M-182. Faculty Advisor: Lt Col Christopher M. Stoppel. Sponsor: AFCEC.
- DEBOIS, PETER A., *The Financial Impact of Commercial Small Satellite and Small Launch Providers on the Department of Defense*. AFIT/ENV/MS/17M-183. Faculty Advisor: Lt Col Clay M. Koschnick. Sponsor: SMC.
- DEGROOT, COREY R., *Identifying Partnership Opportunities at Air Force Installations: A Geographic Information Systems Approach*. AFIT/ENV/MS/17M-184. Faculty Advisor: Maj Jason K. Freels. Sponsor: Booz Allen Hamilton, Inc.
- DWYER, KEVIN M., *Forecasting Traditional vs Blended Retirement System for Individual Service Members*. AFIT/ENV/MS/17M-185. Faculty Advisor: Dr. Robert D. Fass. Sponsor: SAF.
- ESHLEMAN, JUSTIN E., *Enhancing the Thermal Performance of Temporary Fabric Shelters for the Advanced Energy Efficient Shelter System*. AFIT/ENV/MS/17M-186. Faculty Advisor: Capt Robert A. Lake. Sponsor: AFCEC.
- GALBRAITH, VIRGINIA L., *Analysis of Factors Related to Turnover Intentions Among the Financial Management (65Fx/65Wx) Career Field*. AFIT/ENV/MS/17M-187. Faculty Advisor: Dr. Brandon M. Lucas. Sponsor: AFLCMC.
- GOODEN, DUSTIN L., *United States Air Force Unaccompanied Housing Divestiture: An Economic Analysis*. AFIT/ENV/MS/17M-188. Faculty Advisor: Dr. Jared A. Astin. Sponsor: HQ USAF/A4.
- GRABOSKI, ALEXANDER J., *The Impacts of Climate Change and Anthropogenic Processes on Permafrost Soils and USAF Infrastructure within Northern Tier Bases*. AFIT/ENV/MS/17M-189. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: N/A.
- GREINER, NATHAN A., *Runway Repair using Additive Manufacturing*. AFIT/ENV/MS/17M-190. Faculty Advisor: Maj Jason K. Freels. Sponsor: AFCEC.
- GUINN, VICTOR L., *Smartphone-Based Infrastructure Work Order Submission*. AFIT/ENV/MS/17M-192. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: AFCEC.
- HARRIS, MARK A., *Variable Timing Effects on Performance and Behavior within Human-Machine Teams*. AFIT/ENV/MS/17J-056. Faculty Advisor: Dr. Michael E. Miller. Sponsor: AFOSR.
- HARRIS, SHARIF F., *Learning Curves: An Alternative Analysis*. AFIT/ENV/MS/17M-193. Faculty Advisor: Dr. John Elshaw. Sponsor: NPS.
- HILLESHEIM, ANTHONY J., *Analysis of Human and Agent Characteristics on Human-Agent Team Performance and Trust*. AFIT/ENV/MS/17M-194. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: AFOSR. [ANT]
- JACKSON, BRYAN V., *Alternate Stimuli for the Elicitation of Event-Related Potentials*. AFIT/ENV/MS/17M-195. Faculty Advisor: Dr. Michael E. Miller. Sponsor: NASA. [ANT]
- JAMES, SHANDON L., *Investigating Point-of-Use UV-LED Water Purification Device using Computational Multiphysics Modeling Software*. AFIT/ENV/MS/17M-196. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA.
- JENKINS, MATHEW K., See CUHRAN, JOSEPH J. [CSRA]
- JOHNSON, CLIFFORD D., *A Framework for Analyzing and Discussing Level of Human Control Abstraction*. AFIT/ENV/MS/17M-197. Faculty Advisor: Dr. Michael E. Miller. Sponsor: AFOSR. [ANT]
- KOHLHEPP, DAVID A., *Modeling and Validating a Continuous Flow Ultraviolet Light Emitting Diode Water Purification Reactor*. AFIT/ENV/MS/17M-198. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA.

- KRAMER, ERICH C., *An Empirical Analysis of Air Force Military Construction Project Delivery Method Performance in the United States*. AFIT/ENV/MS/17M-199. Faculty Advisor: Lt Col Christopher M. Stoppel. Sponsor: AFCEC.
- LISKOWCYZ, MATTHEW M., *SpaceX: Breaking the Barrier to the Space Launch Vehicle Industry*. AFIT/ENV/MS/16D-045. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: NASIC.
- LUCAS, LAURA L., *Enhanced Cost Minimization Algorithm for Control Architectures*. AFIT/ENV/MS/17M-200. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]
- MARTEL, CHAD A., *Quantifying the Strategic Value of United States Air Force Airfields*. AFIT/ENV/MS/17M-201. Faculty Advisor: Maj Heidi M. Tucholski. Sponsor: AFCEC.
- MCCLANAHAN, ROBERT L., *Improving Unmanned Aerial Vehicle Formation Flight and Swarm Cohesion by using Commercial off the Shelf Sonar Sensors*. AFIT/ENV/MS/17M-202. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]
- MCCOLLUM, BLAKE T., *Analyzing GPS Accuracy Through the Implementation of Low-cost COTS Real-time Kinematic GPS Receivers in Unmanned Aerial Systems*. AFIT/ENV/MS/17M-203. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]
- MURPHY, SEAN T., *Strength Test and Analysis of Additive Manufactured Gears and Their Applicability for Explosive Ordnance Disposal Robots*. AFIT/ENV/MS/17M-204. Faculty Advisor: Lt Col Vhance V. Valencia. Sponsor: AFCEC.
- NOWOCZYNSKI, MATTHEW P., *Method Development for the Characterization of Organic Chemical Emission Hazards from the Combustion of Advanced Aircraft Composite Materials*. AFIT/ENV/MS/ 17M-205. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: 711 HPW/USAFSAM.
- NUSSBAUM, JOHN H., *Analyzing the Viability of Photovoltaic Pavement Systems: Quantifying Climate Impacts on Potential Power and the Risks of Implementation*. AFIT/ENV/MS/17M-206. Faculty Advisor: Capt John H. Nussbaum. Sponsor: N/A.
- OLIVE, MARY C., *An Energy Benchmarking Categorization Scheme and Consumption Data Validation for Air Force Facilities*. AFIT/ENV/ MS /17M-207. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: AFCEC.
- OWENS, JOSEPH R., *Evaluating Process Improvement Courses of Action through Modeling and Simulation*. AFIT/ENV/MS/17S-049. Faculty Advisor: Dr. John M. Colombi. Sponsor: 513 EWS.
- PAGE, MICHELLE L., *Characterization of Jet Fuel Combustion Emissions During a C-130 Aeromedical Evacuation Engines Running Onload*. AFIT/ENV/MS/17S-050. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: 711 HPW/USAFSAM.
- PAGE, WILLIAM L., *Air Force Additive Manufacturing: Case Studies on Tools, Jigs, and Topology Optimization*. AFIT/ENV/MS/17M-212. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: AFCEC.
- PETERSON, MICHAEL W., *The Security Risks Associated with using a Mobile Application to Collect Work Order Data*. AFIT/ENV/MS/17M-213. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: AFCEC.
- RECKER, RYAN P., *Determining the Operation and Support Cost for Low Cost Attributable Aircraft*. AFIT/ENV/MS/ 17M-214. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ.
- RHEA, AARON M., *Comparison of Profit Margin Percentages Between Prime Contractors and Subcontractors for Aircraft, Missiles, and Unmanned Aerial Vehicles*. AFIT/ENV/MS/17M-215. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

RIGGS, CASEY J. R., *Resource Evaluation of Quantum Linear Systems Algorithm for Application to Electromagnetic Scattering Problems*. AFIT/ENV/MS/17M-216. Faculty Advisor: Maj Logan O. Mailloux. Sponsor: Sandia National Laboratories.

ROBERTS, ANDREW J., *A Systems Engineering Approach to Measuring Live, Virtual, Constructive Training Effectiveness and Performance*. AFIT/ENV/MS/17M-217. Faculty Advisor: Maj Logan O. Mailloux. Sponsor: 705 CTS.

RONNING, DANIEL, *The use of Price Indices and Cost Estimating Relationships (CERs) in Forecasting Aircraft Maintenance Costs*. AFIT/ENV/MS/17M-218. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFCAA.

ROSSON, JOHN P., *An Expanded Cyber Insurance Framework to Mitigate Cyber Induced Economic Losses of the US Power Industry*. AFIT/ENV/MS/17M-219. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS.

RUSSELL, MORGAN M., *Destruction of Aqueous Phase Organic Pollutants using Ultraviolet Light Emitting Diodes and Photocatalysis*. AFIT/ENV/MS/17M-220. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: EPA.

SATAVA, STEPHEN J., *Neck Injury Criteria Development for use in System Level Ejection Testing; Characterization of ATD to Human Response Correlation under Gy Accelerative Input*. AFIT/ENV/MS/17M-221. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: 711 HPW/RH.

SCHMIDT, CHRISTOPHER T., *Adsorption of Perfluorinated Compounds from Post-Emergency Response Wastewater*. AFIT/ENV/MS/17M-222. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: EPA.

SCHULTZ, DIANE E., *Derating Predicted Mean Time Between Failures for Life Cycle Cost Estimates*. AFIT/ENV/MS/17M-223. Faculty Advisor: Maj Jason K. Freels. Sponsor: AFSC.

SMITH, MATTHEW D., *The Effect of Bacillus Globigii Spores on the Activity and Performance of Activated Sludge*. AFIT/ENV/MS/17M-226. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA.

STERN, JORDAN L., & WATCHEL, STEVEN T., *Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures*. AFIT/ENV/MS/17M-277. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RV. [CSRA]

SWIFT, CHRISTOPHER A., *M1A1 Abrams Main Battle Tank Crew Member Occupational Health Hazard Analysis during Live-Fire Operations*. AFIT/ENV/MS/17M-228. Faculty Advisor: Dr. Eric G. Mbonimpa. Sponsor: 711 HPW/USAFSAM.

TILLMAN, ROMAN, *Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures*. AFIT/ENV/MS/17M-277. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFTAC. [CSRA]

TOSCANO, LIDIA, *Effectiveness of Inter-Vehicle Communications and On-Board Processing for Close Unmanned Autonomous Vehicle (UAV) Flight Formations*. AFIT/ENV/MS/17M-230. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ. [ANT]

TWIGG, CHRISTOPHER M., *Recommended Selective Maintenance and Rehabilitation Treatment Approach for Air Force Primary Rigid Runway Pavement Systems*. AFIT/ENV/MS/17M-232. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: AFCEC.

VAIRA, KEEGAN D., *Improving Fire Station Turnout Time through Discrete-Event Simulation*. AFIT/ENV/MS/17M-233. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: WPAFB Fire Emergency Services.

VEITENHEIMER, SHANE R., *Implication of Additive Manufacturing on United States Air Force Expeditionary Civil Engineer Squadron Supply Chain*. AFIT/ENV/MS/17M-234. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: AFCEC.

WATCHEL, STEVEN T., See STERN, JORDAN L. [CSRA]

WALTERS, MICHAEL J., See CUHRAN, JOSEPH J. [CSRA]

WILLIAMS, ANTHONY D., *Predicting Solar Performance in a Contingency Environment to Meet Net-Zero Facility Power*. AFIT/ENV/MS/17M-237. Faculty Advisor: Lt Col Christopher M. Stoppel. Sponsor: AFCEC.

5.6.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliation is listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BADIRU, ADEDEJI B.,

Dean, Graduate School of Engineering and Management, AFIT Appointment Date: 2013 (AFIT/EN); BS, Tennessee Technological University, 1979; MS, Tennessee Technological University, 1981; PhD, Industrial Engineering, University of Central Florida, 1984. Dr. Badiru's research interests include Project Modeling, Analysis, Management and Control, Mathematical Modeling, Computer Simulation, Information Systems, and Economic Analysis. He is the author of several books and technical journals. Tel. 937-255-3636 x4799, email: Adedeji.Badiru@afit.edu

COLOMBI, JOHN M.,

Associate Professor and Program Chair of Systems Engineering, Department of Systems Engineering and Management, AFIT Civilian Appointment Date: 2008 (AFIT/ENV); BSEE, University of Lowell, 1982; MSEE, Air Force Institute of Technology, 1992; PhD, Electrical Engineering, Air Force Institute of Technology, 1996. Dr. Colombi's research interests within the broad discipline of Systems Engineering include systems architecture and model-based systems engineering techniques, multi-vehicle unmanned/autonomous design, acquisition process modeling, optimal space constellation design, systems of systems analysis, complex adaptive systems and human systems integration. AFIT research center affiliation(s): ANT and CSRA. Tel. 937-255-3636 x3347, email: John.Colombi@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Automation and Autonomy Requirements for Employment of Building Interior Surveillance System (BISS) via Unmanned Aerial Vehicles." Sponsor: DTRA. Funding: \$150,000 – Colombi 40%, Jacques 40%, Cox 15%, Clinton 5%. [ANT]

"Open Systems Acquisition II." Sponsor: SAF/AQ. Funding: \$271,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"AFMC Sponsored SE Certificate Program AY17-18." Sponsor: AFMC/EN. Funding: \$400,000 – Colombi 50%, Moran 50%.

REFEREED JOURNAL PUBLICATIONS

Chalyvidis, C., Ogden, J., Johnson, A., Colombi, J. Ford, T. C. (2016). A Method for Measuring Supply Chain Interoperability, *Supply Chain Forum: an International Journal*, Vol. 17, Issue 4. pp. 246-258.

Colombi, J., Buckle, L., Black, J., and S. Nurre (2017). Optimal Launch Manifesting for Heterogeneous Disaggregated Satellite Constellations, *Journal of Spacecraft and Rockets*, Vol. 54, No. 3 (2017), pp. 582-591. [ANT/CSRA]

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Human-centered design using system modeling language, *Journal of Cognitive Engineering and Decision Making*, 11(3), 252-269. [ANT]

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Informing System Design Using Human Performance Modeling, *Systems Engineering*, 20(2), 173-187. [ANT]

Rodewald, J., Colombi, J., Oyama, K. and Johnson, A., "Methodology for simulation and analysis of complex adaptive supply network structure and dynamics using information theory," *Entropy*, Vol. 18, No. 10, p. 367, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Stern J., Wachtel, S., Colombi, J., Meyer, D., and Cobb, R., "Multi-objective Optimization of Geosynchronous Earth Orbit Space Situational Awareness System Architectures," CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach CA, Mar 23-25, 2017. [CSRA]

Colombi, J., D. Jacques and J. Lambach, "Integrating UAS Swarming with Formation Drag Reduction," 11th Annual IEEE International Systems Conference, Montreal, Quebec, Canada April 24-27, 2017. [ANT]

Bentz, B. R., Colombi, J. M. and Freels, J. K. (2017), *Attritable Design Trades: Reliability and Cost Implications for Unmanned Aircraft*, Annual IEEE International Systems Conference – Montreal. Canada April 24-27, 2017. [ANT]

D. A. Shultz, J. M. Colombi, D. R. Jacques, R. G. Cobb. "Model-based Engineering: Analysis of Alternatives for Optical Satellite Observation." 15th Annual Conference on Systems Engineering (CSER) Research Redondo Beach, CA, March 23-25, 2017. [CSRA]

Rodewald, J., Colombi, J., Oyama, K., and Johnson, A., "Confidence Investigation of Discovering Organizational Network Structures Using Transfer Entropy," Complex Adaptive Systems, Cihan H. Dagli, Editor in Chief, Conference Organized by Missouri University of Science and Technology Los Angeles, CA, 2016.

COX, AMY M., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT
Appointment Date: 2016 (AFIT/ENV); BS, Mechanical Engineering, University of Cincinnati, 1997; MS, Space Operations, Air Force Institute of Technology, 1999; AA French, Presidio of Monterey, 2005; Brevet, Flight Test Engineering, École du Personnel Navigant d'Essais et de Réception, 2006, PhD, Systems Engineering, George Washington University, 2017. Lt Col Cox's research interests include flexible design, system architecture, user innovation and open innovation. Tel. 937-255-3636 x4352, email: Amy.Cox@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Cox, A., Szajnarfarber, Z.. "System user pathways to change," 15th Annual Conference on Systems Engineering Research, Redondo Beach, CA, March 23-25, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Page, W., Parr, J., Thal, A., Cox, A., "User-Centered Design in the U.S. Air Force Additive Manufacturing; Case Studies On Tools, Jigs, And Topology Optimization." 9th International Conference on Applied Human Factors and Ergonomics, Los Angeles, CA, July 11-21, 2017.

BOOKS AND CHAPTERS IN BOOKS

Page, W., Parr, J., Thal, A., Cox, A., "Advances in Usability and User Experience, User-Centered Design in U.S Air Force Additive Manufacturing; Case Studies on Tools, Jigs, and Topology Optimization," 2017, Springer International Publishing AG.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Cox, A., "Functional Gain and Change Mechanisms in Post-Production Complex Systems." Doctoral Dissertation, January, 2017.

Cox, A., Invited Panel Member, "The Need for Expertise in Innovation," Industry Studies Conference, Presentation on Expertise Leveraged by User Innovators, Washington DC, May, 2017.

ELSHAW, JOHN J.,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management; AFIT
Appointment Date: 2013 (AFIT/ENV); BS, Accounting, University of Akron, 1991; MBA, Regis University, 1996, PhD, Krannert School of Management, Purdue University, 2010. Dr. Elshaw's research interests include organizational behavior, trust, leadership, human resource management, organizational causes of high-consequence errors, technology impact on individual and group behavior, social network analysis, cognition and emotions, organizational climate and culture, psychological influences on foreign audiences, cross-cultural leadership and communication, and hierarchical linear modeling. Tel. 937-255-3636 x4650, email: John.Elshaw@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Learning Curve Analysis in Department of Defense Acquisition Programs.” Sponsor: NPS. Funding: \$77,040 – Elshaw 70%, Badiru 30%.

REFEREED JOURNAL PUBLICATIONS

Elshaw, John J., Fass, Robert D., & Mauntel, Brian R. (2017). Cognitive Mentorship: Protégé Behavior as a Mediator to Performance. *Journal of Mentoring and Teaching*. In Print.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Gay, Christopher, Bobko, Philip, Elshaw, John J., Horowitz, Barry M., Kim, Inki. (2017) Operator Suspicion and Detection / Response to Cyber-Attacks on Unmanned Systems. The Journal of Human Factors and Ergonomics Society conference, 9-13 Oct 2017, Austin, TX.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Dwyer, Kevin M. Jr., Fass, R. David, Koschnick, Clay M., Elshaw, John J. (2017) Forecasting Traditional vs. Blended Retirement System for Individual Service Members, 85th Military Operations Research Society Symposium, 22 June 2017, USMA West Point, NY, Presentation ID: 19643.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Elshaw, John J. (2017). Learning Curve Analysis in Department of Defense Acquisition Programs. Sponsored technical paper by the Naval Postgraduate School.

ENINGER, ROBERT M., Lt Col,

Assistant Professor of Industrial Hygiene, AFIT Appointment Date: 2015 (AFIT/ENV); BS, Civil and Environmental Engineering, United States Air Force Academy, 1995; MS, Civil Engineering, University of Texas-San Antonio, 2000; MS, Health Science, Purdue University, 2002; PhD, Environmental Health, University of Cincinnati, 2008. Lt Col Eninger’s research interests include aerosol science, exposure assessment, and respiratory protective devices. Tel. 937-255-3636 x4511, email: Robert.Eninger@afit.edu

REFEREED JOURNAL PUBLICATIONS

Dominguez, T., Aurell, J., Gullett, B., Eninger, R., & Yamamoto, D. (2017). Characterizing emissions from open burning of military food waste and ration packaging compositions. *Journal of Material Cycles and Waste Management*, 1-12.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Eninger, R.M., and Slagley, J.M. “Proposed New Noise Weighting for Pregnant Workers,” American Industrial Hygiene Conference and Exposition (AIHCE), Seattle, WA, 5-8 June 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Chavez, I., Eninger, R.M. (2017) Optimal Configurations for Aerosol Monitoring with Multi-Rotor Small Unmanned Aerial Systems, Abstracts of the American Industrial Hygiene Conference and Exposition (Seattle, Washington, U.S.A., June 4 – 7, 2017), poster session.

Swift, C.A., Mbonimpa, E.G., Eninger, R.M., Grabinski, C.M. (2017) M1A1 Abrams Main Battle Tank Crew Member Occupational Inhalation Health Hazard Risk Analysis During Live-Fire of the 120mm, 7.62 mm, and .50 caliber Weapon Systems, Abstracts of the American Industrial Hygiene Conference and Exposition (Seattle, Washington, U.S.A., June 4 – 7, 2017), poster session.

Page, M.L., Eninger, R.M., Rubenstein, M.H., Ott, D.K., Yamamoto, D.P. (2017) Characterization of C-130 Combustion Emissions During Aeromedical Evacuation Engines Running Onload, Abstracts of the American Industrial Hygiene Conference and Exposition (Seattle, Washington, U.S.A., June 4 – 7, 2017), poster session.

Eninger, R.M., Eninger, A.P. (2017) PDC #303: Death to Death by PowerPoint: Highly Effective Training Through Storytelling, American Industrial Hygiene Conference and Exposition (Seattle, Washington, U.S.A., June 4 – 7, 2017), 4-hr continuing education session.

FASS, ROBERT D.,

Assistant Professor of Systems Integration and Cost Analysis, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BA Economics, University of New Mexico, 1989; MBA, University of New Mexico, 1993, PhD, Business Administration and Management, New Mexico State University, 2008. Dr. Fass's research interests include cost analysis, decision analysis, risk analysis, operations research, behavioral economics, organizational behavior, organizational change, and government acquisition policy.

Tel. 937-255-3636 x4388, email: Robert.Fass@afit.edu

REFEREED JOURNAL PUBLICATIONS

Elshaw, John J., Fass, R. David, Mauntel, Brian R. (2017). Cognitive Mentorship: Protégé Behavior as a Mediator to Performance. Accepted: NCPEA Mentoring & Tutoring: Partnership in Learning.

Griffith, John R., White, Edward D, III., Fass, R. David, Lucas, Brandon, M. (2017). Comparison of Body Composition Metrics for United States Air Force Airmen, Accepted: Military Medicine.

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DeBois, Peter A., Koschnick, Clay M., Fass, R. David, Bryson, Roy (2017). The Financial Impact of Commercial Small Satellite and Small Launch Providers on the Department of Defense, 85th Military Operations Research Society Symposium, 22 June 2017, USMA West Point, NY, Presentation ID: 19681.

Dwyer, Kevin M. Jr., Fass, R. David, Koschnick, Clay M., Elshaw, John J. (2017). Forecasting Traditional vs. Blended Retirement System for Individual Service Members, 85th Military Operations Research Society Symposium, 22 June 2017, USMA West Point, NY, Presentation ID: 19643.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Brown, Michael J., Fass, R. David, Ritschel, Jonathan D., Mabe, Richard D. (2017). An Evaluation of Cost and Schedule in Open Mission System Avionics versus Historical Proprietary Designs. International Cost Estimating and Analysis Association (ICEAA) Dayton Chapter. Invited Thesis Presentation: 02 March 2017.

Galbraith, Virginia L., Lucas, Brandon M., Elshaw, John J., Fass, R. David (2017). Analysis of Factors Related to Turnover Intentions Within the Financial Management Career Field. International Cost Estimation & Analysis Association (ICEAA) Dayton Chapter, Thesis Presentation: 02 March 2017.

FELKER, DANIEL L.,

Chemist GS-11, Department of Systems Engineering and Management, Appointment Date: 2006 (AFIT/ENV); PhD, Analytical Chemistry, Kansas State University, 2005, served in the United States Army from Dec 1986 to Aug 1997. Current research interests include: X-ray photoelectron spectroscopy of thin film surfaces with a focus on the surface absorption organophosphates; modeling the absorbent properties of nano-particles for remediation of toxic compounds; the mechanism of thermo deactivation of Bacillus Anthracis Spores; electrochemical biosensors for the detection of organophosphates; and environmental chemistry of wetlands. Tel. 937-255-3636 x7410, email: Daniel.Felker@afit.edu

FORD, THOMAS C.

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management (through Integrity Applications, Inc.), AFIT Appointment Date: 2014 (AFIT/ENV); BS, Electrical Engineering, Brigham Young University, 1994; BA, Chinese, Brigham Young University, 1994; MS, Engineering, Wright State University, 1998; PhD, Systems Engineering, Air Force Institute of Technology, 2008. Lt Col Ford's research interests include interoperability, resiliency, and system architecting. Tel. 937-255-3636 x4747, email: Thomas.Ford@afit.edu

FREELS, JASON K., Maj,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Auburn University, 2000; MS, Air Force Institute of Technology, 2006; PhD, Systems Engineering, Air Force Institute of Technology, 2013. Maj Freels' research interests include reliability growth testing, accelerated life testing, accelerated degradation testing, and competing risk analysis. Tel. 937-255-3636 x4676, email: Jason.Freels@afit.edu

REFEREED JOURNAL PUBLICATIONS

Boehmke B. C. and Freels J. K. (2016), learning Curve: An Implementation of Crawford's and Wright's Learning Curve Production Functions, Journal of Open Source Software, doi: 10.21105/joss.00202.

Vandawaker R. M., Jacques D. R., Freels J. K., Ryan E., and Huscroft J. (2016), "Health Monitoring Impact on Non-Repairable Component Supply Methods," Journal of Quality in Maintenance Engineering.

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Bentz, B. R., Colombi, J. M. and Freels, J. K. (2017), *Attributable Design Trades: Reliability and Cost Implications for Unmanned Aircraft*, Annual IEEE International Systems Conference – Montreal, Canada April 24-27, 2017. [ANT]

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Freels, J. K. and Meeker, W. Q. (2017), *R Package SMRD – Statistical Methods for Reliability Data*, Quality and Productivity Research Conference - Storrs, CT.

Freels, J. K. and Meeker, W. Q. (2017), *Statistical Methods for Reliability Data*, Institute for Defense Analyses Test Science Workshop - Springfield, VA.

GRMAILA, MICHAEL R.,

Professor and Head, Department of Systems Engineering and Management, AFIT Appointment Date: 2004 (AFIT/ENV); BS, Texas A&M University, 1993; MS, Texas A&M University, 1995; PhD, Computer Engineering, Texas A&M University, 1999. Dr. Grimaila's research interests include modeling and simulation, mission assurance, network management and security, quantum cryptography, and systems engineering. He is a member of the ACM, a Senior Member of the IEEE, a Fellow of the ISSA, and serves as an advisor to the Prince of Wales Fellows/Prince Edward Fellows at MIT and Harvard. AFIT research center affiliation(s): CCR and CSRA. Tel. 937-255-3636 x4800, email: Michael.Grimaila@afit.edu

REFEREED JOURNAL PUBLICATIONS

Mailloux, L. O., Grimaila, M.R., Hodson, D. D., and Baumgartner, G. (2017). The benefits of joining a multidisciplinary research team. IEEE Potentials, 36(3), 18-22.

Mailloux, L. O., Grimaila, M.R., Hodson, D. D., McLaughlin, C., & Baumgartner, G. (2017). Modeling, simulation, and performance analysis of decoy state enabled quantum key distribution systems. Applied Sciences. 7(2), 212.

Engle, R. D., Mailloux, L. O., Grimaila, M.R., Hodson, D. D., McLaughlin, C. V., & Baumgartner, G. (2017). Implementing the decoy state protocol in a practically-oriented quantum key distribution system-level model. The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, March 23, 2017; doi: 10.1177/1548512917698053.

Hodson, D. D., Grimaila, M.R., Mailloux, L. O., McLaughlin, C. V., & Baumgartner, G. B. (2017). Modeling quantum optics for quantum key distribution system simulation, The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, January 10, 2017; doi: 10.1177/1548512916684561.

Denton, J. C., Hodson, D. D., Cobb, R. G., Mailloux, L.O., Grimaila, M.R., & Baumgartner, G. B. (2017). A model to estimate performance of space-based quantum communication protocols including quantum key distribution systems. The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, January 16, 2017; doi: 10.1177/1548512916684562. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mailloux, L. O., Sargent B., Hodson, D. D., & Grimaila, M.R. (2017). System-level considerations for modeling space-based quantum key distribution architectures. IEEE SysCon. Montreal, Quebec, Canada. April 24-27, 2017. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Russell, M., Mailloux, L. O., Grimaila, M.R., Hodson, D. D., Engle, R. D. A model and simulation framework for studying implementation non-idealities in quantum key distribution systems. 6th International Conference on Quantum Cryptography. Washington D.C., United States, September 28-October 2, 2016.

PATENT APPLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., "Machine learning by construction of a Qualia Modeling Agent - method and apparatus," filed 16 May 2017, Air Force Invention number AFD-1680, US Serial Numbers 62/506,034 and 62/506,040. [CCR]

HARPER, WILLIE F.,

Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2012 (AFIT/ENV); BS, Civil Engineering, University of California, Los Angeles, 1992; MS, Civil and Environmental Engineering, Cornell University, 1993; PhD, Civil and Environmental Engineering, University of California, Berkeley, 2002. Dr. Harper's research interests include water quality, with a focus on environmental biotechnology, advanced oxidation, and sensing. Tel. 937-255-3636 x4528, email: Willie.Harper@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Addendum: Sequencing Batch Reactors (SBR) for Fate of Bacillus Spores in Wastewater." Sponsor: EPA. Funding: \$127,953.

REFEREED JOURNAL PUBLICATIONS

Terada, A., Sugawara, S., Hojo, K., Takeuchi, Y., Riya, S., Harper, W.F., Yamamoto, T., Kuroiwa, M., Isobe, K., Katsuyama, C., Suwa, Y., Koba, K., and Hosomi, M., "Hybrid nitrous oxide production from partial nitrifying bioreactor: hydroxylamine interactions with nitrite. Environmental Science and Technology," (2017) Vol. 51(5), 2748-2756.

Scott, R., Mudimbi, P., Miller, M., Magnuson, M., Willison, S., Phillips, R., Harper, W.F., "Advanced oxidation of tartrazine and brilliant blue with pulsed ultraviolet light emitting diodes." Water Environment Research, Vol. 89, 24-31.

Baseley, D., Wunderlich, L., Phillips, G., Gross, K., Perram, G., Willison, S., Phillips, R., Magnuson, M., Sang Don Lee, Harper, W.F., “Hyperspectral analysis for standoff detection of dimethyl methylphosphonate on building materials, Building and Environment” (2016)., Vol. 108, 135-142.

Harper, W.F., Flemings, W., Bailey, K., Lee, W., Felker, D., Gallardo, V., Magnuson, M., Phillips, R., “Adsorption of malathion onto copper and iron surfaces relevant to water infrastructure,” Journal of American Water Works Association.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Dyson, S., Kunicki, J., Kempisty, D., Phillips, R., Magnuson, M., Harper, W.F., “Advanced oxidation and adsorption treatment train for the removal of toxicity from emerging and co-contaminants in groundwater,” 2017 World Environmental and Water Resources Congress, Sacramento, CA, May 2017.

Smith, M., Xing, Y., Bailey, K., Magnuson, M., Phillips, R., Harper, W.F., “Biocontaminants in wastewater: Interactions between *Bacillus Globigii* spores and mixed cultures of activated sludge,” U.S. Environmental Protection Agency International Decontamination Research and Development Conference, Research Triangle Park, North Carolina, November 2016.

HOISINGTON, ANDREW J., Lt Col,

Assistant Professor and Program Chair of Engineering Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2017 (AFIT/ENV); BS, Civil Engineering, University of Michigan Ann Arbor 2001; MS, Environmental Engineering, University of Texas, Austin, 2007; PhD, Environmental Engineering, University of Texas, Austin 2013. Lt Col Hoisington’s research interests include air quality in the built environment, microbiome of the built environment, and air quality or microbiome factors that influence mental health. Tel. 937-255-3636 x4826, email: Andrew.Hoisington@afit.edu

REFEREED JOURNAL PUBLICATIONS

Hemmings SM, Malan-Muller S, van den Huevel LL, Demmitt BA, Smith DG, Bohr AD, Stamper CE, Hyde ER, Morton JT, Marotz CA, Siebler PH, Hoisington AJ, Brenner LA, Postolache TT, Dicks LM, McQueen MB, Krauter, KS, Knight R, Seedat S, Lowry CA. (2017). “The microbiome in Posttraumatic Stress Disorder (PTSD) and Trauma-Exposed Controls: An Exploratory Study,” *Psychosom Med*, 79(8), 936-946.

Amritwar A, Lowry C, Brenner L, Hoisington A, Stiller J, Hamilton R, Postolache T. (2017). “Mental Health In Allergic Rhinitis: Depression and Suicidal Behavior,” *Curr Treat Options Allergy*, 4(1), 71-97.

Raheja U, Fuchs D, Lowry C, Stephens S, Pavlovich M, Mohyuddin H, Yousufi H, Ryan K, O’Conner J, Brenner L, Punzala C, Hoisington A, Nijar G, Groer M, Shuldiner A, Pollin T, Stiller J, Mitchell B, Postolache T. (2017), “Heritability of Plasma Neopterin Levels in the Old Order Amish.” *Journal of Neuroimmunology*, 307, 37-41.

Okusaga O, Fuchs D, Reeves G, Giegling I, Hartmann A, Konte B, Friedl M, Groer M, Cook T, Stearns-Yoder K, Pandey, J, Kelly D, Hoisington A, Lowry C, Eaton W, Brenner L, Rujescu D, Postolache T. (2016), “Kynurenine and tryptophan levels in patients with schizophrenia with elevated antigliadin immunoglobulin G antibodies,” *Psychosomatic Medicine*, 78(8), 931-939.

Hoisington AJ, Kays K, Christ JA, Cooper C. (2017). “Risk-Taking in Engineering Instruction at the U.S. Air Force Academy” in Risk-Taking in Higher Education: The Importance of Negotiating Intellectual Challenge in the College Classroom, Editors Kelty R, Bunten B, Rowman & Littlefield, 119-129.

JACQUES, DAVID R.,

Associate Professor of Aerospace Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 1999 (AFIT/ENY); BS, Mechanical Engineering, Lehigh University, 1983; MS, Aeronautical Engineering, AFIT, 1989; PhD, Aeronautical Engineering, AFIT, 1995. Dr. Jacques’ research interests include development planning, architecture based evaluation, multi-objective or constrained optimal design, and cooperative

behavior and control of autonomous vehicles. AFIT research center affiliation(s): ANT and CSRA. Tel. 937-255-3636 x3329, email: David.Jacques@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Airfield Damage Inspection and Assessment using Small UAS.” Sponsor: AFCEC. Funding: \$100,000 – Jacques 50%, Colombi 20%, Thal 15%, Stoppel 15%. [ANT]

“Comparison of Traditional Versus Cubesat Remote Sensing.” Sponsor: Undisclosed. Funding: \$20,000.

“System Qualities Ontology, Tradespace and Affordability (SQOTA) Project – Phase VI.” Sponsor: OSD. Funding: \$24,000.

REFEREED JOURNAL PUBLICATIONS

Vandawaker, R.M., D. Jacques, E. Ryan, J. Huscroft and J. Freels. Health Monitoring Impact on Non-Repairable Component Supply Methods, *Journal of Quality in Maintenance Engineering*, 23 (1), 82-94, 2016.

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Humphreys, C., R. Cobb, D. Jacques and J. Reeger, “Dynamic Re-plan of the Loyal Wingman Optimal Control Problem in a Changing Environment, Proceedings of the AIAA Sci-Tech Conference, Jan 2017. [ANT]

Shultz, D., Colombi, J., Jacques, D., and Cobb, R., “Model-based Engineering: Analysis of Alternatives for Optical Satellite Observation,” CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach CA, Mar 23-25, 2017. [CSRA]

Colombi, J., D. Jacques and J. Lambach, “Integrating UAS Swarming with Formation Drag Reduction,” 11th Annual IEEE International Systems Conference, Montreal, Quebec, Canada April 24-27, 2017. [ANT]

KEMPISTY, DAVID M., Lt Col,

Assistant Professor of Environmental Engineering and Science, AFIT Appointment Date: 2014 (AFIT/ENV); BS, Environmental Engineering, Michigan Technological University, 1996; MS, Environmental Engineering and Science, Air Force Institute of Technology, 2006; PhD, Civil Engineering, University of Colorado Boulder, 2014. Lt Col Kempisty’s research interests include water quality issues, specifically using advanced and conventional adsorbents and UV-LED photocatalyst technologies. Perfluorinated compounds and their environmental toxicity, fate, and transport are also an active research area. Tel. 937-255-3636 x4711, email: David.Kempisty@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Water Treatment by Advanced Oxidation Treatment Train (IA DW-057-92441501-0).” Sponsor: EPA. Funding: \$65,038.

REFEREED JOURNAL PUBLICATIONS

Kempisty, David; Summers, R.S.; Effect of influent groundwater quality on adsorption of low concentrations of 1,2 dichloroethane by granular activated carbon, *Journal of Environmental Engineering*, 20 Jun 2016 (doi 10.1061/(ASCE)EE.1943-7870.0001142)

Kanel, S.R., Misak, H., Nepal, D., Mall, S., Brittle, S., Pavel-Sizemore, I., Kempisty, D., and M. Goltz; Application of Carbon Nanotube Yarns as a Filter Media to Treat Nitroaromatic-contaminated Water, *New Carbon Materials*, (doi 10.1016/S1872-5805 (16) 60021-5).

Droste, D.J.; Shelley, M.; Gearhart, J.; Kempisty, D.M.; A systems dynamics approach to the efficacy of oxime therapy for mild exposure to sarin gas, *Disaster Medicine Journal* (doi 10.5055/ajdm.2016.0229)

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Kempisty, D.M., Phillips, R., Dyson, S.; Magnuson, M.; Mills M., Advanced Oxidation and Adsorption Treatment Train for the Removal of Toxicity from Emerging and Co-contaminants in Groundwater; World Environmental & Water Resources Congress, Sacramento, CA, May 21-25, 2017.

Schmidt, C., Magnuson, M., Phillips, R., Hall, J., Kempisty, D., Adsorption of Perfluorinated Compounds from Post-emergency Response Wastewater; World Environmental & Water Resources Congress, Sacramento, CA, May 21-25, 2017.

INVENTION DISCLOSURES

Kempisty, David M., Stubbs, John E., Russel, Morgan, "Water Treatment System-Cylindrical Teflon® Reactor containing Ultraviolet Light Emitting Diodes with Nano-Sized TiO₂," filed 19 Jun 17, Air Force Docket No. ADF-1708.

KOSCHNICK, CLAY M., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BS, United States Air Force Academy, 1998; MS, Georgia Institute of Technology, 2007; PhD, University of Florida, 2012. Lt Col Koschnick's research interests include engineering economy, dynamic programming, and econometrics. Tel 937-255-3636 x4638, email: Clay.Koschnick@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

DeBois, Peter A., Koschnick, Clay M., Fass, R. David, Bryson, Roy (2017). The Financial Impact of Commercial Small Satellite and Small Launch Providers on the Department of Defense, 85th Military Operations Research Society Symposium, 22 June 2017, USMA West Point, NY, Presentation ID: 19681.

Dwyer, Kevin M. Jr., Fass, R. David, Koschnick, Clay M., Elshaw, John J. (2017) Forecasting Traditional vs. Blended Retirement System for Individual Service Members, 85th Military Operations Research Society Symposium, 22 June 2017, USMA West Point, NY, Presentation ID: 19643.

LANGHALS, BRENT T.,

Assistant Professor of Information Resource Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2016 (AFIT/ENV); BS, United States Air Force Academy, 1995; MS, Air Force Institute of Technology, 2001; PhD, University of Arizona, 2011. Dr. Langhals' research interests include Data Analytics, "Big Data," Human-Computer Interfaces, Systems Engineering, Vigilance, and Psychophysiological Cue Detection. Tel 937-255-3636 x7402, email: Brent.Langhals@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Langhals, B. T., Burgoon, J. K., Nunamaker, J.F. (2017) "Psychophysiological Cue Correlation to Mental Workload." International Symposium on Aviation Psychology, 10 May 2017, Dayton Ohio.

Guinn, V., Peterson, M., Langhals, B. "Using Mobile Application for Civil Engineering Work-Order Submission," SOCHE STEM Cyber Research Conference, 17 March 2017, Dayton Ohio.

PATENTS AWARDED

Russi, J.G., Langhals, B.T., Miller, M.E., and Heft, E.L., May 2017. "Stereoscopic 3-D Presentation for Air Traffic Control Digital Radar Displays," US Patent No. 9,667,947. [ANT]

LONG, DAVID S.,

Assistant Professor of Systems Engineering (through SRISY), Department of Systems Engineering and Management, AFIT Appointment Date: 2016 (AFIT/ENV); BS, Industrial Engineering & Management, North Dakota State University, 1988; MS, Engineering, California State University Northridge; PhD, Engineering Systems, Massachusetts Institute of Technology, 2012. Dr. Long research interests include systems of systems, open systems architecture, model based systems engineering, wicked problems, human machine interfaces, automation and autonomy. Tel. 937-255-3636 x4390, email: David.Long.ctr@afit.edu

LUCAS, BRANDON M., Lt Col,

Assistant Professor of Cost Analysis, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BA, University of Texas at Austin, 1998; ME & MA, University of Oklahoma, 2002; MS, Air Force Institute of Technology, 2004; PhD, Economics, George Mason University, 2011. Lt Col Lucas' research interests include incentive structures, profit motives, coordination issues, and the economics of public choice & the law. Tel. 937-255-3636 x4441, email: Brandon.Lucas@afit.edu

REFEREED JOURNAL PUBLICATIONS

Jimenez, Christopher A., White, Edward D., Brown, Gregory E., Jonathan D. Ritschel, Lucas, Brandon M., and Seibel, Michael J. "Using Pre-Milestone B Data to Predict Schedule Duration for Defense Acquisition Programs." Journal of Cost Analysis and Parametrics, Vol. 9 Issue 2, 2016.

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Bentz, B. R., Colombi, J. M. and Freels, J. K. (2017), *Attributable Design Trades: Reliability and Cost Implications for Unmanned Aircraft*, Annual IEEE International Systems Conference – Montreal. Canada April 24-27, 2017. [ANT]

MAILLOUX, LOGAN O., Maj,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BS, Computer Engineering, Lawrence Technological University, 2002; MS, Systems Engineering, Air Force Institute of Technology, 2008; PhD, Systems Engineering, Air Force Institute of Technology, 2015. He is commissioned as Major in the United States Air Force (USAF) and serves as a computer developmental engineer. Maj Mailloux is a Certified Information System Security Professional (CISSP), Certified Systems Engineering Professional (CSEP), and holds department of defense certifications in cyberspace operations, systems engineering science and technology management, test & evaluation, and program management. He is a member of IEEE, ACM, INCOSE, and ITEA professional societies, as well as, HKN and TBP honor societies. Maj Mailloux has served the USAF as a cyberspace operations expert responsible for planning and executing network defense exercises, documenting and training computer security best practices, performing test and evaluation of enterprise resource planning solutions, and maintaining distributed simulation infrastructure. Maj Mailloux's research interests include system security engineering, complex information systems, and quantum key distribution. AFIT research center affiliation(s): CCR. Tel. 937-255-3636 x3348, email: Logan.Mailloux@afit.edu

REFEREED JOURNAL PUBLICATIONS

Mailloux, L. O., Grimaila, M.R., Hodson, D. D., and Baumgartner, G. (2017). The benefits of joining a multidisciplinary research team. IEEE Potentials, 36(3), 18-22.

Mailloux, L. O., Grimaila, M.R., Hodson, D. D., McLaughlin, C., & Baumgartner, G. (2017). Modeling, simulation, and performance analysis of decoy state enabled quantum key distribution systems. Applied Sciences. 7(2), 212.

Engle, R. D., Mailloux, L. O., Grimaila, M.R., Hodson, D. D., McLaughlin, C. V., & Baumgartner, G. (2017). Implementing the decoy state protocol in a practically-oriented quantum key distribution system-level model. The

Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, March 23, 2017; doi: 10.1177/1548512917698053.

Hodson, D. D., Grimaila, M.R., Mailloux, L. O., McLaughlin, C. V., & Baumgartner, G. B. (2017). Modeling quantum optics for quantum key distribution system simulation, The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, January 10, 2017; DOI: 10.1177/1548512916684561.

Denton, J. C., Hodson, D. D., Cobb, R. G., Mailloux, L.O., Grimaila, M.R., & Baumgartner, G. B. (2017). A model to estimate performance of space-based quantum communication protocols including quantum key distribution systems. The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, January 16, 2017; DOI: 10.1177/1548512916684562.

MBONIMPA, ERIC G.,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2014 (AFIT/ENV); BS, Civil Engineering, Kigali Institute of Science and Technology, 2004; MS, Environmental Engineering, University of Missouri-Columbia, 2007; PhD, Environmental Engineering, Purdue University, 2010. Dr. Mbonimpa's research interests include environmental sustainability, life cycle assessment, and water quality. Tel. 937-255-3636 x7405, email: Eric.Mbonimpa@afit.edu

REFEREED JOURNAL PUBLICATIONS

Emery I., E. Mbonimpa, A. Thal. Climate-based policies may increase life cycle social costs of vehicle fleet operation. *Energy Policy* 101, 1-9, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Emery I, E. Mbonimpa, S. Kumar, K. Muthu, L. Wei, A. Jahndideh, S. Singh, V. Owens. Life cycle assessment of drop-in biofuels from prairie cordgrass. ASABE Meeting 2017 Paper Number: 1701357, DOI: 10.13031/aim.201701357.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Eric Mbonimpa, Isaac Emery, David Kempisty. An Approach to Estimate a Product Life Cycle Stress on Local Fresh Water. EWRI Congress 2017, Sacramento, CA.

Isaac Emery, Eric Mbonimpa, David Kempisty. Life cycle evaluation of PFAS remediation scenarios. ISIE-ISSST 2017, Chicago, IL.

MILLER, MICHAEL E.,

Associate Professor of Systems Integration, Department of Systems Engineering and Management, AFIT Appointment Date: 2010 (AFIT/ENV); BS, Ohio University, 1987; MS, Ohio University, 1989; PhD, Industrial and Systems Engineering, Virginia Tech., 1993. Dr. Miller's research interests include Human Systems Integration, Human-Automated Agent Interaction, and Application of Human Vision to Display, and Lighting Design. AFIT research center affiliation(s): ANT. Tel. 937-255-3636 x4651, email: Michael.Miller@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Computational Agent Capable of Adapting Roles within a Human-Machine Team." Sponsor: AFOSR. Funding: \$173,715 – Miller 30%, Bindewald 30%, Peterson 30%, Langhals 10%. [ANT]

"Test and Evaluation of Autonomous Systems." Sponsor: OFRN (WSU). Funding: \$30,000. [ANT]

"Investigating Lighting-Display Configurations for Improved ISR." Sponsor: USAFSAM. Funding: \$45,400.

"Enhanced HMD-Capable Gaze Tracker using Steady-State Visually-Evoked Potentials." Sponsor: 711 HPW. Funding: \$20,793 – Miller 50%, Borghetti 50%. [ANT]

“Design Metrics for Near to Eye Display Symbolology.” Sponsor: 711 HPW. Funding: \$22,145 – Miller 50%, Jackson 50%.

REFEREED JOURNAL PUBLICATIONS

Scott, R., Mudimbi, P., Miller, M.E., Magnuson, M., Willison, S., Phillips, R., Harper, Jr., W.F. (2017). Advanced Oxidation of Tartrazine and Brilliant Blue FCF with Pulsed Ultraviolet Light-Emitting Diodes, *Water Environment Research*, 89(1), 24-31.

Fyda, S., Godby, N., Miller, M.E., and Almquist, C. (2017). An Investigation of Ultraviolet Light Emitting Diodes (UV LEDs) in a Plug-Flow Reactor for Water Treatment, *Environ. Prog. Sustainable Energy*, 36(3), 857-863.

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Human-centered design using system modeling language, *Journal of Cognitive Engineering and Decision Making*, 11(3), 252-269. [ANT]

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Informing System Design Using Human Performance Modeling, *Systems Engineering*, 20(2), 173-187. [ANT]

Goodman, T.J., Miller, M.E., Rusnock, C.F. and Bindewald, J.M. (2017). Effects of Agent Timing on the Human-Agent Team, *Cognitive Systems Research*, 46, pp. 40-51. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J.M., Peterson, G.L., Miller, M.E. (2016). Clustering-Based Online Player Modeling. International Joint Conference on Artificial Intelligence (IJCAI)-Computer Games Workshop, New York, NY, July 10, 2016. [ANT]

Rusnock, C.F., Miller, M.E. & Bindewald, J.M. (2017). Observations on Trust, Reliance, and Performance Measurement in Human-Automation Team Assessment, Proceedings of the 2017 Industrial and Systems Engineering Conference, Pittsburg, PA, May 22, 2017. [ANT]

Turner, K. & Miller, M.E. (2017). The Effect of Automation and Workspace Design on Humans’ Ability to Recognize Patterns in Data While Fusing Information, Proceedings of the 2017 IEEE Conference on Cognitive and Computational Aspects of Situation Management, Savannah, GA March 28, 2017. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Shields B.L., Valencia, V.V., Thal Jr, A.E., Miller, M.E., and Parr, J.C. (2016). in R. Goonetilleke and W. Karwowski (eds.), Advances in Physical Ergonomics and Human Factors, Advances in Intelligent Systems and Computing 489, doi 10.1007/978-3-319-41694-6-86. [ANT]

PATENTS AWARDED

Russi, J.G., Langhals, B.T., Miller, M.E., and Heft, E.L., May 2017. “Stereoscopic 3-D Presentation for Air Traffic Control Digital Radar Displays,” US Patent No. 9,667,947. [ANT]

PATENT APPLICATIONS

Miller, M.E. and Spencer, M.J., “Reactor for Treating water with Ultraviolet light from LEDs,” filed May 2017, Air Force Docket No. AFD-1522, US Serial No. 15/609,589.

MORAN, KENNETH O.,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and Management. AFIT Appointment Date: 2015 (AFIT/ENV); PhD, Aeronautical Engineering, AFIT, 1994. Research interests include systems engineering, unmanned systems, and/or space systems, early concept refinement, policy

analytics, optimal designs, design trade space, modeling and simulation, and flight test. Tel. 937-255-3636 x4310, email: Kenneth.Moran@afit.edu

PARR, JEFFREY C., Lt Col,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and Management. AFIT Appointment Date: 2014 (AFIT/ENV); BS, Civil Engineering, US Air Force Academy, 1998; MS, Environmental Engineering, AFIT 2002; PhD, Systems Engineering, AFIT, 2014. Research interests include human systems, injury criteria, and ejection system requirements. Tel. 937-255-3636 x4709, email: Jeffrey.Parr@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Neck Injury Criteria Development.” Sponsor: 711 HPW. Funding: \$38,475 – Parr 80%, Miller 20%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Parr, J. C., Rusnock, C. F. and Miller, M. E. (2017). An Overview of the Air Force Institute of Technology’s Human Systems Master’s Degree Program. Proceedings of the 2017 International Applied Human Factors and Ergonomics Conference, Los Angeles, CA. In book by Springer International Publishing AG, T. Andre (ed.), Advances in Human Factors in Training, Education, and Learning Sciences, Advances in Intelligent Systems and Computing 596, doi 10.1007/978-3-319-60018-5-18.

Page, W. L., Parr, J. C., Thal Jr., A. E., and Cox, A. M. (2017). User-Centered Design in U.S Air Force Additive Manufacturing; Case Studies on Tools, Jigs, and Topology Optimization. Proceedings of the 2017 International Applied Human Factors and Ergonomics Conference, Los Angeles, CA. In book by Springer International Publishing AG, T. Ahram and C. Falco (eds.), Advances in Usability and User Experience, Advances in Intelligent Systems and Computing 607, doi 10.1007/978-3-319-60492-3-6.

PRIGGE, DIEDRICH V.,

Assistant Professor of Engineering Management, Department of Systems Engineering and Management. AFIT Appointment Date: 2016 (AFIT/ENV); BS, Arizona State University, 2002; MS, Arizona State University, 2010; PhD, Arizona State University, 2013. Dr. Prigge’s research interests include leadership, management, construction, volunteerism, productivity, and cross-cultural global integration. Tel. 937-255-3636 x4648, email: Diedrich.Prigge@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Global Photovoltaic Power Potential Assessment.” Sponsor: NGB. Funding: \$12,500 – Prigge 60%, Thal 40%.

RITSCHEL, JONATHAN D., Lt Col,

Assistant Professor of Cost Analysis, Department of Systems Engineering and Management, AFIT Appointment Date: 2011 (AFIT/ENV); BBA, Accountancy, University of Notre Dame, 1997; MS, Cost Analysis, Air Force Institute of Technology, Wright-Patterson AFB, OH, 2003; PhD, Economics, George Mason University, VA, 2011. Lt Col Ritschel’s research interests include public choice, the effects of acquisition reforms on cost growth in DOD weapon systems, research and development cost estimation, and economic institutional analysis. Tel. 937-255-3636 x4484, email: Jonathan.Ritschel@afit.edu

REFEREED JOURNAL PUBLICATIONS

Ritschel, J.D., and Ritschel, T.L. (2017). “Improving Resource Management in the Afghan Air Force,” Air and Space Power Journal, 31(2): 4-16.

Ritschel, J.D., and Ritschel, T.L. (2016). “Organic or Contract Support? Investigating Cost and Performance in Aircraft Sustainment,” Journal of Transportation Management, 26(2): 47-58.

Gardner, N.R., Ritschel, J.D., White, E.D., and Wallen, A.T. (2017). "Forecasting Foreign Exchange Rates for Department of Defense Budgeting," *Journal of Public Procurement*, 17(3): 315-336.

Kozlak, S. J., White, E. D., Ritschel, J. D. Lucas, B., & Seibel, M. J. (2017). Analyzing cost growth at program stages for DOD aircraft. *Defense Acquisition Research Journal*, 24(3), 386–407.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Ritschel, J.D., and Ritschel, T.L. "Anatomy of the Future Department of Defense Cost Estimator," ICEAA 2017 Professional Development Conference & Training Workshop, Portland, Oregon, 6-9 June 2017.

RUSNOCK, CHRISTINA, F., Maj,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT
Appointment Date: 2013 (AFIT/ENV); BA, Economics-Government, Claremont McKenna College, 2004; MS, Research and Development Management, Air Force Institute of Technology, 2008; MS, Industrial Engineering-Systems Engineering, University of Central Florida, 2011; PhD, Industrial Engineering-Human Factors, University of Central Florida, 2013. Maj Rusnock's research interests include cognitive workload modeling, human performance modeling, human-systems integration, and discrete event simulation.

REFEREED JOURNAL PUBLICATIONS

Watson, M., Rusnock, C., Miller, M. and Colombi, J. (2017), Informing System Design Using Human Performance Modeling. *Syst Eng*, 20: 173–187. doi:10.1002/sys.21388.

Maxheimer, E.W., Rusnock, C.F., Oyama, K.F., & Valencia, V.V. (to appear) "Simulation-based Evaluation of the Effects of Patient Load on Mental Workload of Medical Staff." *Simul Healthc*. 2017 Aug; 12(4):260-267. doi: 10.1097/SIH.0000000000000248.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Garnick, C.J., Bindewald, J.M., & Rusnock, C.F. "Designing an Automated Agent to Encourage Human Reliance" *2017 Human Factors and Ergonomics Society Annual Meeting*, Austin, TX, Oct 9-13, 2017.

Hillesheim A.J., Rusnock, C.F., Bindewald, J.M., & Miller, M.E. "*Relationships Between Human User Demographics and User Trust in an Autonomous Agent*" *2017 Human Factors and Ergonomics Society Annual Meeting*, Austin, TX, Oct 9-13, 2017.

Boubin, J.G, Rusnock, C.F., & Bindewald, J.M. "Quantifying Compliance and Reliance Trust Behaviors to Influence Trust in Human-Automation Teams" *2017 Human Factors and Ergonomics Society Annual Meeting*, Austin, TX, Oct 9-13, 2017.

Vaira, K.D., Rusnock, C.F., & Hammond, G.D. "Improving Fire Station Turn-Out-Time" *2017 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference*, Pittsburgh, PA, May 20-23, 2017.

Valencia, V.V. and Rusnock, C.F. "Using Geographic Information Systems to Improve Healthcare Services" *2017 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference*, Pittsburgh, PA, May 20-23, 2017.

Rusnock, C.F., Miller, M.E. & Bindewald, J.M. "Observations on Trust, Reliance, and Performance Measurement in Human-Automation Team Assessment" *2017 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference*, Pittsburgh, PA, May 20-23, 2017.

Hillesheim, A.J., & Rusnock, C.F., (2016). Predicting the Effects of Automation Reliability Rates on Human-Machine Team Performance. *2016 Winter Simulation Conference*, Arlington, VA, Dec 11-14, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bindewald, J.M., Rusnock, C.F., & Miller, M.E. “Measuring Human Trust Behavior in Human-Machine Teams” 2017 International Conference on Applied Human Factors and Ergonomics (AHFE) , Los Angeles, CA, Jul 17-21 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Rusnock, C.F., “Technology Helps Add That Personal Touch” *Industrial and Systems Engineering*. Tools and Technologies. (Feb 2017).

SLAGLEY, JEREMY M.,

Assistant Professor of Industrial Hygiene and Environmental Science, Department of Systems Engineering and Management, AFIT Appointment Date: 2016 (AFIT/ENV); BS, United States Military Academy, 1993; MS, University of Iowa, 2000; PhD, West Virginia University, 2006. Dr. Slagley’s research interests include occupational stressor assessment and control, specifically for hazardous noise, aerosols, and exposure assessment. He also models deployed waste-to-energy systems for sustainability. Tel. 937-255-3636 x4632, email: Jeremy.Slagley@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Computer Model Technoeconomic Analysis of Deployable Waste to Energy Gasification System.” Sponsor: AFCEC. Funding: \$96,000 – Slagley 50%, Grimaila 20%, Fass 30%.

REFEREED JOURNAL PUBLICATIONS

Schaal, N., Slagley, J., Zreiqat, M., & Paschold, H. (2017). Effects of combined exposure to metals, solvents, and noise on permanent threshold shifts. *American Journal of Industrial Medicine*, 60(3), 227-238. doi:10.1002/ajim.22690. JIF: 1.632.

Slagley, J.M., Paschold, H., Engler, J. (2017) Evaluation of Coverall Field Dry Aerosol Decontamination Methods Using a Manikin. *Journal of Occupational and Environmental Hygiene*, 14(7), 502-509. DOI: 10.1080/15459624.2017.1296235. JIF: 1.155.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Eninger, R.M., and Slagley, J.M. “Proposed New Noise Weighting for Pregnant Workers,” American Industrial Hygiene Conference and Exposition (AIHCE), Seattle, WA, 5-8 June 2017.

Schaal, N., Slagley, J., Richburg, C., Zreiqat, M., & Paschold, H. “Hearing Loss from Metals, Solvents, and Noise,” AIHCE, Seattle, WA, 5-8 June 2017.

STOPPEL, CHRISTOPHER M., Lt Col,

Assistant Professor of Engineering Management, Department of Systems Engineering and Management ,AFIT Appointment Date: 2015 (AFIT/ENV); BS, United States Air Force Academy, 1996; MS, Air Force Institute of Technology, 2001; PhD, University of Texas at Austin, 2013. Lt Col Stoppel’s research interests include sustainability, building energy performance, and project delivery evaluation. Tel. 937-255-3636 x4645, email: Christopher.Stoppel@afit.edu

THAL, ALFRED E., Jr.,

Assistant Professor of Engineering Management, Department of Systems Engineering and Management, AFIT
Appointment Date: 1998 (AFIT/ENV); BS, Civil Engineering, Texas Tech University, 1981; MS, Engineering Management, AFIT, 1985; PhD, Environmental Engineering, University of Oklahoma, 1999. Dr. Thal's research interests include engineering and environmental management, groundwater flow and remediation technologies, facility and infrastructure management, product development, sustainability, and project management.
Tel. 937-255-3636 x7401, email: Al.Thal@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Value-Driven Human Systems Integration." Sponsor: 711 HPW. Funding: \$30,385 – Thal 75%, Parr 25%.

REFEREED JOURNAL PUBLICATIONS

Emery, I., E. Mbonimpa, and A.E. Thal, Jr., "Climate-based Policies May Increase Life-cycle Social Costs of Vehicle Fleet Operation," Energy Policy, 101, 1-9, [dx.doi.org/10.1016/j.enpol.2016.11.018](https://doi.org/10.1016/j.enpol.2016.11.018), February 2017.

VALENCIA, VHANCE V., Lt Col,

Assistant Professor of Engineering Management, Department of Systems Engineering and Management, AFIT
Appointment Date: 2013 (AFIT/ENV); BS, Mechanical Engineering, San Diego State University, 2001; MS, Engineering Management, Air Force Institute of Technology, 2007; PhD, Systems Engineering, Air Force Institute of Technology, 2013. Lt Col Valencia's primary interest is in infrastructure asset management and systems engineering as applied to infrastructure. Research topics include civil engineering applications for additive manufacturing technologies, autonomous systems for assessing infrastructure, and infrastructure applications for geographic information systems.

WAGNER, TORREY J., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT
Appointment Date: 2017 (AFIT/ENV); BS, Electrical Engineering, University of Minnesota, 2000; MS, Aerospace Systems Engineering, Loughborough University, 2004; PhD, Electro-optics, Air Force Institute of Technology, 2010. Lt Col Wagner's primary interest is in renewable energy and water systems engineering, with research topics including solar energy, UV water treatment and small-grid energy systems. Tel. 937-255-3636 x4611, email: Torrey.Wagner@afit.edu

6. RESEARCH CENTER PUBLICATIONS AND FUNDING INFORMATION

The contents of this section are duplicated data, grouped by center. The information is previously listed within each project's specific academic department.

6.1. AUTONOMY AND NAVIGATION TECHNOLOGY CENTER

Autonomy and Navigation Technology (ANT) Center

Director 255-3636 x4580
Executive Administrator 255-3636 x4583
Laboratory Manager 255-3636 x4911
Homepage: <http://www.afit.edu/ANT>

6.1.1. DOCTORAL DISSERTATIONS

COMPTON, ANDREW JM., *A Location-Aware Middleware Framework for Collaborative Visual Information Discovery and Retrieval*. AFIT/ENG/DS/17S-010. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: N/A.

LOPEZ, JR., JUAN, *Enhanced Industrial Control System (ICS) and Supervisory Control and Data Acquisition (SCADA) Security for ISA99 Level-0 using Field Device Wired Signal Distinct Native Attributes (WS-DNA) Fingerprints*. AFIT/ENG/DS/16D-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: DHS.

6.1.2. MASTER'S THESES

BECHERER, NICHOLAS C., *Transfer Learning in Convolutional Neural Networks for Fine-Grained Image Classification*. AFIT/ENG/MS/17M-005. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RQ.

CARSON, DANIEL J., *Aerial Visual-Inertial Odometry Performance Evaluation*. AFIT/ENG/MS/17M-010. Faculty Advisor: Dr. John F. Raquet. Sponsor: Lockheed Martin.

COATES, SEAN, *An Investigation of the Homicidal Chauffeur Differential Game*. AFIT/ENG/MS/17M-015. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/RW.

COLLIS, SCHUYLER, *GPS Spoofer Detection via Receiver Statistical Signal Processing*. AFIT/ENG/MS/17M-016. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

COOPER, MATTHEW A., *Converting a 2D Scanning LiDAR to a 3D System for use on Quad-Rotor UAVs in Autonomous Navigation*. AFIT/ENG/MS/17M-019. Faculty Advisor: Dr. John. F. Raquet. Sponsor: AFRL/RW.

FAIN, BENJAMIN M., *Small Fixed-wing Aerial Positioning using Inter-vehicle Ranging Combined with Visual Odometry*. AFIT/ENG/MS/17M-027. Faculty Advisor: Dr. John. F. Raquet. Sponsor: AFRL/RW.

GARNICK, CHRISTOPHER J., *A Study of Human Reliance on Imperfect Automation*. AFIT/ENG/MS/17M-030. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: AFOSR.

GUERRERO, JUSTIN, *GNSS Receiver Front-End Component Characterization for High Fidelity Signal Deformation Monitoring Applications*. AFIT/ENG/MS/17M-033. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: N/A.

GUTIÉRREZ DEL ARROYO, JOSÉ A., *Enhancing Critical Infrastructure Security using Bluetooth Low Energy Traffic Sniffers*. AFIT/ENG/MS/17M-034. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: DHS.

HILLESHEIM, ANTHONY J., *Analysis of Human and Agent Characteristics on Human-Agent Team Performance and Trust*. AFIT/ENV/MS/17M-194. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: AFOSR.

JACKSON, BRYAN V., *Alternate Stimuli for the Elicitation of Event-Related Potentials*. AFIT/ENV/MS/17M-195. Faculty Advisor: Dr. Michael E. Miller. Sponsor: NASA.

JACKSON, PHILIP C., *Performance Evaluation of Astro-Optical-Inertial Navigation System*. AFIT/ENG/MS/17M-035. Faculty Advisor: Dr. John F. Raquet. Sponsor: CSDL.

JOHNSON, CLIFFORD D., *A Framework for Analyzing and Discussing Level of Human Control Abstraction*. AFIT/ENV/MS/17M-197. Faculty Advisor: Dr. Michael E. Miller. Sponsor: AFOSR.

JOHNSON, DANIEL T., *Combined Stereo Vision and Inertial Navigation for Automated Aerial Refueling*. AFIT/ENG/MS/17M-036. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ.

KIM, MARK S., *Celestial Aided Inertial Navigation by Tracking High Altitude Vehicles*. AFIT/ENG/MS/17M-040. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: AFRL/RW.

LEDFORD, MICHAEL J., *Development of a Software-Defined GNSS Simulation Prototype for Advanced Signals Research*. AFIT/ENG/MS/17M-043. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV.

LEFGREN, SCOTT, *Classification of Matched Filtered Replicated Signals in Interference using Radio Frequency Distinct Native Attributes*. AFIT/ENG/MS/17M-044. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

LUCAS, LAURA L., *Enhanced Cost Minimization Algorithm for Control Architectures*. AFIT/ENV/MS/17M-200. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ.

MASH, ROBERT L., *Toward Automated Aerial Refueling: Automated Visual Aircraft Identification with Convolutional Neural Networks*. AFIT/ENG/MS/17M-048. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: AFRL/RQ.

MCCLANAHAN, ROBERT L., *Improving Unmanned Aerial Vehicle Formation Flight and Swarm Cohesion by using Commercial off the Shelf Sonar Sensors*. AFIT/ENV/MS/17M-202. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ.

MCCOLLUM, BLAKE T., *Analyzing GPS Accuracy Through the Implementation of Low-cost COTS Real-time Kinematic GPS Receivers in Unmanned Aerial Systems*. AFIT/ENV/MS/17M-203. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ.

PARSONS, CHRISTOPHER A., *Improving Automated Aerial Refueling Stereo Vision Pose Estimation using a Shelled Reference Model*. AFIT/ENG/MS/17M-057. Faculty Advisor: Dr. Scott L. Nykl. Sponsor: AFRL/RQ.

SPULLER, JAKE M., *Analysis of How Communication Affects Human Teams in a Dynamic Game*. AFIT/ENG/MS/17M-071. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: AFOSR.

TOSCANO, LIDIA, *Effectiveness of Inter-Vehicle Communications and On-Board Processing for Close Unmanned Autonomous Vehicle (UAV) Flight Formations*. AFIT/ENV/MS/17M-230. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ.

WEATHERS, DAVID L., *Sound Based Positioning*. AFIT/ENG/MS/17M-081. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/RV.

WIREMAN, MARK J., *Signal Deformation Analysis of the GLONASS Constellation using Chip Shape Processing*. AFIT/ENG/MS/17M-082. Faculty Advisor: Dr. Sanjeev Gunawardena. Sponsor: AFRL/RV.

6.1.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BETANCES, JOAN A., Maj, Department of Electrical and Computer Engineering

BINDEWALD, JASON M., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Measuring Human-Machine Trust Relationships.” Sponsor: AFOSR. Funding: \$29,415 – Bindewald 55%, Rusnock 45%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, Jason M., Gilbert L. Peterson, Michael E. Miller. “Clustering-Based Online Player Modeling.” International Joint Conference on Artificial Intelligence (IJCAI) – Computer Games Workshop. New York, NY, 2016.

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Hefron, Ryan G., Borghetti, Brett, J., Christensen, James C. Schubert Kabban, Christine M. “Deep long short-term memory structure model temporal dependencies improving cognitive workload estimation,” *Pattern Recognition Letters* (IEEE), Vol. 94, 15 July 2017, pp. 96-104.

Borghetti, B.J., Giametta, J.J., & Rusnock, C.F., “Assessing Continuous Operator Workload with a Hybrid Scaffolded Neuroergonomic Modeling Approach,” *Human Factors*, Vol. 59, No. 1, Feb 2017, pp. 134-146. doi: 10.1177/0018720816672308.

Rusnock, C.F., and Borghetti, B.J., “Workload Profiles: A continuous Measure of Mental workload,” *International Journal of Industrial Ergonomics*, (In Press / available online, 2016).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hefron, R.G., Borghetti, B.J. “A New Feature for Cross-day Psychophysiological Workload Estimation,” 15th IEEE International Conference on Machine Learning and Applications (ICMLA’16), December 18-20, 2016, Anaheim, California, USA.

Mash, R.L., Borghetti, B.J., Pecarina, J.M., “Improved Aircraft Recognition for Aerial Refueling through Data Augmentation in convolutional Neural Networks,” *Proceedings of the 12th International Symposium on visual Computing* (ISVC’16), December 12-14, 2016, Las Vegas, Nevada, USA.

CANCIANI, AARON J., Capt, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Magnetic Anomaly Navigation for Naval Platforms.” Sponsor: ONR. Funding: \$250,000.

“Cooperative Navigation and Magnetic/Vision Navigation Approaches.” Sponsor: AFRL/RW. Funding: \$100,000 – Canciani 80%, Raquet 20%.

REFEREED JOURNAL PUBLICATIONS

Canciani, A.J., J. Raquet, “Airborne Magnetic Anomaly Navigation,” *IEEE Transactions on Aerospace and Electronics Systems*, Vol. 53, No. 1, February 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Canciani, A.J., K. Brink, “Improved Magnetic Anomaly Navigation through Cooperative Navigation,” *ION Pacific Navigation and Timekeeping Conference*. Honolulu, Hawaii, May 2017.

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

CLINTON, JUSTIN A., Department of Engineering Physics

COBB, RICHARD G., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Optimization for Tactical Off-Board Sensing and Persistent Intelligence, Surveillance, and Reconnaissance.”
Sponsor: AFRL/RQ. Funding: \$35,000 – Cobb 50%, Kunz 50%.

REFEREED JOURNAL PUBLICATIONS

Livermore, R., Lindholm, G., Neal, C., Cobb, R. and Colombi, J., “Heuristic Near-Optimal UAS Path Planning for Convoy Overwatch,” *Journal of Unmanned Aerial Systems*, Vol. 2, No. 1, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Carr, and Cobb, R. “An Energy Based Objective for Solving an Optimal Missile Evasion Problem,” AIAA Guidance, Navigation, and Control Conference, AIAA SciTech Forum, 8-12 Jan 2017 Grapevine, TX.

Humphreys, J., Cobb R., Jacques D, and Reeger, J., “Dynamic Re-Plan of the Loyal Wingman Optimal Control Problem,” AIAA Guidance, Navigation, and Control Conference, AIAA SciTech Forum, 8-12 Jan 2017 Grapevine, TX.

Shultz, D., Colombi, J., Jacques, D., and Cobb, R., “Model-based Engineering: Analysis of Alternatives for Optical Satellite Observation,” CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach, CA, Mar 23-25, 2017.

COLLINS, PETER J., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Knisely, Andrew, Collins, Peter J., and A. J. Terzuoli, “High Frequency RCS Characterization of a Unique Two Way Field Probe,” *Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017)*, Firenze, IT, 26-30 March 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Knisely, Andrew and Collins, Peter J., “Utilizing A Shielded Drone As A Two-Way Field Probe At A Radar Cross Section Range,” The 38th Antenna Measurement Techniques Association Symposium, Austin, Texas, 30 October – 4 November 2016.

Knisely, Alexander, Hyde, M., Havrilla, M., and Collins, Peter J., “Uniaxial Anisotropic Material Measurement using a Single Port Waveguide Probe,” The 38th Antenna Measurement Techniques Association Symposium, Austin, Texas, 30 October – 4 November 2016.

COLOMBI, JOHN M., Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

“Automation and Autonomy Requirements for Employment of Building Interior Surveillance System (BISS) via Unmanned Aerial Vehicles.” Sponsor: DTRA. Funding: \$150,000 – Colombi 40%, Jacques 40%, Cox 15%, Clinton 5%.

REFEREED JOURNAL PUBLICATIONS

Colombi, J., Buckle, L., Black, J., and S. Nurre (2017). Optimal Launch Manifesting for Heterogeneous Disaggregated Satellite Constellations, *Journal of Spacecraft and Rockets*, Vol. 54, No. 3 (2017), pp. 582-591.

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Human-centered design using system modeling language, *Journal of Cognitive Engineering and Decision Making*, 11(3), 252-269.

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Informing System Design Using Human Performance Modeling, *Systems Engineering*, 20(2), 173-187.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Colombi, J., D. Jacques and J. Lambach, “Integrating UAS Swarming with Formation Drag Reduction,” 11th Annual IEEE International Systems Conference, Montreal, Quebec, Canada April 24-27, 2017.

Bentz, B. R., Colombi, J. M. and Freels, J. K. (2017), *Attributable Design Trades: Reliability and Cost Implications for Unmanned Aircraft*, Annual IEEE International Systems Conference – Montreal. Canada April 24-27, 2017.

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering,

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Timing Testbed.” Sponsor: Undisclosed. Funding: \$200,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Scott Lefgren, Phillip Corbell, “Classification of Matched Filtered Real and Replicated Signals Using RF-DNA,” 2017 Tri-Service Radar Conference, Springfield, VA, July 18-21 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Schuyler Collis, Phillip Corbell, “GPS Spoofer Detection via Receiver Statistical Signal Processing” Institute of Navigation Joint Navigation Conference, Dayton, OH, June 6-8, 2017.

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“GPS Waveform Prototyping Platform (GWPP).” Sponsor: AFRL/RV. Funding: \$300,000 – Gunawardena 90%, Raquet 10%.

“GNSS Testbed Development.” Sponsor: AFRL/RV. Funding: \$454,000.

REFEREED JOURNAL PUBLICATIONS

S. Gunawardena, J. Raquet, M. Carroll, “Innovation: Correlator Beamforming for Low-Cost Multipath Mitigation,” *GPS World*, January 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- J. M. Guerrero, S. Gunawardena, "Characterization of Timing and Pseudorange Biases Due to GNSS Front-End Filters by Type, Temperature, and Doppler Frequency," Proceedings of the 2017 International Technical Meeting of The Institute of Navigation, Monterey, California, January 2017, pp. 418-444.
- M. Wireman, S. Gunawardena, M. Carroll, "High-Fidelity Signal Deformation Analysis of the Live Sky GLONASS Constellation using Chip Shape Processing," Proceedings of the 2017 International Technical Meeting of The Institute of Navigation, Monterey, California, January 2017, pp. 521-535.
- S. Gunawardena, J. Raquet, M. Carroll, "Correlator Beamforming for Multipath Mitigation at Relatively Low Cost: Initial Performance Results," Proceedings of the 29th International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS+ 2016), Portland, Oregon, 2016, pp. 353-363.
- A. Lemmenes, P. Corbell, S. Gunawardena, "Detailed Analysis of the TEXBAT Datasets Using a High Fidelity Software GPS Receiver," Proceedings of the 29th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2016), Portland, Oregon, 2016, pp. 3027-3032.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- S. Gunawardena, J. Raquet, M. Carroll, "Correlator Beamforming for Multipath Mitigation in High-Fidelity GNSS Monitoring Applications," Proceedings of the 2017 International Technical Meeting of the Institute of Navigation, Monterey, California, January 2017, pp. 1173-1188.
- S. Gunawardena, M. Carroll, "GNSS Authentication using Natural Signal Deformation: Performance Evaluation during Live-Sky Exercises," Classified Proceedings of the 2017 Joint Navigation Conference of The Institute of Navigation, Dayton, Ohio, June 2017.
- S. Pentecost, S. Gunawardena, "Implementation of L1C on a GNSS Waveform Prototyping Platform for Evaluating Next-Generation GPS Advanced Signal Concepts," Proceedings of the 2017 Joint Navigation Conference of The Institute of Navigation, Dayton, Ohio, June 2017.
- E. Vinande, M. Carroll, S. Gunawardena, "High Gain Chip Shape Generation and Dissemination," Proceedings of the 2017 Joint Navigation Conference of the Institute of Navigation, Dayton, Ohio, June 2017.
- P. Patel, M. Ledford, S. Gunawardena, "Development of a GNSS Waveform Prototyping Platform for Advanced Signals Research," Proceedings of the 2017 Joint Navigation Conference of the Institute of Navigation, Dayton, Ohio, June 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- S. Gunawardena, "Introduction to GNSS Software Defined Receivers," Invited talk/tutorial, 2017 Joint Navigation Conference of the Institute of Navigation, Dayton, Ohio, June 2017.
- S. Gunawardena, "Correlator Beamforming for Multipath Mitigation in High-Fidelity GNSS Monitoring Applications," Invited Talk, Dayton Section of The Institute of Navigation, Dayton, Ohio, May 2017.
- S. Gunawardena, "Chip-Shape Signal Processing for High-Fidelity GPS Signal Monitoring," Invited Talk, Combined meetings of the Dayton Sections of the IEEE Signal Processing Society, IEEE Engineering in Medicine and Biology Society and IEEE Systems, Man, & Cybernetics Society, Nov 2016, Dayton Ohio.
- S. Gunawardena, "Advanced Correlator Architectures for Military GNSS," Invited Talk, The MITRE Corporation.

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering,

SPONSOR FUNDED RESEARCH PROJECTS

“AFSIM Maturation and Capability Improvements.” Sponsor: AFRL/RQ. Funding: \$34,269 – Hodson 50%, Peterson 50%.

REFEREED JOURNAL PUBLICATIONS

A.J. Kamrud, D.D. Hodson, G.L. Peterson and B.G. Woolley, “Unified Behavior Framework in Discrete Event Simulation Systems,” *Journal of Defense Modeling and Simulation (JDMS)*, Oct 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

M.J. Bentley, A.C. Lin and D.D. Hodson, “Overcoming Challenges to Air Force Satellite Ground Control Automation,” 2017 IEEE Conference on Cognitive and Computational Aspects of Situational Management (CogSIMA), Nov 2016.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

JACQUES, DAVID R., Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

“Airfield Damage Inspection and Assessment using Small UAS.” Sponsor: AFCEC. Funding: \$100,000 – Jacques 50%, Colombi 20%, Thal 15%, Stoppel 15%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Humphreys, C., R. Cobb, D. Jacques and J. Reeger, “Dynamic Re-plan of the Loyal Wingman Optimal Control Problem in a Changing Environment, *Proceedings of the AIAA Sci-Tech Conference*, Jan 2017.

Colombi, J., D. Jacques and J. Lambach, “Integrating UAS Swarming with Formation Drag Reduction,” 11th Annual IEEE International Systems Conference, Montreal, Quebec, Canada April 24-27, 2017.

LEISHMAN, ROBERT C., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Robust Back-end Navigation Techniques.” Sponsor: AFRL/RQ. Funding: \$25,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Leishman, R. C. and Raquet, J. “Utilization of UAV Autopilots in Vision-based Alternative Navigation,” ION GNSS+ 2017, Portland OR, September 25-29 2017.

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Richard K. Martin, Christian Keyser, Timothy Smith, P. Khanh Nguyen, Arielle Adams, and Michael Pokornik, “Spectro-Polarimetric Feature Selection for Target-Surface Material Classification in a Single Laser Pulse LADAR System,” in *Proc. 2017 Meeting of the Military Sensing Symposia (MSS) Specialty Group on Active E-O Systems*, Gaithersburg, MD, September 2017.

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPER ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Chris Johnson, Monica McGill, Durell Bouchard, Michael K. Bradshaw, Víctor A. Bucheli, Laurence D. Merkle, Michael James Scott, Z. Sweedyk, J. Ángel, Zhiping Xiao, and Ming Zhang. 2016. Game Development for Computer Science Education. In *Proceedings of the 2016 ITiCSE Working Group Reports (ITiCSE '16)*. ACM, New York, NY, USA, 23-44. doi: 10.1145/3024906.3024908.

MILLER, MICHAEL E., Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

“Computational Agent Capable of Adapting Roles within a Human-Machine Team.” Sponsor: AFOSR. Funding: \$173,715 – Miller 30%, Bindewald 30%, Peterson 30%, Langhals 10%.

“Test and Evaluation of Autonomous Systems.” Sponsor: OFRN (WSU). Funding: \$30,000.

“Enhanced HMD-Capable Gaze Tracker using Steady-State Visually-Evoked Potentials.” Sponsor: 711 HPW. Funding: \$20,793 – Miller 50%, Borghetti 50%.

REFEREED JOURNAL PUBLICATIONS

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Human-centered design using system modeling language, *Journal of Cognitive Engineering and Decision Making*, 11(3), 252-269.

Watson, M., Rusnock, C.F., Colombi, J.M. and Miller, M.E. (2017). Informing System Design Using Human Performance Modeling, *Systems Engineering*, 20(2), 173-187.

Goodman, T.J., Miller, M.E., Rusnock, C.F. and Bindewald, J.M. (2017). Effects of Agent Timing on the Human-Agent Team, *Cognitive Systems Research*, 46, pp. 40-51.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J.M., Peterson, G.L., Miller, M.E. (2016). Clustering-Based Online Player Modeling. International Joint Conference on Artificial Intelligence (IJCAI)-Computer Games Workshop, New York, NY, July 10, 2016.

Rusnock, C.F., Miller, M.E. & Bindewald, J.M. (2017). Observations on Trust, Reliance, and Performance Measurement in Human-Automation Team Assessment, Proceedings of the 2017 Industrial and Systems Engineering Conference, Pittsburgh, PA, May 22, 2017.

Turner, K. & Miller, M.E. (2017). The Effect of Automation and Workspace Design on Humans’ Ability to Recognize Patterns in Data While Fusing Information, Proceedings of the 2017 IEEE Conference on Cognitive and Computational Aspects of Situation Management, Savannah, GA March 28, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Shields B.L., Valencia, V.V., Thal Jr, A.E., Miller, M.E., and Parr, J.C. (2016). in R. Goonetilleke and W. Karwowski (eds.), *Advances in Physical Ergonomics and Human Factors, Advances in Intelligent Systems and Computing* 489, doi 10.1007/978-3-319-41694-6-86.

PATENTS AWARDED

Russi, J.G., Langhals, B.T., Miller, M.E., and Heft, E.L., May 2017. “Stereoscopic 3-D Presentation for Air Traffic Control Digital Radar Displays,” US Patent No. 9,667,947.

NYKL, SCOTT L., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase II.” Sponsor: AFRL/RQ. Funding: \$120,000 – Nykl 50%, Pecarina 50%.

“Reconnaissance Improvement through Secure, Reduced Bandwidth Communication and Cooperative Navigation Using Jetson TX1s (New).” Sponsor: Undisclosed. Funding: \$130,789 – Nykl 30%, Graham 30%, Pierce 30%, Carbino 10%.

REFEREED JOURNAL PUBLICATIONS

D. T. Johnson, S. Nykl, and J. Raquet, “Combining Stereo Vision and Inertial Navigation for Automated Aerial Refueling,” *Journal of Guidance, Control, and Dynamics*, Vol. 6, May 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

C. Parsons and S. Nykl, “Real-Time Automated Aerial Refueling Using Stereo Vision,” in *Advances in Visual Computing: 12th International Symposium, ISVC 2016, Las Vegas, NV, USA, December 12-14, 2016, Proceedings, Part II*, ser. *Lecture Notes in Computer Science*. Springer International Publishing, 2016, Vol. 10073, pp. 605–615.

J. Robinson, M. Piekenbrock, L. Burchett, S. Nykl, B. Woolley, and A. Terzuoli, “Real-Time Automated Aerial Refueling Using Stereo Vision,” in *Advances in Visual Computing: 12th International Symposium, ISVC 2016, Las Vegas, NV, USA, December 12-14, 2016, Proceedings, Part II*, ser. *Lecture Notes in Computer Science*. Springer International Publishing, 2016, Vol. 10073, pp. 593–602.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J. Roeber and S. Nykl, “Reducing C2 Bandwidth via Swarm-Based Real-time Three-Dimensional Model Synthesis,” in *Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC)*, ser. *ION JNC '17*. Dayton, OH, USA: Institute of Navigation, 2017.

Z. Paulson and S. Nykl, “Quantifying the Effect of Boom Occlusion on Relative Positioning for AAR,” in *Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC)*, ser. *ION JNC '17*. Dayton, OH, USA: Institute of Navigation, 2017.

N. Seydel and S. Nykl, “Autonomous Aerial Refueling Flight Testing and Data Collection Engineering,” in *Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC)*, ser. *ION JNC '17*. Dayton, OH, USA: Institute of Navigation, 2017.

OXLEY, MARK E., Department of Mathematics and Statistics

PATENT APPLICATIONS

Vaughan, S. L., Mills, R. F., Rogers, S. K., Peterson, G. L., Oxley, M. E., and Patterson, R. E., “Machine learning by construction of a Qualia Modeling Agent - method and apparatus, May 2017, Air Force invention number AFD-1680, Patent Pending U.S. Serial Nos. 62/506,034 and 62/506,040.

PACHTER, MEIR, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Cooperative Control.” Sponsor: AFRL/RQ. Funding: \$40,000.

REFEREED JOURNAL PUBLICATIONS

- M. Pachter: “LQG Dynamic Games with a Control-Sharing Information_Pattern,” Dynamic Games and Applications, Vol. 7, No. 2, pp. 289-322, doi 10.1007/s13235-016-0182-6.
- K. Kalyanam and M. Pachter: “The Role of Prior in Optimal Tea Decisions for Pattern Recognition,” Communications in Information and Systems, Vol. 16, No. 1, 2016, pp. 1-16.
- K. Kalyanam, D. Casbeer and M. Pachter: “Pursuit of a Moving Target with Bounded Constant Speed on a Directed Acyclic Graph under Partial Information,” IMA Journal of Mathematical Control and Information (2016), Vol. 32, pp. 1-16.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Weintraub, E. Garcia, D. Casbeer and M. Pachter: “An Optimal Aircraft Defense Strategy for the Active Target Defense Scenario,” AIAA SciTech GNC Conference, 9-13 January 2017, Grapevine, TX, AIAA 2017-1917.
- S. Coates and M. Pachter: “Optimal Control of a Dubins Car and the Homicidal Chauffeur Differential Game,” Proceedings of the 57th Israel Annual Conference on Aerospace Sciences, Tel Aviv & Haifa, Israel, March 15-16, 2017.

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Webber, F.C., and Peterson, G.L., Enhancing Multi-Objective Reinforcement Learning with Concept Drift, The Thirtieth International FLAIRS Conference, pp. 460–465, 2017.
- Ziegler, J., Bindewald, J.M., and Peterson, G.L., AutoTank, Education Advancement in Artificial Intelligence 2017, Model AI Assignment Workshop, 2017.
- Wardell, D.C., Mills, R.F., Peterson, G.L., and Oxley, M.E., “A Method for Revealing and Addressing Security Vulnerabilities in Cyber-Physical Systems by Modeling Malicious Agent Interactions with Formal Verification,” Complex Adaptive Systems, Publication 6, pp. 24-31, Nov 2016.

BOOKS AND CHAPTERS IN BOOKS

- Bindewald, J.M., Peterson, G.L., Miller, M.E., Clustering-Based Online Player Modeling, In: Cazenave T., Winands M., Edelkamp S., Schiffel S., Thielscher M., Togelius J. (eds) Computer Games. Communications in Computer and Information Science, Vol. 705. Springer, 2017.

PIERCE, SCOTT J., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

- “New Star Tracker Design for Beaconless Sub-Microradian Spacecraft Pointing Estimation.” Sponsor: Undisclosed. Funding: \$21,090 – Pierce 34%, Cain 33%, Oxley 33%.
- “Trade Study for Army Training Position/Attitude System.” Sponsor: USA RDEC. Funding: \$200,000 – Pierce 80%, Raquet 20%.

RAQUET, JOHN F., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

- “GPS/Inertial/Vision Integrated Navigation System (GIVINS) Development.” Sponsor: AFRL/RW. Funding: \$150,000 – Raquet 50%, Woolley 25%, Jacques 25%.
- “Star Trackers for Non-GPS Navigation.” Sponsor: Draper Laboratories. Funding: \$20,000 – Raquet 20%, Pierce 80%.
- “Support for Alternative Navigation Research.” Sponsor: DARPA. Funding: \$9,836 – Raquet 80%, Pierce 20%.
- “Multi-Sensor Navigation Demonstration.” Sponsor: USA CERDEC. Funding: \$450,000.
- “Ultra-High Accuracy Reference System (UHARS) Support.” Sponsor: 746 TS. Funding: \$100,000.
- “Trajectory Determination and Analysis Software (TDAS) Development Planning.” Sponsor: 812 TSS. Funding: \$150,000.
- “PNT Collaboration.” Sponsor: Lockheed Martin. Funding: \$100,000 – Raquet 50%, Pierce 10%, Canciani 40%.
- “ANT Center and Laboratory Support per MOA between AFIT and AFRL.” Sponsor: AFRL/RV. Funding: \$200,000 – Raquet 50%, Pierce 50%.
- “Non-GPS Smartphone Navigation.” Sponsor: AFRL/RI. Funding: \$173,000.
- “MAGPIE Project Support.” Sponsor: AFRL/RW. Funding: \$53,523.
- “Support for PNT Modeling and Simulation.” Sponsor: USA CERDEC. Funding: \$75,000 – Raquet 50%, Leishman 25%, Canciani 25%.

REFEREED JOURNAL PUBLICATIONS

- Canciani, A. and J. Raquet, “Airborne Magnetic Anomaly Navigation,” *IEEE Trans. On Aerospace and Electronic Systems*, Vol. 53, No. 1, pp. 67-80, Jan 2017.
- Gunawardena, S., J. Raquet, and M. Carroll, “Correlator Beamforming for Low-Cost Multipath Mitigation,” *GPS World* (trade magazine), Vol. 28, No. 1, pp. 54-63, Jan 2017.
- Venable, D. and J. Raquet, “Large Scale Image Aided Navigation,” *IEEE Trans. On Aerospace and Electronic Systems*, Vol. 52, No. 16, pp. 2849-2860, Dec 2016.
- Brewer, J. and J. Raquet, “Differential Vector Phase Locked Loop,” *IEEE Trans. On Aerospace and Electronic Systems*, Vol. 52, No. 3, pp. 1046-1055, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Fain, B. and J. Raquet, “Small Fixed-Wing Aerial Positioning Using Inter-Vehicle Ranging Combined with Visual Odometry,” *Proceedings of ION Pacific PNT*, Honolulu, HI, May 2017.
- Carson, D. J. Raquet, and K. Kauffman “Aerial Visual-Inertial Odometry Performance Evaluation,” *Proceedings of ION Pacific PNT*, Honolulu, HI, May 2017.
- Jurado, J., and J. Raquet, “A Common Framework for Inertial Sensor Error Modeling,” *Proceedings of ION Pacific PNT*, Honolulu, HI, May 2017.

Gunawardena, S., J. Raquet, and M. Carroll, “Correlator Beamforming for Multipath Mitigation in High-Fidelity GNSS Monitoring Applications” *Proceedings of 2017 International Technical Meeting of the ION*, Monterey, CA, Jan 2017.

J. Raquet, “UAVs vs. Natural Autonomous Vehicles (NAVs)—Are We Closing the Gap?” *Proceedings of ION GNSS+ 2016*, pp. 1558-1584, Portland, OR, 2016.

Gunawardena, S., J. Raquet, and M. Carroll, “Correlator Beamforming for Multipath Mitigation at Relatively Low Cost: Initial Performance Results,” *Proceedings of ION GNSS+ 2016*, pp. 353-363, Portland, OR, 2016.

Canciani, A. and J. Raquet, “Validation of a Magnetic Anomaly Navigation Model with Flight Test Data,” *Proceedings of ION GNSS+ 2016*, pp. 1241-1262, Portland, OR, 2016.

Smagowski, P., J. Raquet, and K. Kauffman, “Smartphone Navigation Using Barometric Altitude and Topographic Maps,” *Proceedings of ION GNSS+ 2016*, pp. 1270-1278, Portland, OR, 2016.

Machin, T., J. Raquet, D. Jacques, and D. Venable, “Real-Time Implementation of Vision-Aided Navigation for Small Fixed-Wing Unmanned Aerial Systems,” *Proceedings of ION GNSS+ 2016*, pp. 1305-1311, Portland, OR, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Carson, D. and J. Raquet, “Aerial Visual-Inertial Odometry Performance Evaluation,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2017.

Kauffman, K., D. Marietta, J. Kresge, M. Veth, R. Patton, J. Gray, J. Raquet, A. Schofield, “Field Demonstration of Plug and Play Navigation System Using Scorpion and Smart Sensors/Cables,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2017.

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

6.2. CENTER FOR CYBERSPACE RESEARCH

Center for Cyberspace Research (CCR)

Director 255-6565 x4690

Executive Program Coordinator 255-3636 x4602

Homepage: <http://www.afit.edu/CCR>

6.2.1. DOCTORAL DISSERTATIONS

BADENHOP, CHRISTOPHER W., *A Multifaceted Security Evaluation of Z-Wave, a Proprietary Implementation of the Internet of Things*. AFIT/ENG/DS/17J-074. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/R.Y.

BENTLEY, MICHAEL J., *Enabling Air Force Satellite Ground System Automation through Software Engineering*. AFIT/ENG/MS/17M-006. Faculty Advisor: Maj Alan C. Lin. Sponsor: SMC.

CADY, CAMDON J., *A Tree Locality-Sensitive Hash for Secure Software Testing*. AFIT/ENG/DS/17S-005. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

COMPTON, ANDREW JM., *A Location-Aware Middleware Framework for Collaborative Visual Information Discovery and Retrieval*. AFIT/ENG/DS/17S-010. Faculty Advisor: Lt Col John M. Pecarina. Sponsor: N/A.

LEWIS, TYRONE A.L., *Biologically Inspired Network (BiONet) Authentication using Logical and Pathological RF-DNA Credential Pairs*. AFIT/ENG/DS/17S-012. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI.

LIEFER, NATHANIEL C., *Application of Radio Frequency Distinct Native Attribute Fingerprinting to Commercial Push-to-Talk (PTT) Radios*. AFIT/ENG/DS/17S-013. Faculty Advisor: Dr. Michael A. Temple. Sponsor: N/A.

LOPEZ, JR., JUAN, *Enhanced Industrial Control System (ICS) and Supervisory Control and Data Acquisition (SCADA) Security for ISA99 Level-0 using Field Device Wired Signal Distinct Native Attributes (WS-DNA) Fingerprints*. AFIT/ENG/DS/16D-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: DHS.

MILLAR, JEREMY R., *A Stochastic Model of Plausibility in Live-Virtual-Constructive Environments*. AFIT/ENG/DS/17S-015. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A.

RICE, JOHN C., *RF-DNA Aided Ambiguity Resolution in a Dual Process Electronic Warfare Receiver*. AFIT/ENG/DS/16D-001. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/R.Y.

6.2.2. MASTER'S THESES

AUST, MATTHEW E., *Proactive Host Mutation in Software-Defined Networking*. AFIT/ENG/MS/17M-003. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

BUSHO, COLIN R., *Tactical Targeting Network Technology (TTNT) Device Discrimination using Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting*. AFIT/ENG/MS/17M-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y.

CABERTO, EDDIE K., *Securing Controller Area Networks in Vehicles via Packet Switched Network Segregation*. AFIT/ENG/MS/17M-009. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A.

CHAPPELL, RICHARD E., *A Game Theory Model for Allocating Scarce Resources in Critical Infrastructure Protection*. AFIT/ENG/MS/17M-012. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI.

CHAVES, ANDREW J., *Increasing Cyber Resiliency of Industrial Control Systems*. AFIT/ENG/MS/17M-013. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

COON, CAMERON W., *Comparative Analysis of RF Emission Based Fingerprinting Techniques for ZigBee Device Classification*. AFIT/ENG/MS/17M-017. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI.

COOPER, KEVIN S., *Process Categorization using Tree Edit Distance*. AFIT/ENG/MS/17M-018. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

DAOUD, JOSEPH K., *Multi-PLC Exercise Environments for Training ICS First Responders*. AFIT/ENG/MS/17M-020. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

DAZZIO, ELAINE L., *Statistically Modeling Fuel Consumption with Heteroscedastic Data*. AFIT/ENG/MS/17J-075. Faculty Advisor: Dr. Scott R. Graham. Sponsor: N/A.

GALLENSTEIN, JUSTIN K., *Integration of the Network and Application Layers of Automatically Configured Programmable Logic Controller Honeypots*. AFIT/ENG/MS/17M-029. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

GOOD, RYAN A., *AutoProv: An Automated File Provenance Collection Tool*. AFIT/ENG/MS/17M-031. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DC3.

GOODGION, JONATHON S., *Active Response using Host-Based Intrusion Detection System and Software-Defined Networking*. AFIT/ENG/MS/17M-032. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

GUTIÉRREZ DEL ARROYO, JOSÉ A., *Enhancing Critical Infrastructure Security using Bluetooth Low Energy Traffic Sniffers*. AFIT/ENG/MS/17M-034. Faculty Advisor: Maj Jason M. Bindewald. Sponsor: DHS.

KHOU, STEPHEN, *A Framework for Understanding, Prioritizing, and Applying Systems Security Engineering Processes, Activities, and Tasks*. AFIT/ENG/MS/17M-039. Faculty Advisor: Maj Logan O. Mailloux. Sponsor: AFRL/RI.

LIN, HTEIN A., *Framework for Industrial Control System Honeypot Network Traffic Generation*. AFIT/ENG/MS/17M-046. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

LUGO, DANIEL, *A Sandbox in Which to Learn and Develop Soar Agents*. AFIT/ENG/MS/17M-047. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A.

MAYS, CALEB E., *Constructing Honeypots to Defend Building Automation Systems*. AFIT/ENG/MS/17M-049. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

MCCARGAR, ELWYN J., *Synchronization Algorithms for Programmable Logic Controller Emulation*. AFIT/ENG/MS/17M-050. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

MCKINION, ERIC M., *Evaluation of Security Flaws in the Current Probe Request Design and Proposed Solutions*. AFIT/ENG/MS/17M-051. Faculty Advisor: Maj Alan C. Lin. Sponsor: 711 HPW/RH.

O'NEILL, SEAN P., *Radio Frequency-Based Device Discrimination of Mixed-Signal Integrated Circuits and Counterfeit Detection*. AFIT/ENG/MS/17M-055. Faculty Advisor: Maj Joan A. Betances. Sponsor: AFRL/Ry.

PLUMLEY, EVAN G., *A Framework for Categorization of Industrial Control System Cyber Training Environments*. AFIT/ENG/MS/17M-059. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

PORTANTE, ANTHONY A., *Analysis of Denial-of-Service Attack Vectors in Software-Defined Networks*. AFIT/ENG/MS/17M-060. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

- POTTHOFF, TRAVIS S., *A Proof-Of-Concept for Software-Only Attestation on Real-Time Systems using Von Neumann Architecture and Dynamic Memory Allocation*. AFIT/ENG/MS/17M-062. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/R.Y.
- REBER, PATRICK A., *A Comprehensive Security Analysis of and an Implementation Framework for Embedded Software Attestation Methods Leveraging FPGA-Based System-On-A-Chip Architectures*. AFIT/ENG/MS/17M-063. Faculty Advisor: Dr. Scott R. Graham. Sponsor: AFRL/R.Y.
- ROSE, ANTHONY J., *Security Evaluation and Exploitation of Bluetooth Low Energy Devices*. AFIT/ENG/MS/17M-066. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.
- ROSS, BRADY P., *Physical-Layer Identification of Power Line Communications using WS-DNA Fingerprinting*. AFIT/ENG/MS/17M-067. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/R.Y.
- SIBIGA, MATTHEW P., *Applying Cyber Threat Intelligence to Industrial Control Systems*. AFIT/ENG/MS/17M-069. Faculty Advisor: Dr. Robert F. Mills. Sponsor: DHS.
- STINE, IAN W., *A Cyber Risk Scoring System for Medical Devices*. AFIT/ENG/MS/17M-072. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS.
- TALBOT, CHRISTOPHER M., *Securing Insteon Home Automation Networks using Slope-Based FSK (SB-FSK) Fingerprinting*. AFIT/ENG/MS/17M-074. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y.
- VAN PATTEN, DONALD A., *Prototyping Modern Web Technologies and Lambda Architecture Concepts to Facilitate Collection, Analysis, and Presentation of UAS Log Data*. AFIT/ENG/MS/17M-076. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/R.Y.
- VAUGHN, ALTON M., *MIL-STD-1553 Fingerprinting using Wired Signal Distinct Native Attributes*. AFIT/ENG/MS/17M-077. Faculty Advisor: Maj Timothy J. Carbino. Sponsor: AFRL/R.Y.
- YERKES, BLAKE E., *Cyber Security Analysis and Strategy Development for Software-Defined Radars*. AFIT/ENG/MS/17M-083. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

6.2.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BINDEWALD, JASON M., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Cyber Operations and Behavior Modeling in AFSIM.” Sponsor: AF/A9. Funding: \$59,000 – Bindewald 34%, Hodson 33%, Peterson 33%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Gutierrez del Arroyo, Jose A., Jason M. Bindewald, Benjamin W. Ramsey. “Securing Bluetooth Low Energy Enabled Industrial Monitors,” 12th International Conference on Cyber Warfare and Security (ICWS 2017), Dayton, OH, March 2017.

Rose, Anthony J., Jose A. Gutierrez del Arroyo, Jason M. Bindewald, and Benjamin W. Ramsey. “BlueFinder: A Range-finding Tool for Bluetooth Classic and Low Energy,” 12th International Conference on Cyber Warfare and Security (ICWS 2017), Dayton, OH, March 2017.

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Modeling Decision Confidence to Improve Cyber Mission Effectiveness.” Sponsor: 711 HPW. Funding: \$27,089.

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ross, Brady P., Carbino, Timothy J., and Temple, Michael A., “Simulcasted Power Line Communication Network (SPN) Configuration Validation for Home Automation Applications Using Wired Signal Distinct Native Attributes (WS-DNA) Fingerprinting,” *Journal of Information Warfare* 16.3 (2017): 95-118. Print.

Ross, Brady P., Carbino, Timothy J., Stone, Samuel J., “Physical-Layer Discrimination of Power Line Communications,” 12th Int’l Conference on Computers, Networking and Communications (ICNC17), Jan 17, Silicon Valley CA.

Ross, Brady P., Carbino, Timothy J., Temple, Michael A., “Physical-Layer Identification of Power Line Communications (PLC) Using Wired Signal Distinct Native Attribute (WS-DNA),” Int’l Conference on Cyber Warfare & Security (ICCWS14), Mar 17, Dayton OH.

Talbot, Christopher M., Temple, Michael A., Carbino, Timothy J., “Securing Insteon Home Automation Systems Using Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprints,” Int’l Conference on Cyber Warfare & Security (ICCWS14), Mar 17, Dayton OH.

CASEY, DANIEL J., Maj, Department of Electrical and Computer Engineering

COLLINS, PETER J., Department of Electrical and Computer Engineering

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

DEVER, MATTHEW C., Department of Electrical and Computer Engineering

GRAHAM, SCOTT R., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Gutierrez, J., Bindewald, J., Graham, S.R., Rice, M., “Enabling Bluetooth Low Energy auditing through synchronized tracking of multiple connections,” *International Journal of Critical Infrastructure Protection*, Mar 2017.

Reber, P.E., Graham, S.R., “Evaluating System on a Chip Design Security,” *Journal of Information Warfare*, Vol. 16, Issue 3, 2017.

Badenhop, C.W., Graham, S.R., Ramsey, B.W., Mullins, B.E., Mailloux, L.O., “The Z-Wave Routing Protocol and it’s Security Implications,” *Elsevier Journal of Computers & Security*, Vol. 68, Jul 2017, pp. 112-129.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Simon, P.E., Graham, S.R., “Potential Privacy Ramifications of Modern Vehicle Software and Firmware,” *12th European Conference on Cyber Warfare and Security (ECCWS 2017)*, Jun 2017.

Gutierrez, J., Bindewald, J., Graham, S.R., Rice, M., “Enabling Bluetooth Low Energy auditing through synchronized tracking of multiple connections,” *International Conference of Critical Infrastructure Protection*, Mar 2017.

Potthoff T.S., Graham, S.R., “Dynamic Attestation of Real-Time Systems,” *12th International Conference on Cyber Warfare and Security (ICCWS 2017)*, Mar 2017.

Caberto, E.K., Graham, S.R., “A Method of Securing a Vehicle’s Controller Area Network,” *12th International Conference on Cyber Warfare and Security (ICCWS 2017)*, Mar 2017.

Reber, P.E., Graham, S.R., “Security by Design in System on a Chip Applications,” *12th International Conference on Cyber Warfare and Security (ICCWS 2017)*, Mar 2017.

GRIMAILA, MICHAEL R., Department of Systems Engineering and Management

PATENT APPLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., “Machine learning by construction of a Qualia Modeling Agent - method and apparatus,” filed 16 May 2017, Air Force Invention number AFD-1680, US Serial Numbers 62/506,034 and 62/506,040.

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“AFSIM Maturation and Capability Improvements.” Sponsor: AFRL/RQ. Funding: \$34,269 – Hodson 50%, Peterson 50%.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Enhancing Cybersecurity Education with Adversarial Thinking.” Sponsor: NSA. Funding: \$100,000.

LIN, ALAN C. Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-domain Scenario-based Wargaming.” Sponsor: 711 HPW. Funding: \$29,973 – Lin 67%, Peterson 33%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

M. Bentley, A. Lin, and D. Hodson, “Overcoming Obstacles to Air Force Satellite Ground Station Automation,” *IEEE CogSIMA*. Savannah, Georgia, Mar 2017.

E. McKinion and A. Lin, “Evaluation of Security Flaws in the Current Probe Request Design and Proposed Solutions,” *ICCWS*, Dayton, OH. Mar 2017.

D. P. Richardson, A. C. Lin, J. M. Pecarina. “Hosting Distributed Databases on Internet of Things-Scale Devices.” *IEEE Conference on Dependable and Secure Computing*. Taipei, Taiwan. Aug 2017.

MAGNUS, AMY L., Department of Mathematics and Statistics

SPONSOR FUNDED RESEARCH PROJECTS

“Distributed Intelligence and the Nature of Mature Work.” Sponsor: AFOSR. Funding: \$149,865 – Magnus 90%, Oxley 10%.

MAILLOUX, LOGAN O., Maj, Department of Systems Engineering and Management

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Analytical Support for Hardware Assurance.” Sponsor: AFRL/RV. Funding: \$14,302

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Learning about Signals through Tinkering and Game-Playing.” Sponsor: ONR (WWU). Funding: \$127,600.

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

MILLAR, JEREMY R., Maj, Department of Electrical and Computer Engineering

MILLS, ROBERT F., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Rich, M.D., Mills, R.F., Dube, T.E., and Rogers, S.K., “Evaluating Machine Learning Classifiers for Defensive Cyber Operations,” *Military Cyber Affairs*, Vol. 2, Issue. 1, Article 6, pp. 1-18, doi: 10.5038/2378-0789.2.1.1005, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Wardell, D.C., Mills, R.F., Peterson, G.L., and Oxley, M.E., “A Method for Revealing and Addressing Security Vulnerabilities in Cyber-Physical Systems by Modeling Malicious Agent Interactions with Formal Verification,” *Complex Adaptive Systems*, Publication 6, pp. 24-31, Nov 2016.

BOOKS AND CHAPTERS IN BOOKS

Proceedings of the 12th International Conference on Cyber Warfare and Security, ed: Bryant, A.R., Lopez, J.R., and Mills, R.F., Academic Conferences and Publishing International, March 2017.

PATENT APPLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., “Machine learning by construction of a Qualia Modeling Agent - method and apparatus,” filed 16 May 2017, Air Force Invention number AFD-1680, US Serial Numbers 62/506,034 and 62/506,040.

MULLINS, BARRY E., Department of Electrical and Computer Engineering,

SPONSOR FUNDED RESEARCH PROJECTS

“Advanced Cyber Physical Security Research Support.” Sponsor: DHS. Funding: \$194,918.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

M. E. Aust and B. E. Mullins, “Proactive Host Mutation in Software Defined Networking,” *12th International Conference on Cyber Warfare and Security ICCWS-2017*, Dayton OH, 2-3 March 2017, pp. 453-460.

J. S. Goodgion and B. E. Mullins, “Active Network Response Using Host-Based IDS and Software Defined Networking,” *12th International Conference on Cyber Warfare and Security ICCWS-2017*, Dayton OH, 2-3 March 2017, pp. 469-478.

A. Portante and B. E. Mullins, “Analysis of the OpenFlow Protocol in Software Defined Networks,” *12th*

International Conference on Cyber Warfare and Security ICCWS-2017, Dayton OH, 2-3 March 2017, pp. 479-488.
Best Masters Presentation/Paper.

BOOKS AND CHAPTERS IN BOOKS

K. A. Girtz, B. E. Mullins, M. Rice, and J. Lopez Jr., “Practical Application Layer Emulation In Industrial Control System Honeypots,” *Critical Infrastructure Protection X*, M. Rice and S. Sheno, eds., Springer, New York, NY, November 2016, pp. 83-98.

NYKL, SCOTT L., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Reconnaissance Improvement through Secure, Reduced Bandwidth Communication and Cooperative Navigation Using Jetson TX1s (New).” Sponsor: Undisclosed. Funding: \$130,789 – Nykl 30%, Graham 30%, Pierce 30%, Carbino 10%.

PACHTER, MEIR, Department of Electrical and Computer Engineering

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., “A Dual-Process Qualia Modeling Framework,” *Biologically Inspired Cognitive Architectures*, Vol. 17, pp. 71-85, 2016.

Lapso, J. Peterson, G.L., and Okolica, J.S., Whitelisting system state in windows forensic memory visualizations, *Digital Investigation*, Vol. 20, March 2017, pp. 2-15.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Webber, F.C., and Peterson, G.L., Enhancing Multi-Objective Reinforcement Learning with Concept Drift, The Thirtieth International FLAIRS Conference, pp. 460–465, 2017.

Wardell, D.C., Mills, R.F., Peterson, G.L., and Oxley, M.E., “A Method for Revealing and Addressing Security Vulnerabilities in Cyber-Physical Systems by Modeling Malicious Agent Interactions with Formal Verification,” *Complex Adaptive Systems*, Publication 6, pp. 24-31, Nov 2016.

BOOKS AND CHAPTERS IN BOOKS

Peterson, G. and Sheno, S., *Advances in Digital Forensics XII*, Springer-Verlag, 2016.

PATENT APPLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., “Machine learning by construction of a Qualia Modeling Agent - method and apparatus,” filed 16 May 2017, Air Force Invention number AFD-1680, US Serial Numbers 62/506,034 and 62/506,040.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Software Release: AutoProv, Good, R., and Peterson, G., Automated digital file provenance generation.

REITH, MARK G., Lt Col, Department of Electrical and Computer Engineering

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“RF-EW Systems Support.” Sponsor: AFRL/RX. Funding: \$120,233.

“Application of RF-DNA to Enhance Transition of Functional Materials, Devices, and Components.” Sponsor: AFRL/RX. Funding: \$15,000.

6.3. CENTER FOR DIRECTED ENERGY

Center for Directed Energy (CDE)

Director 255-3636 x4506

Executive Administrator 255-3636 x4551

Homepage: <http://www.afit.edu/CDE>

6.3.1. DOCTORAL DISSERTATION

BAUER, WILLIAM A., *Laser Heating of Graphite and Pulsed Laser Ablation of Titanium and Aluminum*. AFIT/ENP/DS/17S-020. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO.

BURLEY, JARRED L., *A Computational Tool for Hyperspectral Propagation of NUDET Effects*. AFIT/ENP/DS/17S-021. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFTAC.

EMMONS, DANIEL J., *Analysis of Ar(1s5) Metastable Populations in High Pressure Argon-Helium Gas Discharges*. AFIT/ENP/DS/17S-025. Faculty Advisor: Dr. David E. Weeks. Sponsor: DEJTO.

ESHEL, BEN, *Linear and Nonlinear Spectroscopy of Optically-Thick Argon and Argon-Helium Plasmas in Radio-Frequency Dielectric-Barrier Discharges*. AFIT/ENP/DS/17J-011. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO.

GONZALES, ASHLEY E., *Kinetics of Graphite Oxidation in Reacting Flow from Imaging Fourier Transform Spectroscopy*. AFIT/ENP/DS/17M-093. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO.

HALUSKA, NATHAN D., *Cascade and Two-Photon Lasing from Two-Photon Excitation of Cesium 62D*. AFIT/ENP/DS/17S-026. Faculty Advisor: Dr. Glen P. Perram. Sponsor: DEJTO.

6.3.2. MASTER'S THESES

HALLADA, FRANCIS D., *The Fresnel Zone Light Field Spectral Imager*. AFIT/ENP/MS/17M-095. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: N/A.

ROSS, JOHN S., *Total Electron Count Variability and Stratospheric Ozone Effects on Solar Backscatter and LWIR Emissions*. AFIT/ENP/MS/17M-103. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: N/A.

WURST, NATHAN P., *Improved Atmospheric Characterization for Hyperspectral Exploitation*. AFIT/ENP/MS/17J-014. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/RV.

6.3.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AKERS, BENJAMIN F., Department of Mathematics and Statistics

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Akers, B., "Atmospheric Propagation Sciences for the APSHELs Program," Air Force Institute of Technology, 1 June 2017.

BOSE-PILLAI, SANTASRI R. Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Milo W. Hyde, Santasri R. Bose-Pillai, and Ryan A. Wood, "Synthesis of non-uniformly correlated partially coherent sources using a deformable mirror," *Applied Physics Letters*, Vol. 111, No. 10, 101106 (5 pp.), Sep 2017, doi: 10.1063/1.4994669.

Milo W. Hyde IV, Santasri R. Bose-Pillai, Xifeng Xiao, and David G. Voelz, "Physical realization of Schell-model sources using a fast steering mirror," *Microwave and Optical Technology Letters*, Vol. 59, No. 11, pp. 2731-2735, Nov 2017, doi: 10.1002/mop.30818.

Milo W. Hyde IV, and Santasri R. Bose-Pillai, "Fresnel spatial filtering of quasi-homogenous sources for wave optics simulations," *Optical Engineering*, Vol. 56, No. 8, 083107 (7 pp.), Aug 2017, doi: 10.1117/1.OE.56.8.083107.

Milo W. Hyde IV, and Santasri R. Bose-Pillai, "Partially coherent sources with circular coherence: comment," *Optics Letters*, Vol. 42, No. 16, pp. 3084-3084, Aug 2017, doi: 10.1364/OL.42.003084.

Jack E. McCrae, Santasri R. Bose-Pillai, and Steven T. Fiorino, "Estimation of turbulence from time-lapse imagery," *Optical Engineering*, Vol. 56, No. 7, 071504 (9 pp.), Jul 2017, doi: 10.1117/1.OE.56.7.071504.

Russell C. Hardie, Jonathan D. Power, Daniel A. LeMaster, Douglas R. Droege, Szymon Gladysz, Santasri Bose-Pillai, "Simulation of anisoplanatic imaging through optical turbulence using numerical wave propagation with new validation analysis," *Optical Engineering*, Vol. 56, No. 7, 071502 (9 pp.), Jul 2017, doi: 10.1117/1.OE.56.7.071502.

Noah R. Van Zandt, Milo W. Hyde IV, Santasri R. Bose-Pillai, David G. Voelz, Xifeng Xiao, and Steven T. Fiorino, "Synthesizing time-evolving partially-coherent Schell-model sources," *Optics Communications*, Vol. 387, pp. 377-384, Mar 2017, doi: 10.1016/j.optcom.2016.10.055.

Xifeng Xiao, David G. Voelz, Santasri R. Bose-Pillai, and Milo W. Hyde, "Modeling random screens for predefined electromagnetic Gaussian-Schell model sources," *Optics Express*, Vol. 25, No. 4, pp. 3656-3665, Feb 2017, doi: 10.1364/OE.25.003656.

M. W. Hyde IV, S. Bose-Pillai, X. Xiao, and D. G. Voelz, "A fast and efficient method for producing partially coherent sources," *Journal of Optics*, Vol. 19, No. 2, 025601 (6 pp.), Feb 2017, doi:10.1088/2040-8986/19/2/025601.

Milo W. Hyde, Santasri Bose-Pillai, David G. Voelz, and Xifeng Xiao, "Generation of Vector Partially Coherent Optical Sources Using Phase-Only Spatial Light Modulators," *Phys. Rev. Applied*, Vol. 6, No. 6, 064030 (12 pp.), Dec 2016, doi: 10.1103/PhysRevApplied.6.064030.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Santasri Bose-Pillai, Jack McCrae, and Steven Fiorino, "Estimation of turbulence parameters from time-lapse imagery," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena, OSA Technical Digest (online) (OSA, 2017)*.

Jack McCrae, Santasri Bose-Pillai, and Steven Fiorino, "Analysis of Turbulence Anisotropy with a Hartmann Sensor," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena, OSA Technical Digest (online) (OSA, 2017)*.

Noah R. Van Zandt, Milo W. Hyde, Santasri Bose-Pillai, and Steven T. Fiorino, "Simulating Time-Evolving Non-Cross-Spectrally Pure Schell-Model Sources," 2017 IEEE Aerospace Conference, Big Sky, MT, 4-11 Mar 2017.

Jack E. McCrae, Santasri R. Bose-Pillai, Matthew G. Current, Kevin P. Lee, and Steven T. Fiorino, “Measurements of Anisotropy in Optical Turbulence,” 2017 IEEE Aerospace Conference, Big Sky, MT, 4-11 Mar 2017.

INVENTION DISCLOSURES

Milo W. Hyde IV and Santasri Bose-Pillai, “Generation of Vector Partially Coherent Optical Sources Using Phase-Only Spatial Light Modulators,” May 2017, Air Force Invention Number AFD-1689.

BUTLER, SAMUEL D., Maj, Department of Engineering Physics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Butler, S. D., J. A. Ethridge, S. E. Nauyoks, and M. A. Marciniak. “Experimentally validated modification to Cook-Torrance BRDF model for improved accuracy,” *Proc. SPIE*, 1040214 (2017).

Lanari, A. M., S. D. Butler, M. A. Marciniak, and M. F. Spencer. “Wave optics simulation of statistically rough surface scatter,” *Proc. SPIE*, 1040215 (2017).

COBB, RICHARD G., Department of Aeronautics and Astronautics

FERDINANDUS, MANUEL R., Maj, Department of Engineering Physics

FIORINO, STEVEN T., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Wave Optics of Deep Atmospheric Turbulence: From Underlying Physics towards Predictive Modeling, Mitigation and Exploitation.” Sponsor: AFOSR. Funding: \$180,000.

“Airborne Aero-optics Lab Beam Control Collection and Evaluation.” Sponsor: DEJTO. Funding: \$53,080.

“AFIT Research in Support of ONR’s US-India OSD-DRDO Collaborations.” Sponsor: ONR. Funding: \$680,000 – Fiorino 25%, Sritharan 25%, Akers 25%, Reeger 25%.

“Directed Energy and Remote Sensing Research, Development and Prototype Demonstration.” Sponsor: Raytheon. Funding: \$50,000.

“Wavefront Measurement through Scintillation with Speckle.” Sponsor: AFRL/RD. Funding: \$100,000.

“2017 AFIT Center for Directed Energy DOD HPCMP HPC Internship Program (HIP).” Sponsor: HPCMP. Funding: \$48,000.

“Weather Effects for Integrated HEL / KE Weapons Capabilities Analyses.” Sponsor: AFRL/RD. Funding: \$100,000.

“CFLOS - 4D Weather Cubes for HyDRA.” Sponsor: AFRL/RD. Funding: \$150,000.

“2017 AFIT Center for Directed Energy Summer Intern (DESI) Program.” Sponsor: DEJTO. Funding: \$60,000.

“4D Weather Cubes for Sensors Concept Development.” Sponsor: AFRL/RD. Funding: \$75,000.

“CY2017 HEL JTO AP TAWG Product Development.” Sponsor: DEJTO. Funding: \$400,000.

“CY2017 HEL JTO AP TAWG Research and Analysis.” Sponsor: DEJTO. Funding: \$375,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“High Energy Laser End to End Operational Simulation (HELEEOS) Short Course.” Sponsor: AFTAC. Funding: \$8,543.

REFEREED JOURNAL PUBLICATIONS

McCrae, J.E., S. Bose-Pillai, and S.T. Fiorino, 2017: “Estimation of turbulence from time-lapse imagery,” *Opt. Eng.* 0001; 56(7):071504. doi:10.1117/1.OE.56.7.071504.

Van Zandt, N., M. Hyde, S. Bose-Pillai, D. Voelz, X. Xiao, and S.T. Fiorino, 2017: “Synthesizing time-evolving partially-coherent Schell-model sources” *Optics Communications*. 387, pp. 377-384.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Fiorino S.T., K. Keefer, C. Rice, J. Burley, and J. Schmidt, “Characterizing multispectral vertical profiles of aerosol extinction with surface-based measurements,” in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, San Francisco CA, (OSA, 27 June 2017).

Schmidt, J., Fiorino S.T., J. Burley, and B. Elmore, “Multi-spectral Weather Cubes for atmospheric plume characterization,” in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, San Francisco CA, (OSA, 27 June 2017).

McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, “Analysis of Turbulence Anisotropy with a Hartmann Sensor,” in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, San Francisco CA, (OSA, 27 June 2017).

Bose-Pillai, S., J.E. McCrae, and S.T. Fiorino, “Estimation of atmospheric parameters from time-lapse imagery,” in *Propagation through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, San Francisco CA, (OSA, 27 June 2017).

Ross, J.S. and S.T. Fiorino, “Total Electron Count Variability and Stratospheric Ozone Effects on Solar Backscatter and LWIR Emissions,” *Proceedings of SPIE*, Vol. 10198, 101980A, Anaheim, CA, 11 April 2017.

Wurst, N.P., J. Meola, and S.T. Fiorino, “Improved Atmospheric Characterization for Hyperspectral Exploitation,” *Proceedings of SPIE*, Vol. 10198, 101980B, Anaheim, CA, 11 April 2017.

McCrae, J.E., S.R. Bose-Pillai, M.G. Current, K.P. Lee, and S.T. Fiorino, “Measurements of Anisotropy in Optical Turbulence,” 2017 IEEE Aerospace Conference, Big Sky, MT, March 2017.

Van Zandt, N.R., M.W. Hyde, S.R. Bose-Pillai, and S.T. Fiorino, “Simulating Time-Evolving Non-Cross-Spectrally Pure Schell-Model Sources,” 2017 IEEE Aerospace Conference, Big Sky, MT, March 2017.

Zuraski, S. M., S. T. Fiorino, E. A. Beecher, N. M. Figlewski, J. D. Schmidt, and J. E. McCrae, “Electro-optic testbed utilizing a dynamic range gated Rayleigh beacon for atmospheric turbulence profiling,” *Proc. SPIE 10002, Optics in Atmospheric Propagation and Adaptive Systems XIX*, 1000207 (October 19, 2016); doi:10.1117/12.2240980.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., J. Schmidt, B. Elmore, and J. Burley, “Multi-spectral Weather Cubes and 4D Visualizations of Atmospheric and Radiative Effects,” *UK/US Directed Energy Workshop*, Swindon, UK, 12-15 June 2017.

McCrae, J.E. and S.T. Fiorino, “Comparison between Wave Optics and Scaling Law Models for Coherent Laser Arrays,” *UK/US Directed Energy Workshop*, Swindon, UK, 12-15 June 2017.

Bowers, J. and S.T. Fiorino, "Assessing the trade space for Techniques, Analysis, Calibration, and Standards, for High Energy Laser Sensors (TACoSHELS) program," UK/US Directed Energy Workshop, Swindon, UK, 12-15 June 2017.

Fiorino, S.T., K.J. Keefer, and B.J. Elmore, "Simulation of Pulsed Laser-Induced Environmental Changes on Laser Propagation," Directed Energy Professional Society 19th Annual DE Symposium, Huntsville, AL (February 2017).

Schmidt, J.E., S.T. Fiorino, B.J. Elmore, J.L. Burley, and K.J. Keefer, "Evaluation of Probabilistic Climatology as a Determiner for HEL System Performance," Directed Energy Professional Society 19th Annual DE Symposium, Huntsville, AL (February 2017).

Burley, J.L., S.T. Fiorino, J.E. Schmidt, and B.J. Elmore, "4D Weather Cubes and CFLOS from Numerical Weather Prediction Data," Directed Energy Professional Society 19th Annual DE Symposium, Huntsville, AL (February 2017).

Bose-Pillai, S., J.E. McCrae, N.R. Van Zandt, and S.T. Fiorino, "Estimation of atmospheric parameters from time-lapse imagery," Directed Energy Professional Society 19th Annual DE Symposium, Huntsville, AL (February 2017).

McCrae, J. E., S. R. Basu, M. G. Current, K.P. Lee, S. T. Fiorino, "Analysis of Turbulence Anisotropy Measured with a Hartmann Sensor," Directed Energy Professional Society 19th Annual DE Symposium, Huntsville, AL (February 2017).

Fiorino, S.T., J. Burley, B. Elmore, J. Schmidt, "Weather Cubes and 4D Visualizations Including Cloud and Rain Fields Generated from Numerical Weather Prediction Data," 33rd Conference on Environmental Information Processing Technologies, 97th Annual American Meteorological Society Meeting, Seattle, WA, Jan 2017.

Van Zandt, N.R., S.T. Fiorino, J. McCrae, and D. Kunkel, "Imaging and Tracking Modeling including Earth Reflection and Multiple Scattering," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 2016.

INVENTION DISCLOSURES

Fiorino, Steven T., McCrae, Jack E., Schmidt, Jason, Zuraski, Steven M., Figlewski, Nathan M., Beecher, Elizabeth A., "Design for an Electro-Optic Testbed Utilizing a Dynamic Range Gated Rayleigh Beacon for Atmospheric Turbulence Profiling," filed 11 Jul 17, Air Force Docket No. ADF-1721.

GROSS, KEVIN C., Department of Engineering Physics

HAWKS, MICHAEL R., Department of Engineering Physics

HYDE, MILO W. IV, Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Subaperture Adaptive Optics for Directed Energy Phased Arrays." Sponsor: tOSC. Funding: \$220,500.

REFEREED JOURNAL PUBLICATIONS

Xifeng Xiao, David G. Voelz, Santasri Bose-Pillai, and Milo W. Hyde IV, "Modeling random screens for predefined electromagnetic Gaussian Schell-model sources," *Optics Express*, Vol. 25, No. 4, pp. 3656-3665, Feb 2017, doi: 10.1364/OE.25.003656. JIF: 3.148.

Milo W. Hyde IV, Santasri Bose-Pillai, David G. Voelz, and Xifeng Xiao, "Generation of vector partially coherent optical sources using phase-only spatial light modulators," *Physical Review Applied*, Vol. 6, No. 6, 064030 pp. 12, Dec 2016, doi: 10.1103/PhysRevApplied.6.064030. JIF: 4.061.

Milo W. Hyde IV, Santasri Bose-Pillai, Xifeng Xiao, and David G. Voelz, “A fast and efficient method for producing partially coherent sources,” *Journal of Optics*, Vol. 19, No. 2, 025601 pp. 6, Dec 2016, doi: 10.1088/2040-8986/19/2/025601. JIF: 1.847.

Noah R. Van Zandt, Milo W. Hyde IV, Santasri Bose-Pillai, David G. Voelz, Xifeng Xiao, and Steven T. Fiorino, “Synthesizing time-evolving partially-coherent Schell-model sources,” *Optics Communications*, Vol. 387, pp. 377-384, Nov 2016, doi: 10.1016/j.optcom.2016.10.055. JIF: 1.480.

Milo W. Hyde IV and Glenn A. Tyler, “Temporal coherence effects on target-based phasing of laser arrays,” *Journal of the Optical Society of America A*, Vol. 33, No. 10, pp. 1931-1937, Oct 2016, doi: 10.1364/JOSAA.33.001931. JIF: 1.457.

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Milo W. Hyde IV, Glenn A. Tyler, and Carlos Rosado Garcia, “Target-in-the-loop phasing of a fiber laser array fed by a linewidth-broadened master oscillator,” *Proceedings of SPIE (SPIE Defense + Commercial Sensing)*, Vol. 10192, pp. 7, Anaheim, CA, Apr 2017.

Noah Van Zandt, Milo Hyde, and Santasri Basu, “Simulating time-evolving non-cross-spectrally pure Schell-model sources,” *IEEE Aerospace Conference (AeroConf)*, pp. 9, Big Sky, MT, Mar 2017.

INVENTION DISCLOSURES

Milo W. Hyde IV and Santasri Bose-Pillai, “Generation of Vector Partially Coherent Optical Sources Using Phase-Only Spatial Light Modulators,” May 2017, Air Force Invention Number AFD-1689.

MARCINIAK, MICHAEL A., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Discontinuous Phase Surfaces for Low-Profile Infrared Optics.” Sponsor: AFOSR. Funding: \$50,400.

REFEREED JOURNAL PUBLICATIONS

Burgi, K.W., Marciniak, M.A., Oxley, M.E. and Nauyoks, S.E., “Measuring the reflection matrix of a rough surface,” *Applied Sciences* Vol. 7, No. 568, pp. 1-15 (May 2017).

Burgi, K.W., Ullom, J.M., Marciniak, M.A. and Oxley, M.E., “Reflective Inverse Diffusion,” *Applied Sciences* Vol. 6, No. 370, pp. 1-17 (Nov 2016).

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Burgi, K.W. and Marciniak, M.A., “Reflective inverse diffusion method for dynamic compensation of small optical system perturbations,” *Proc. SPIE* 10347, 10347-20 (2017).

Butler, S.D., Ethridge, J.A., Nauyoks, S.E. and Marciniak, M.A., “Experimentally validated modification to Cook-Torrance BRDF model for improved accuracy,” *Proc. SPIE* 10402, 1040214(1-8) (2017).

Lanari, A., Butler, S.D., Marciniak, M.A. and Spencer, M.F., “Wave optics simulation of statistically rough surface scatter,” *Proc. SPIE* 10402, 1040215(1-9) (2017).

Adomanis, B.M., Burckel, D.B. and Marciniak, M.A., “Design of infrared meta-surfaces for low-profile optics using COMSOL Multiphysics®.”

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Adomanis, B.M., Burckel, D.B. and Marciniak, M.A., “Design and fabrication of meta-surface lenses in MWIR,” presented at 2016 Quantum Meta-photonics and Metamaterials MURI Review held on 7-9 November 2016 in Arlington, VA.

MCCRAE, JACK E., Jr., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Hyde IV, M. W., J E. McCrae, and G. A. Tyler, “Target-based coherent beam combining of an optical phased array fed by a broadband laser source,” *Journal of Modern Optics*, Vol. 64, Iss. 20, 2017.
doi:10.1080/09500340.2017.1343403.

McCrae, J.E., S. Bose-Pillai, and S.T. Fiorino, 2017: “Estimation of turbulence from time-lapse imagery,” *Opt. Eng.* 0001; 56(7):071504. doi:10.1117/1.OE.56.7.071504.

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McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, “Analysis of Turbulence Anisotropy with a Hartmann Sensor,” in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, San Francisco CA, (OSA, 27 June 2017).

Bose-Pillai, S., J.E. McCrae, and S.T. Fiorino, “Estimation of atmospheric parameters from time-lapse imagery,” in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, San Francisco CA, (OSA, 27 June 2017).

McCrae, J. E., S. R. Bose-Pillai, M. G. Current, K. P. Lee, and S. T. Fiorino, “Measurements of Anisotropy in Optical Turbulence,” 2017 IEEE Aerospace Conference, Big Sky, MT, March 2017.

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McCrae, J.E. and S.T. Fiorino, “Comparison between Wave Optics and Scaling Law Models for Coherent Laser Arrays,” *UK/US Directed Energy Workshop*, Swindon, UK, 12-15 June 2017.

Bose-Pillai, S., J.E. McCrae, N.R. Van Zandt, and S.T. Fiorino, “Estimation of atmospheric parameters from time-lapse imagery,” *Directed Energy Professional Society 19th Annual DE Symposium*, Huntsville, AL (February 2017).

McCrae, J. E., S. R. Basu, M. G. Current, K.P. Lee, S. T. Fiorino, “Analysis of Turbulence Anisotropy Measured with a Hartmann Sensor,” *Directed Energy Professional Society 19th Annual DE Symposium*, Huntsville, AL (February 2017).

INVENTION DISCLOSURES

Fiorino, Steven T., McCrae, Jack E., Schmidt, Jason, Zuraski, Steven M., Figlewski, Nathan M., Beecher, Elizabeth A., “Design for an Electro-Optic Testbed Utilizing a Dynamic Range Gated Rayleigh Beacon for Atmospheric Turbulence Profiling.” filed 11 Jul 17, Air Force Docket No. ADF-1721.

NAUYOKS, STEPHEN E., Department of Engineering Physics,

REFEREED JOURNAL PUBLICATIONS

K.W. Burgi, M.A. Marciniak, M.E. Oxley and S.E. Nauyoks, “Measuring the reflection matrix of a rough surface,” *Applied Sciences* Vol. 7, No. 568, pp. 1-15 (May 2017).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

S.D. Butler, J.A. Ethridge, S.E. Nauyoks, M.A. Marciniak, “Experimentally validated modification to Cook-Torrance BRDF model for improved accuracy,” Proc. SPIE 10402, p. 1040214 September 2017.

K.W. Burgi, M.A. Marciniak, S.E. Nauyoks, and M.E. Oxley “Exploiting redundant phase information of a reflection matrix,” Proc. SPIE 10347, p. 103470K (August 2017).

PERRAM, GLEN P., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Rubidium Vapor Circulation System: Optical Diagnostic (Phase II).” Sponsor: Creare. Funding: \$49,448.

“In-Process Monitoring of Additive Manufacturing. Phase II. Selective Laser Melting and E-Beam Manufacture.” Sponsor: NASA (WSU and MLPC). Funding: \$118,820.

“Diode Pumped Alkali Lasers: Ionization and Beam Quality.” Sponsor: DEJTO. Funding: \$200,000.

“Wave Front Sensing for Laser Weapon Applications.” Sponsor: AFRL/RD. Funding: \$100,000 – Perram 80%, Rice 20%.

REFEREED JOURNAL PUBLICATIONS

Ben Eshel, Joseph A. Cardosa, David E. Weeks and Glen P. Perram, “*Role of adiabaticity in controlling alkali-metal fine-structure mixing induced by rare gases,*” Physical Review A 95, 042708, April 2017.

William Bauer, Charlie Fox, Ryan Gosse, Glen Perram, “*Visible emission from C₂ and CN during cw laser irradiated graphite,*” Optical Engineering, 56, 011017, Jan 2017.

Grady T. Phillips, William A. Bauer, Charles D. Fox, Ashley E. Gonzales, Nicholas C. Herr, Ryan C. Gosse, and Glen P. Perram, “*Mass removal by oxidation and sublimation of porous graphite during fiber laser irradiation,*” Optical Engineering, 56, 011013, Jan 2017.

Woody S. Miller, Christopher A. Rice, Gordon D. Hager, Mathew D. Rotondaro, Hamid Berriche, and Glen P. Perram, “*High Pressure Line Shapes of the Rb D₁ and D₂ lines for ⁴He and ³He collisions,*” Journal of Quantitative Spectroscopy and Radiative Transfer, 184, 118-134, Nov 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Grady T. Phillips, William A. Bauer, Ashley E. Gonzales, Nicholas C. Herr, and Glen P. Perram, “Oxidation and sublimation of porous graphite during fiber laser irradiation” Proc SPIE 10097-15, Photonics West, Feb 2017.

Anthony Gavrieladas, Vern Schlie, Robert Loper, Michael Hawks, and Glen Perram, “Unstable resonators for high power diode pumped alkali lasers” Proc SPIE 10090-57, Photonics West, Feb 2017.

William Bauer, Glen Perram, and Timothy Haugan, “Plume dynamics from UV pulsed ablation of Al and Ti” Proc SPIE 10014, 100140S SPIE Laser Induced Damage in Optical Materials, 2016.

Glen P. Perram, “Wavelength diversity in optically pumped alkali lasers,” Proc. SPIE 10254, 102540Q XXI International Symposium on High Power Laser Systems and Applications, Jan 2017).

BOOKS AND CHAPTERS IN BOOKS

Glen P. Perram and Grady T. Phillips, “*Optical diagnostics for real-time monitoring and feedback control of metal additive manufacturing processes*” in Additive Manufacturing Handbook: Product Development for the Defense Industry A. Badiru, V.V. Valencia, and D. Liu, editors (CRC Press, 2017).

PHILLIPS, GRADY T., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Grady T. Phillips, William A. Bauer, Charles D. Fox, Ashley E. Gonzales, Nicholas C. Herr, Ryan C. Gosse, and Glen P. Perram, “Mass removal by oxidation and sublimation of porous graphite during fiber laser irradiation,” Optical Engineering, 56, 011013, Jan 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Grady T. Phillips, William A. Bauer, Ashley E. Gonzales, Nicholas C. Herr, and Glen P. Perram, “Oxidation and sublimation of porous graphite during fiber laser irradiation” Proc SPIE 10097-15, Photonics West, Feb 2017.

BOOKS AND CHAPTERS IN BOOKS

Glen P. Perram and Grady T. Phillips, “*Optical diagnostics for real-time monitoring and feedback control of metal additive manufacturing processes*” in Additive Manufacturing Handbook: Product Development for the Defense Industry A. Badiru, V.V. Valencia, and D. Liu, editors (CRC Press, 2017).

REEGER, JONAH A., Maj, Department of Mathematics and Statistics

RICE, CHRISTOPHER A., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Woody S. Miller, Christopher A. Rice, Gordon D. Hager, Mathew D. Rotondaro, Hamid Berriche, and Glen P. Perram, “*High Pressure Line Shapes of the Rb D_1 and D_2 lines for ^4He and ^3He collisions,*” Journal of Quantitative Spectroscopy and Radiative Transfer, 184, 118-134, Nov 2016.

INVENTION DISCLOSURES

“Perram, Glen P., Rice, Christopher A., Haluska, Nathan D., “Diode Pumped Alkali Laser Extended to Novel Wavelengths via Two-Photon Pumping,” Air Force Docket No. AFD-1768.

SRITHARAN, SIVAGURU S., Department of Mathematics and Statistics

TERZUOLI, ANDREW J., Jr., Department of Electrical and Computer Engineering

WEEKS, DAVID E., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Theoretical Models of Absorption and Emission in Thulium Doped Fiber Lasers.” Sponsor: AFRL/RD. Funding: \$15,000.

6.4. CENTER FOR OPERATIONAL ANALYSIS

Center for Operational Analysis (COA)

Director 255-3636 x4251

Deputy Director 255-3636 x4523

Homepage: <http://www.afit.edu/COA>

6.4.1. DOCTORAL DISSERTATIONS

HANKS, ROBERT W., *Robust Goal Programming and Risk Assessment using Cardinality-Constrained and Strict Robustness via Alternative Uncertainty Sets*. AFIT/ENS/DS/17S-035. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM.

WHITE, ANTHONELLI, *Determinants of Individual-level Demand Forecasting Performance*. AFIT/ENS/DS/17S-045. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AFSC.

6.4.2. MASTER'S THESES

ATKINSON, JOHN D., *Diffusion of Autonomous Vehicles as an Organizational Innovation*. AFIT/ENS/MS/17M-112. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: N/A.

BARKALOW, ALLISON M., *Identifying Factors that Affect the Retention Behaviors of Aircraft Maintenance (21A) and Munitions and Missile Maintenance (21M) Officers*. AFIT/ENS/MS/17J-016. Faculty Advisor: Lt Col Robert E. Overstreet Sponsor: HQ USAF/A4.

CREAN, RYAN C., *Benchmarking DOD use of Additive Manufacturing and Quantifying Costs*. AFIT/ENS/MS/17M-121. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC.

CROUCH, DANIEL W., *Improving Minuteman III Maintenance Concepts*. AFIT/ENS/MS/17M-122. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFGSC.

GUTIERREZ, ROBERT J., *A Tabulated Vector Approach for Log-Based Anomaly Detection*. AFIT/ENS/MS/17M-131. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: ARCYBER.

HOYT, GREG E., *An Investigation Into the Indicators of a Successful Total Force Association*. AFIT/ENS/MS/17M-133. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: N/A.

POTTS, GREGORY D., *Simulation Modeling and Analysis of Deployed F-16 Operations and Logistics Support*. AFIT/ENS/MS/17M-154. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC.

REBOULET, AMANDA M., *Organizational Strategic Basing Framework with Infusion of Multi-Dimensional Uncertainty*. AFIT/ENS/MS/17S-068. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: N/A.

SMITH, JESSICA A., *Supply Chain Transformation: An Information Technology Perspective*. AFIT/ENS/MS/17S-065. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: HQ USAF/A4.

WILLIAMS, RUSSELL H., *Predicting Failure Rates for the B-1B Bomber*. AFIT/ENS/MS/17M-163. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: AFGSC.

VINCENT, AARON T., *Maintenance Officer Initial Skills Training Timeline*. AFIT/ENS/MS/17M-160. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: HQ ACC/A4.

6.4.3. GRADUATE RESEARCH PAPERS

BREDESEN, DAVID T., *More With Less: Increasing The Strategic Airlift Fleet Capability Through Optimized Planning Factors*. AFIT/ENS/MS/17J-018. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 618 AOC.

DAWSON, JEREMY D., *Deterring the Russian Tactical Nuclear Arsenal*. AFIT/ENS/MS/17J-020. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: N/A.

FRENCH, JONATHAN M., *Organizing Major Commands for Today's Cyber Security Challenges*. AFIT/ENS/MS/17J-026. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AMC.

PARRISH, JEFFREY M., *United States Nuclear Deterrence Policy: Past, Present, and Future*. AFIT/ENS/MS/17J-043. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: HQ USAF/A3.

PEDERSEN, JEFFREY J., *Assessment of MAF Pilot Overabsorption: Expansion of the 1999 Rated Summit Intent*. AFIT/ENS/MS/17J-044. Faculty Advisor: Dr. Bradley C. Boehmke. Sponsor: AMC.

RIDLEY, MICHAEL E., *Cascadia Subduction Zone Earthquake Basing and Supply Delivery Strategy Based on Current Planning and Historical Event Analysis*. AFIT/ENS/MS/17J-045. Faculty Advisor: Dr. Paul L. Hartman. Sponsor: FEMA.

RIGOLLET, TAYLOR S., *One Size Does Not Fit All: Removing Unnecessary Barriers To Entry In The Pilot Community*. AFIT/ENS/MS/17J-047. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: JCS/J4.

WELLS, MICHAEL W., *Reduced-Engine Taxi: A Cost-Savings Exploration*. AFIT/ENS/MS/17J-051. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: USAFA.

6.4.4. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BAUER, KENNETH W., Department of Operational Sciences

BOEHMKE, BRADLEY C., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Logistics Data Environment.” Sponsor: AF/A4. Funding: \$550,000 – Boehmke 50%, Hartman 25%, Weir 25%.

“IMSC Analytic Support.” Sponsor: AFISMC. Funding: \$235,000 – Boehmke 50%, Hartman 25%, Weir 25%.

“V-22 Data Analytics.” Sponsor: NAVAIR. Funding: \$170,000 – Boehmke 50%, Hartman 25%, Weir 25%.

CHRISSIS, JAMES W., Department of Operational Sciences

CUNNINGHAM, WILLIAM A., Department of Operational Sciences

DOUGLAS, MATTHEW A., Col, Department of Operational Sciences

HARTMAN, PAUL L., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Operational Requirements for the Mechanical Equipment & Subsystem Integrity Program (MECSIP).” Sponsor: AFLCMC. Funding: \$61,376 – Hartman 50%, Hartman 50%.

“Modernization of the AFRL Enterprise Business System Program Office (EBS PO) Capabilities.” Sponsor: AFRL/RC. Funding: \$130,000.

“COA Mission Objective Support.” Sponsor: USAF A4C. Funding: \$50,000.

REFEREED JOURNAL PUBLICATIONS

Pulles, Niels J. and Hartman, Paul L., “Likeability and its effect on outcomes of interpersonal interaction,” *Industrial Marketing Management*, Vol. 66, pp. 56-63, 2017.

Hartman, P., Ogden, J., Wirthlin, J. and Hazen, B., “Nearshoring and Reshoring and Insourcing - Oh My! Moving Beyond the Total Cost of Ownership Conversation,” *Business Horizons*, Vol. 60, No. 2, pp. 363-373, 2017.

Hartman, P.L., Ogden, J.A. and Hazen, B.T., “Bring it Back? An Examination of the Insourcing Decision,” *International Journal of Physical Distribution and Logistics Management*, Vol. 47, No. 2/3, pp. 198-221, 2017.

HAZEN, BENJAMIN T., Maj, Department of Operational Sciences

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

JOHNSON, ALAN W., Department of Operational Sciences

KRETZER, MICHAEL P., Capt, Department of Operational Sciences

MILLER, JOHN O., Department of Operational Sciences

OGDEN, JEFFREY A., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Research, Analysis and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center.” Sponsor: AFMC/A4P. Funding: \$440,000 – Ogden 60%, Johnson 40%.

OVERSTREET, ROBERT E., Lt Col, Department of Operational Sciences

ROBBINS, MATTHEW J., Lt Col, Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

Robbins. “Strategic Development Planning & Experimentation Support: Roadmap for Multi-Domain Modeling, Simulation, Analysis and Experimentation.” Sponsor: SDPE. Funding: \$1,000,000 – Robbins 50%, Weir 50%.

SCHULTZ, KENNETH L., Department of Operational Sciences

SMITH, CHRISTOHER M., LTC, Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Big Data Platform Analysis for Cyber Security.” Sponsor: ARCYBER. Funding: \$250,000 – Smith 25%, Bauer 25%, Boehmke 25%, Freels 25%.

STEENECK, DANIEL W., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Repair Network Optimization.” Sponsor: AFSC. Funding: \$220,000.

STONE, BRIAN B., Maj, Department of Operational Sciences

TUCHOLSKI, HEIDI M., Maj, Department of Operational Sciences

WEIR, JEFFERY D., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Value-Driven Tradespace Exploration and Analysis for Resilient Systems.” Sponsor: USA ERDC. Funding: \$420,000.

“Air Force Inspection Agency (AFIA) Support for UEI Generator.” Sponsor: AFIA/CCR. Funding: \$20,000.

“Air Force Supply Chain Problem Item Early Detection.” Sponsor: AFRL/RX. Funding: \$225,000.

“Development of Cyber Resiliency Processes and Mitigation Solutions for Legacy Platforms.” Sponsor: AFLCMC. Funding: \$700,000 – Weir 50%, Hartman 50%.

“Development of a Quantitative Framework for Intelligence Mission Data Support Analysis.” Sponsor: AFLCMC. Funding: \$75,000.

“Global War Reserve Materiel (WRM) Management Support.” Sponsor: 635 SCOW. Funding: \$480,182 – Weir 50%, Hazen 50%.

“412th Test Wing Sortie Scheduling Modernization Effort.” Sponsor: 412 TW. Funding: \$493,936.

“Design of Experiment (DOE) and Meta-Modelling Support for the ISR Decision Support at the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$197,554.

“Joint Service Explosive Ordnance Disposal (EOD) Technology Capability Based Value Model (CBVM) Support.” Sponsor: NSWC. Funding: \$200,000.

“B2 LO Maintenance Optimization.” Sponsor: AFLCMC. Funding: \$225,000.

“Comprehensive Core Capability Risk Assessment Framework (C3RAF) Method Research.” Sponsor: AF/A9. Funding: \$250,000.

“Air Force Institute of Technology Center for Operational Analysis (AFIT/COA) Support to Acquisition Intelligence Requirements Task Force (AIRTF) for Intelligence Mission Data (IMD) Cost, Capability Analysis (CCA) (Revised).” Sponsor: OSD. Funding: \$800,000.

“Analysis/Modeling Support to War Mobilization Plans Volume 5 (WMP-5) Build.” Sponsor: AF/A3. Funding: \$303,000.

“Sliding Scale Autonomy through Physiological Rhythm Evaluations (SAPHYRE).” Sponsor: OFRN (WSU).
Funding: \$109,993.

REFEREED JOURNAL PUBLICATIONS

Hanks, R, Weir, J D, and Lunday, B, “Robust goal programming using different robustness echelons via norm-based and ellipsoidal uncertainty sets,” *European Journal of Operations Research*, Vol. 262, No. 2, pp. 636-646, 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hanks, R, Weir, J D, Lunday, B J, Robbins, M, “Mapping a Decision Maker’s Risk Attitude to Robust Goal Programming Parameters,” Western Decision Sciences Annual Meeting, Vancouver, British Columbia, 4-8 Apr 2017.

Hanks, R, Weir, J D, and Lunday, B, “Risk Assessment using Utility Theory for Robust Goal Programming,” Institute for Operations Research and Management Sciences Computing Society Conference, Austin, TX, 15 Jan 2017.

Hanks, R, Weir, J D, and Lunday, B, “Risk Assessment in Robust Goal Programming,” Institute for Operations Research and Management Sciences Symposium, Memphis, TN, 14 Nov 2016.

6.5. CENTER FOR SPACE RESEARCH AND ASSURANCE

Center for Space Research and Assurance (CSRA)

Director 255-3636 x4578
Deputy Director 255-3636 x4542
Director of Research 255-3636 x4901
Homepage: <http://www.afit.edu/CSRA>

6.5.1. DOCTRAL DISSERTATIONS

SATTTLER, JAMES, *Engineered Surfaces to Control Secondary Electron Yield for Multipactor Suppression*. AFIT/ENG/DS/17S-018. Faculty Advisor: Capt Robert A. Lake. Sponsor: N/A.

WHEELER, PAMELA L., *Satellite Propulsion Spectral Signature Detection and Analysis for Space Situational Awareness using Small Telescopes*. AFIT/ENY/DS/17S-063. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

6.5.2. MASTER THESES

ALF, CHRISTIAN N., *Image Processing for Space Situational Awareness using Commercial-off-the-Shelf Imagery*. AFIT/ENY/MS/17M-238. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

ANDERSON, RYAN J., *Using a Plenoptic Camera for Real-Time Depth Estimation*. AFIT/ENY/MS/17M-002. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

BARNES, DANIEL R., *An Analysis of Radio-Frequency Geolocation Techniques for Satellite Systems Design*. AFIT/ENY/MS/17M-241. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

BENTLEY, MICHAEL J., *Enabling Air Force Satellite Ground System Automation through Software Engineering*. AFIT/ENG/MS/17M-006. Faculty Advisor: Maj Alan C. Lin. Sponsor: SMC.

BOX, CHRISTOPHER A., *Analysis of Additively Manufactured Lattice Structures using Finite Element Methods*. AFIT/ENY/MS/17M-245. Faculty Advisor: Maj Ryan P. O'Hara. Sponsor: AFRL/RW.

BRICK, JOHN N., *Military Space Mission Design and Analysis in a Multi-Body Environment: An Investigation of High-Altitude Orbits as Alternative Transfer Paths, Parking Orbits for Reconstitution, and Unconventional Mission Orbits*. AFIT/ENY/MS/17M-246. Faculty Advisor: Lt Col Christopher D. Geisel. Sponsor: AFRL/RV.

BRICKY, JAMES F., *Radiation Effects in Graphene Field Effect Transistors (GFET) on Hexagonal Boron Nitride (hBN)*. AFIT/ENP/MS/17J-009. Faculty Advisor: Lt Col Michael R. Hogsed. Sponsor: AFRL/RV.

BROCH, LAURA H., *Constellation Architecture Design for Persistent Space Situational Awareness of Direct Ascent to Geosynchronous Orbit*. AFIT/ENY/MS/17M-247. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: NASIC.

CHILDRESS, JONATHAN M., *Control Allocation Methods for Constrained and Over Actuated Satellite Attitude Control Systems*. AFIT/ENY/MS/17M-215. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

COUCH, BRIAN D., *Busek ICM Micro Radio-Frequency Ion Thruster Empirical Performance Determination*. AFIT/ENY/MS/17M-253. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A.

CUHRAN, JOSEPH J., JENKINS, MATHEW K., & WALTERS, MICHAEL J., *Quantifying and Evaluating the Resilience of Optimized Space Constellations for Fire Detection*. AFIT/ENV/MS/17J-057. Faculty Advisor: Dr. John M. Colombi. Sponsor: NASIC.

CUNNINGHAM, CAMERON R., *Evaluation of Networked Satellite Command & Control via Internet Conduit*. AFIT/ENY/MS/17M-254. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

DOWNEY, JACOB J., *Structural Analysis of a 3D Printed Composite Truss*. AFIT/ENY/MS/17M-256. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

DUNKEL, MELISSA A., *The Impact of Atmospheric Fluctuations on Optimal Boost Glide Hypersonic Vehicle Dynamics*. AFIT/ENY/MS/17M-257. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

DUNKEL, PATRICK N., *Application of RF-DNA Fingerprinting Techniques to ICOM Radio Satellite Communication*. AFIT/ENY/MS/17M-258. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

HYATT, NICHOLAS L., *Hall Effect Thruster Characterization through Potential, Magnetic, and Optical Measurements*. AFIT/ENY/MS/17M-267. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR.

JENKINS, MATHEW K., See CUHRAN, JOSEPH J.

KACZMAREK, JEREMY J., *Analysis of Image Processing and Data Reduction for Space Situational Awareness Applications in CubeSats*. AFIT/ENY/MS/17M-268. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

KIRK, JORDAN T., *Multi-Hypothesis Test Detection for Star Tracking Systems*. AFIT/ENG/MS/17M-041. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

LANZO, DANIEL T., *Additively Manufactured Spacecraft Thermal Control System*. AFIT/ENY/MS/17M-271. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A.

LOWERY, JASON P., *Measuring Light Curve Uncertainty for Surrogate Geostationary Satellite Models*. AFIT/ENY/MS/17S-060. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

MCMURRY, RICHARD R., *Improving Space Object Detection for Ground Telescopes with Poisson Distribution Statistics*. AFIT/ENG/MS/17M-052. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

OLIVER, RACHEL, *Model Fidelity Analysis for Production of Accurate Theoretical Light Curves*. AFIT/ENY/MS/17M-279. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

PITMAN, BRIAN W., *Maneuver Detection and Characterization using Wavelets for Geosynchronous Spacecraft*. AFIT/ENY/MS/17M-282. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

REABE, MARISSA C., *Formation Flight of Earth Satellites on Kamtorus using Classical Orbital Elements*. AFIT/ENY/MS/17M-285. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A.

RICH, ADAM T., *Investigating Analytical and Numerical Methods to Predict Satellite Orbits using Two-Line Element Sets*. AFIT/ENY/MS/17M-286. Faculty Advisor: Dr. William E. Wiesel. Sponsor: AFRL/RV.

ROBINSON, CHRISTINE, *Evaluating the Viability of Planar Laser-Induced Fluorescence to Determine the Constituents of AF-M315E Exhaust Plume*. AFIT/ENY/MS/17M-287. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ.

ROSS, JOHN S., *Total Electron Count Variability and Stratospheric Ozone Effects on Solar Backscatter and LWIR Emissions*. AFIT/ENP/MS/17M-103. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: N/A.

ROTH, KRISTA, *Analysis of an Experimental Space Debris Removal Mission*. AFIT/ENY/MS/17J-071. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

SADOWSKI, JUSTIN A., *Dynamic Logical Mission Modeling Tool*. AFIT/ENY/MS/17M-290. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

SMITH, DAVID A., *Satellite Communications in the V and W Band: Natural and Artificial Scintillation Effects*. AFIT/ENG/MS/17M-070. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: AFRL/RI.

STERN, JORDAN L., & WATCHEL, STEVEN T., *Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures*. AFIT/ENV/MS/17M-277. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RV.

STUART, KENNETH J., *KAM Tori from Two-Line Element Sets: A Comparison to SGP4*. AFIT/ENY/MS/17M-293. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A.

TILLMAN, ROMAN, *Genetic Algorithm Optimization of Geosynchronous Earth Orbit Space Situational Awareness Systems via Parallel Evaluation of Executable Architectures*. AFIT/ENV/MS/17M-277. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFTAC.

TOMMILA, CHRISTOPHER D., *Performance Losses in Additively Manufactured Low Thrust Nozzles*. AFIT/ENY/MS/17M-295. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: N/A.

TULLINO, STEPHEN K., *Testing and Evaluating Deployment Profiles of the Canisterized Satellite Dispenser (CSD)*. AFIT/ENY/MS/17M-296. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

WALTERS, MICHAEL J., See CUHRAN, JOSEPH J.

WATCHEL, STEVEN T., See STERN, JORDAN L.

6.5.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AYRES, BRADLEY J., Department of Aeronautics and Astronautics

BETANCES, JOAN A., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Cyber Secure CONOPS for On-Orbit Reprogramming of a Software Defined Radio.” Sponsor: AFRL/RV. Funding: \$40,500.

BETTINGER, ROBERT A., Maj, Department of Aeronautics and Astronautics

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

COBB, RICHARD G., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Optimization and Computer Vision for Proximity Operations.” Sponsor: Undisclosed. Funding: \$40,000 – Cobb 50%, Swenson 50%.

“Optimization and Decision Support for TMAP.” Sponsor: NASIC. Funding: \$35,000.

REFEREED JOURNAL PUBLICATIONS

Denton, J., Hodson, D., Cobb, R., Mailloux, L., Grimaila, M., and Baumgartner, G., “A Model to Estimate Performance of Space-Based Quantum Communication Protocols Including Quantum Key Distribution Systems,” *Journal of Defense Modeling and Simulation (JDMS)*, Nov 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wheeler, P., Cobb, R., Hartsfield, C. and Prince, B., "Satellite Propulsion Spectral Signature Detection and Analysis," IEEE Aerospace Conference 2017, Mar 4-11, Big Sky MT, March 2017.

Wheeler, P., Cobb, R., Hartsfield, C. and Prince, B., "Satellite propulsion spectral signature detection and analysis through Hall effect thruster plume and atmospheric modeling," Proceedings SPIE 9974, Infrared Sensors, Devices, and Applications VI, 99740T (2016). doi:10.1117/12.2238021.

Prince, E. and Cobb, R., "Optimal Slew-rate-limited Guidance for Combined Formation Establishment and Reconfiguration of Inspector Satellite with Exclusion Cone," 27th AAS/AIAA Space Flight Mechanics Meeting, San Antonio, TX, Feb 5-9, 2017.

Prince, E. and Cobb, R., "Optimal Inspector Satellite Guidance to Quasi-Hover via Relative Teardrop Trajectories," IAF 9th International Workshop on Satellite Constellations and Formation Flying, Boulder, CO, 19-21 June 2017.

Stern J., Wachtel, S., Colombi, J., Meyer, D., and Cobb, R., "Multi-objective Optimization of Geosynchronous Earth Orbit Space Situational Awareness System Architectures," CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach CA, Mar 23-25, 2017.

Shultz, D., Colombi, J., Jacques, D., and Cobb, R., "Model-based Engineering: Analysis of Alternatives for Optical Satellite Observation," CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach, CA, Mar 23-25, 2017.

COLLINS, PETER J., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D Smith, P Collins, J Fee, J Petrosky, A Terzuoli, and C Yardim, "Artificial Ionospheric Scintillation Effects on Communication Signals in the V and W Bands," *Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017)*, Firenze, IT, 26-30 March 2017.

D Smith, B Shelters, D Hesser, P Collins, J Fee, J Petrosky, A Terzuoli, C Yardim, "Effects of Ionospheric Scintillation on V and W Band Signals," *Proceedings of the 2017 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI)*, San Diego, CA, 9-14 July 2017.

COLOMBI, JOHN M., Department of Systems Engineering and Management

REFEREED JOURNAL PUBLICATIONS

Colombi, J., Buckle, L., Black, J., and S. Nurre (2017). Optimal Launch Manifesting for Heterogeneous Disaggregated Satellite Constellations, *Journal of Spacecraft and Rockets*, Vol. 54, No. 3 (2017), pp. 582-591.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Stern J., Wachtel, S., Colombi, J., Meyer, D., and Cobb, R., "Multi-objective Optimization of Geosynchronous Earth Orbit Space Situational Awareness System Architectures," CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach CA, Mar 23-25, 2017.

D. A. Shultz, J. M. Colombi, D. R. Jacques, R. G. Cobb. "Model-based Engineering: Analysis of Alternatives for Optical Satellite Observation." 15th Annual Conference on Systems Engineering (CSER) Research Redondo Beach, CA, March 23-25, 2017.

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

DECKRO, RICHARD F., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“JWAC AFIT Interaction.” Sponsor: JWAC. Funding: \$150,000 – Deckro 30%, Ahner 23%, Lunday 23%, Swenson 25%.

FERDINANDUS, MANUEL R., Maj, Department of Engineering Physics

FIORINO, STEVEN T., Department of Engineering Physics

FRANZ, ANTHONY L., Lt Col, Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Plenoptic Cameras for 3D Video.” Sponsor: Undisclosed. Funding: \$7,150.

FULLER, DANE F., Col, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Actinide Radiation Detector Payload.” Sponsor: Undisclosed. Funding: \$367,850 – Fuller 40%, Petrosky 20%, Hogsed 30%, Cobb 5%.

“Long Wave Polarimetric Imaging Research.” Sponsor: Undisclosed. Funding: \$150,000 – Fuller 20%, Gross 40%, Cobb 40%.

“SkyPad.” Sponsor: Undisclosed. Funding: \$661,292 – Fuller 25%, Cobb 25%, Hartsfield 25%, O'Hara 25%.

“Radiation Testing Jeston TX1 and TX2.” Sponsor: Undisclosed. Funding: \$24,300 – Fuller 10%, Hogsed 80%, Cobb 10%.

GEISEL, CHRISTOPHER D., Lt Col, Department of Aeronautics and Astronautics

GRMAILA, MICHAEL R., Department of Systems Engineering and Management

REFEREED JOURNAL PUBLICATIONS

Denton, J. C., Hodson, D. D., Cobb, R. G., Mailloux, L.O., Grimaila, M.R., & Baumgartner, G. B. (2017). A model to estimate performance of space-based quantum communication protocols including quantum key distribution systems. The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, January 16, 2017; doi: 10.1177/1548512916684562.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mailloux, L. O., Sargent B., Hodson, D. D., & Grimaila, M.R. (2017). System-level considerations for modeling space-based quantum key distribution architectures. IEEE SysCon. Montreal, Quebec, Canada. April 24-27, 2017.

GROSS, KEVIN C., Department of Engineering Physics

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Advanced Signal Prototyping on AFIT's Waveform Prototype Platform for Navigation and Timing Applications.” Sponsor: AFRL/RV. Funding: \$67,500.

HARTSFIELD, CARL R., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Ultra-High Speed Plasma Diagnostics in an ExB Device for the Determination of Anomalous Transport Diffusion.” Sponsor: AFOSR. Funding: \$27,593.

“Additively Manufactured Metallic Phase Change Thermal Management Systems.” Sponsor: Undisclosed. Funding: \$95,850 – Hartsfield 34%, Swenson 33%, O'Hara 33%.

“Design for Satellite Structures Built In Space.” Sponsor: Undisclosed. Funding: \$99,900 – Hartsfield 34%, Swenson 33%, O'Hara 33%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hall Effect Thruster Characterization Through Potential, Magnetic, and Optical Measurements (AIAA 2017-0169) Nicholas Hyatt, Carl Hartsfield, David Cunningham; 55th AIAA Aerospace Sciences Meeting, 9 Jan 2017.

Thrust Coefficient Losses in Additively Manufactured Low Thrust Nozzles (AIAA 2017-170) Christopher Tommila, Carl Hartsfield; 55th AIAA Aerospace Sciences Meeting, 9 Jan 2017.

HAWKS, MICHAEL R., Department of Engineering Physics

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M. R. Hawks and B. J. Steward, “Telescope parameter trade studies for LWIR camera,” Air Force Institute of Technology, Wright-Patterson AFB, OH, June 2017 (DTIC No. AD1035034).

HESS, JOSHUAH, A., Capt, Department of Aeronautics and Astronautics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Roth, K, Swenson, E. D., and Hess, J.A., “Analysis of an Experimental Space Debris Removal Mission,” AIAA SPACE and Astronautics Forum and Exposition, AIAA SPACE Forum, (AIAA 2017-5346).

Prince, E.R., Cobb, R.G., Hess, J.A., “Optimal Slew-Rate-Limited Guidance for Combined Formation Establishment and Reconfiguration of Inspector Satellite with Exclusion Cone,” AAS 17-530, Feb 2017. 27th AAS/AIAA Space Flight Mechanics Meeting February 5-9, 2017, San Antonio, Texas.

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

J. C. Denton, D.D. Hodson, R.G. Cobb, L.O. Mailloux, M.R. Grimaila, G.B. Baumgartner, “A Model to Estimate Performance of Space-Based Quantum Communication Protocols Including Quantum Key Distribution Systems,” Journal of Defense Modeling and Simulation (JDMS), Nov 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

L.O. Mailloux, D.D. Hodson and M.R. Grimaila, “System-Level Considerations for Modeling Space-Based Quantum Key Distribution Architectures,” IEEE Systems Conference (SysCon 2017), Jan 2017.

HOGSED, MICHAEL R., Lt Col, Department of Engineering Physics

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Advancing Software Defined Radios for Use in Space Communications.” Sponsor: AFRL/RV. Funding: \$54,000.

JACQUES, DAVID R., Department of Systems Engineering and Management

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Shultz, D., Colombi, J., Jacques, D., and Cobb, R., “Model-based Engineering: Analysis of Alternatives for Optical Satellite Observation,” CSER 2017: 15th Annual Conference on System Engineering Research (CSER), Redondo Beach CA, Mar 23-25, 2017.

JOHNSON, KIRK, W., Lt Col, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Algorithms for Small-Satellite Formation Flying.” Sponsor: AFRL/RV. Funding: \$10,750.

LAKE, ROBERT A. Capt, Department of Electrical and Computer Engineering

LAURVICK, TOD V. Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Plasmonic Grating Geometries and Wavelength-Dependent Focus Depth in IR Detectors.” Sponsor: AFRL/RV. Funding: \$13,500.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. M. Sattler, R. A. Coutu, Jr., R. A. Lake, and T. Laurvick, “Engineering and modeling micro-porous surfaces for secondary electron emission control,” in 9th International Workshop on Multipactor, Corona and Passive Intermodulation, ESA/ESTEC - Noordwijk, The Netherlands, April 2017.

LINGENFELTER, ANDREW J., Capt, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“REBEL Satellite Simulator Automated Mass Balance System.” Sponsor: AFRL/RV. Funding: \$47,000 – Lingenfelter 90%, Swenson 10%.

LOPER, ROBERT D., Department of Engineering Physics

MAGNUS, AMY L., Department of Mathematics and Statistics

MARCINIAK, MICHAEL A., Department of Engineering Physics

MCCLORY, JOHN W., Department of Engineering Physics,

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

NAVA, OMAR A., Maj, Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Space Weather Impacts on HF Propagation.” Sponsor: AFRL/RV. Funding: \$33,750.

O’HARA, RYAN P., Maj, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Optimized, Integrated, and Additively Manufactured CubeSat Structural Bus.” Sponsor: Undisclosed. Funding: \$110,700 – O’Hara 34%, Hartsfield 33%, Swenson 33%.

PETROSKY, JAMES C., Department of Engineering Physics

RUTLEDGE, JAMES L., Maj, Department of Aeronautics and Astronautics

STEWART, BRYAN J., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Wide Area EO/IR Sensor Simulation for ISR Applications.” Sponsor: AFRL/RV. Funding: \$67,500.

“Sensor Data Fusion for Improved Target Detection and Location.” Sponsor: AFRL/RV. Funding: \$67,500.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M. R. Hawks and B. J. Stewart, “Telescope parameter trade studies for LWIR camera,” Air Force Institute of Technology, Wright-Patterson AFB, OH, June 2017 (DTIC No. AD1035034).

SWENSON, ERIC D., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Program Analyst for Integrated Air and Missile Defense.” Sponsor: MDA. Funding: \$173,559.

“Hybrid Flex Circuit Testing.” Sponsor: AFRL/RX. Funding: \$15,000 – Swenson 50%, Hartsfield 50%.

“Geoperceive.” Sponsor: Undisclosed. Funding: \$99,000 – Swenson 25%, Hartsfield 25%, Cobb 25%, Fuller 25%.

“Geoscan.” Sponsor: Undisclosed. Funding: \$98,000 – Swenson 25%, Hartsfield 25%, Cobb 25%, Fuller 25%.

TERZUOLI, ANDREW J., Jr., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D Hesser, L Lee, L Burchett, R Marhefka, A Terzuoli, R Wasky, “Structural and Electromagnetic Design Considerations for Very Large Space Antennas,” Proceedings of the 2017 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI), San Diego, CA, 9-14 July 2017.

D Smith, B Shelters, D Hesser, P Collins, J Fee, J Petrosky, A Terzuoli, C Yardim, “Effects of Ionospheric Scintillation on V and W Band Signals,” Proceedings of the 2017 IEEE Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting (APS/URSI), San Diego, CA, 9-14 July 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

D Smith, P Collins, J Fee, J Petrosky, A Terzuoli, and C Yardim, “Artificial Ionospheric Scintillation Effects on Communication Signals in the V and W Bands,” Proceedings of the 2017 Applied Computational Electromagnetics Society Conference (ACES 2017), Firenze, IT, 26-30 March 2017.

WIESEL, WILLIAM E., Jr., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Precision Onboard Orbit Determination.” Sponsor: Undisclosed. Funding: \$120,000.

REFEREED JOURNAL PUBLICATIONS

Wiesel, W. E., A Numerical, Literal, and Converged Perturbation Algorithm. Journal of the Astronautical Sciences, 2017, Vol. 64, pp. 251-266.

Wiesel, W. E., “Estimating Nongravitational Accelerations on High Area-to-Mass Ratio Objects,” Journal of Guidance, Control and Dynamics, Vol. 39, No. 6 (2016), pp. 1438-1443.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wiesel, W.E., “A KAM Tori Algorithm for Earth Satellite Orbits,” paper AAS 17-553, AAS/AIAA Astrodynamics Specialist Conference, Aug 20-24, 2017.

Adam T. Rich, Kenneth J. Stuart, and William E. Wiesel, “Stochastic Dynamics of and Collision Prediction for Low Altitude Earth Satellites,” paper AAS 17-582, accepted for the AAS/AIAA Astrodynamics Specialist Conference, Aug 20-24, 2017.

6.6. CENTER FOR TECHNICAL INTELLIGENCE STUDIES AND RESEARCH

Center for Technical Intelligence Studies and Research (CTISR)

Director 255-3636 x4558

Homepage: <http://www.afit.edu/CTISR>

6.6.1. DOCTORAL DISSERTATIONS

O'KEEFE, DANIEL S., *Oblique Longwave Infrared Atmospheric Compensation*. AFIT/ENP/DS/17S-030. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFRL/Ry.

MARTIN, JACOB A., *Passively Estimating Index of Refraction for Specular Reflectors using Polarimetric Hyperspectral Imaging*. AFIT/ENP/DS/16D-016. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: DTRA.

6.6.2. MASTER'S THESES

HALLADA, FRANCIS D., *The Fresnel Zone Light Field Spectral Imager*. AFIT/ENP/MS/17M-095. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: N/A.

6.6.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BAUER, KENNETH W., Department of Operational Sciences

BUTLER, SAMUEL D., Maj, Department of Engineering Physics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Butler, S. D., J. A. Ethridge, S. E. Nauyoks, and M. A. Marciniak. "Experimentally validated modification to Cook-Torrance BRDF model for improved accuracy," *Proc. SPIE*, 1040214 (2017).

CAYLOR, MICHAEL, J., Department of Engineering Physics

COBB, RICHARD G., Department of Aeronautics and Astronautics

FIORINO, STEVEN T., Department of Engineering Physics

FRANZ, ANTHONY L., Lt Col, Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

"Plenoptic Cameras for 3D Video." Sponsor: Undisclosed. Funding: \$7,150.

REFEREED JOURNAL PUBLICATIONS

Francis D. Hallada, Anthony L. Franz, Michael R. Hawks. *Fresnel zone plate light field spectral imaging*. *Optical Engineering* 56(8), 081811 (2017).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Francis D. Hallada, Anthony L. Franz, Michael R. Hawks, "Fresnel zone plate light field spectral imaging simulation," in *Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXIII*, David W. Messinger; Miguel Velez-Reyes, Editors, *Proceedings of SPIE Vol. 10198* (SPIE, Bellingham, WA 2017), 1019804.

FULLER, DANE F., Col, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Long Wave Polarimetric Imaging Research.” Sponsor: Undisclosed. Funding: \$150,000 – Fuller 20%, Gross 40%, Cobb 40%.

GROSS, KEVIN C., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-INT Fusion for Anomaly Detection.” Sponsor: Undisclosed. Funding: \$34,829 – Gross 25%, McBee 25%, Oxley 25%, Hopkinson 25%.

“Fuel Injection Diagnostics in Hypersonic Flow via Hyperspectral Imaging.” Sponsor: AFOSR. Funding: \$44,895.

“Fieldable Fireball In-situ and Remote Emission Spectroscopy Sensor Suite (F2IRES3).” Sponsor: Spectral Sciences. Funding: \$24,469.

“Remote Sensing Research Support ((RS)²).” Sponsor: Undisclosed. Funding: \$170,000 – Gross 4%, Oxley 36%, Steward 24%, Hopkinson 24%.

“Open Skies IR Target Study.” Sponsor: NASIC. Funding: \$118,000 – Gross 5%, Hawks 75%, Marciniak 10%, Steward 5%.

“Developing Physics-Based Machine Learning Algorithms to Exploit Hyperspectral Imagery.” Sponsor: AFRL/RY. Funding: \$50,000 – Gross 33%, Merkle 33%, Borghetti 33%.

REFEREED JOURNAL PUBLICATIONS

Daniel Baseley, Luke Wunderlich, Grady Phillips, Kevin Gross, Glen Perram, Stuart Willison, Rebecca Phillips, Matthew Magnuson, Sang Don Lee, Willie F. Harper Jr., “Hyperspectral analysis for standoff detection of dimethyl methylphosphonate on building materials,” Building and Environment, Vol 108, pp 135–142 (2016).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Amy Kerst, Kevin C. Gross, Evan P. Oren, Jeffrey R. Komives, Michael Rhoby, and Timothy Ombrello. “Preliminary Investigation of a Scramjet Flowfield with Hyperspectral Imaging Augmented by Large Eddy Simulation,” 33rd AIAA Aerodynamic Measurement Technology and Ground Testing Conference, AIAA AVIATION Forum, (AIAA 2017-3554), Denver, CO, 5-9 June 2017.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Shannon R. Young, Bryan J. Steward, Kevin C. Gross, “Development and validation of the AFIT scene and sensor emulator for testing (ASSET),” Proc. SPIE 10178, Infrared Imaging Systems: Design, Analysis, Modeling, and Testing XXVIII, 101780A (May 3, 2017).

Michael R. Rhoby, Amy M. Kerst, Kevin C. Gross, Timothy M. Ombrello, “Hyperspectral Imaging Diagnostics of a Scramjet Combustor Cavity,” presented at the 10th U.S. National Combustion Meeting of the Combustion Institute, College Park, MD, April 23-26, 2017.

Michael R. Rhoby, Kevin C. Gross, “Hyperspectral Imaging Diagnostics of a Laminar Hydrogen Flame,” presented at the 10th U.S. National Combustion Meeting of the Combustion Institute, College Park, MD, April 23-26, 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Jacob A. Martin, Kevin C. Gross, “Estimating Index of Refraction for Specular Reflectors Using Passive Polarimetric Hyperspectral (P-HSI) Radiance Measurements,” accepted for publication in *Optical Engineering*, 22 Jun 2017.

HAWKS, MICHAEL R., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

F.D. Hallada, A.L. Franz, M.R. Hawks, “Fresnel zone plate light field spectral imaging,” *Opt Eng* 56(8), 081811 (2017).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

F.D. Hallada, A.L. Franz, and M.R. Hawks, “Fresnel zone plate light field spectral imaging simulation,” Proceedings of the SPIE, Vol. 10198. doi:10.1117/12.2261846 (2107).

Anthony Gavrieladas, Vern Schlie, Robert Loper, Michael Hawks, and Glen Perram, “Unstable resonators for high power diode pumped alkali lasers,” Proc SPIE 10090-57, Photonics West, Feb 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M. R. Hawks and B. J. Steward, “Telescope parameter trade studies for LWIR camera,” Air Force Institute of Technology, Wright-Patterson AFB, OH, June 2017 (DTIC No. AD1035034).

B. J. Steward and M. R. Hawks. “End-to-End Model Enhancements and Hypothetical Detection Scenarios” Air Force Institute of Technology, Wright-Patterson AFB, OH, October 2016 (DTIC No. AD1020340).

M. R. Hawks and B. J. Steward, “IR Signatures of Non Afterburning Aircraft,” Air Force Institute of Technology, Wright-Patterson AFB, OH, 2016 (DTIC No. AD1020325).

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“A Cognitive Recommender System for a Closed Feedback Tasking Loop.” Sponsor: NPS. Funding: \$150,000 – Hopkinson 40%, McBee 10%, Oxley 40%, Schubert Kabban 5%.

HYDE, MILO W. IV, Maj, Department of Electrical and Computer Engineering

JACKSON, JULIE A., Department of Electrical and Computer Engineering

MARCINIAK, MICHAEL A., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Scattering Effects of Human Skin and Hair.” Sponsor: 711 HPW. Funding: \$50,000.

“Spectral, Polarimetric and Directionally Dependent Metrology of Infrared Metamaterials.” Sponsor: Undisclosed. Funding: \$65,540.

“Engineering Approach to Turbine-Engine Plume IR Signature.” Sponsor: AFRL/STO. Funding: \$13,949.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Paulec, M., Marciniak, M., Gross, K. and Azevedo, D., “Infrared signature measurements of a jet turbine using a hyperspectral imager for IR scene generation,” *Proceedings of the 2017 Meeting of the Military Sensing Symposium (MSS) Specialty Group on Electro-Optics and Infrared Countermeasure, Vol. 1, IE03* (2017).

Butler, S.D., Ethridge, J.A., Nauyoks, S.E. and Marciniak, M.A., “Experimentally validated modification to Cook-Torrance BRDF model for improved accuracy,” *Proc. SPIE 10402, 1040214(1-8)* (2017).

Lanari, A., Butler, S.D., Marciniak, M.A. and Spencer, M.F., “Wave optics simulation of statistically rough surface scatter,” *Proc. SPIE 10402, 1040215(1-9)* (2017).

MCCLORY, JOHN W., Department of Engineering Physics

OXLEY, MARK E., Department of Mathematics and Statistics

PERRAM, GLEN P., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Daniel Baseley, Luke Wunderlich, Grady Phillips, Kevin Gross, Glen Perram, Stuart Willison, Matthew Magnuson, Rebecca Phillips, Sang Don Lee, and Willie Harper “*Hyperspectral analysis for standoff detection of dimethyl methylphosphonate on building material*” *Building and Environment*, 108, 135-142, Aug 2016. [CTISR]

RICE, CHRISTOPHER A., Department of Engineering Physics

STEWART, BRYAN J., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Persistent Infrared Scientific and Analytical Support.” Sponsor: NASIC. Funding: \$200,000 – Steward 90%, Gross 10%.

“Stormy Haystack.” Sponsor: NGA. Funding: \$450,000 – Steward 40%, Hawks 50%, Gross 10%.

“National IR Detection and Tracking.” Sponsor: AFRL/RY. Funding: \$100,000 – Steward 60%, Hawks 30%, Gross 10%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Shannon R. Young, Bryan J. Steward, Kevin C. Gross, “Development and validation of the AFIT scene and sensor emulator for testing (ASSET),” *Proc. SPIE 10178, Infrared Imaging Systems: Design, Analysis, Modeling, and Testing XXVIII, 101780A* (May 3, 2017).

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M. R. Hawks and B. J. Steward, “Telescope parameter trade studies for LWIR camera,” Air Force Institute of Technology, Wright-Patterson AFB, OH, June 2017 (DTIC No. AD1035034).

B. J. Steward and M. R. Hawks. “End-to-End Model Enhancements and Hypothetical Detection Scenarios” Air Force Institute of Technology, Wright-Patterson AFB, OH, October 2016 (DTIC No. AD1020340).

M. J. Schwaab, B. J. Steward, and R. Greendyke, “Comparison of Burn Rate Models to Reaching Chemistry Model for HMX,” *International Mechanical Engineering Congress & Exposition, IMECE2016-68555*, Phoenix, AZ, 15 November 2016.

B. J. Steward and M. R. Hawks. "End-to-End Model Enhancements and Hypothetical Detection Scenarios," Air Force Institute of Technology, Wright-Patterson AFB, OH, October 2016 (DTIC No. AD1020340).

M. J. Schwaab, R. Greendyke, and B. J. Steward. "Comparison of Finite Chemistry Model to Mixture Pressure Dependent Burn Rate Model for HMX," Tri-Service Energetic Materials Basic Science Review, Arlington, VA, August 2016.

M. R. Hawks and B. J. Steward, "IR Signatures of Non Afterburning Aircraft," Air Force Institute of Technology, Wright-Patterson AFB, OH, June 2016 (DTIC No. AD1020325).

SWENSON, ERIC D., Department of Aeronautics and Astronautics

TERZUOLI, ANDREW J., Jr., Department of Electrical and Computer Engineering

7. TECHNOLOGY TRANSFER

7.1. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS

“UAV Positioning Experimentation Project (UPEP),” USAF CRADA No. 16-AFIT-22, Collaborator: ENSCO, Inc., Faculty Investigator: Dr. John F. Raquet, Effective Date: 11 October 2016, Term: 24 months.

“Sliding Scale Autonomy through Physiological Rhythm Evaluations (SAPHYRE),” USAF CRADA No. 17-AFIT-02, Collaborator: Wright State University, Faculty Investigator: Dr. Jeffery D. Weir, Effective Date: 26 June 2017, Term: 15 months.

“Intelligent Channel Sensing Based Secure Cross Layer Cognitive Networking for Resilient Space Communication,” USAF CRADA No. 17-AFIT-04, Collaborator: Wright State University, Faculty Investigator: Dr. Robert F. Mills, Effective Date: 24 August 2017, Term: 12 months.

“NDA - Video Gaming and Automated Agents,” USAF CRADA No. 17-AFIT-05, Collaborator: The Ohio State University, Faculty Investigator: Maj Christina F. Rusnock, Effective Date: 22 February 2017, Term: 12 months.

“NDA - Nanotube Technology,” USAF CRADA No. 17-AFIT-06, Collaborator: Nanocomp Technologies, Inc., Faculty Investigator: Dr. Richard F. Deckro, Effective Date: 11 April 2017, Term: 12 months.

“NDA - Intelligent Space and Aero Communication Systems,” USAF CRADA No. 17-AFIT-08, Collaborator: Blue Cranium, LLC dba Comsat Architects, Faculty Investigator: Dr. Robert F. Mills, Effective Date: 18 August 2017, Term: 12 months.

“Test and Evaluation of Autonomous Systems (TEAS),” USAF CRADA No. 17-AFIT-09, Collaborator: Wright State University, Faculty Investigator: Dr. Michael E. Miller, Effective Date: 24 August 2017, Term: 2 months.

“NDA - Review of Interactive Visualization of Computer Security Data (FY18),” USAF CRADA No. 17-AFIT-10, Collaborator: Vambrace, Inc., Faculty Investigator: Dr. Gilbert L. Peterson, Effective Date: 8 September 2017, Term: 12 months.

“Advanced Turbine Cooling,” USAF CRADA No. 17-AFIT-11, Collaborator: The Ohio State University, Faculty Investigator: Dr. Marc D. Polanka, Effective Date: 28 September 2017, Term: 12 months.

“Empirical Optimization of Additive Manufacturing,” USAF CRADA No. 17-AFIT-14, Collaborator: Universal Technology Corporation (UTC), Faculty Investigator: Maj Ryan O'Hara, Effective Date: 26 September 2017, Term: 36 months.

7.2. EDUCATIONAL PARTNERSHIP AGREEMENTS

“EPA - Perfluorinated Compound Water Contamination,” AFIT EPA 2017-01, Collaborator: University of Nebraska Medical Center, Faculty Investigator: Lt Col David Kempisty, Effective Date: 19 December 2016, Term: 36 months.

“EPA - Human Machine Teaming,” AFIT EPA 2017-02, Collaborator: Wright State University, Faculty Investigator: Dr. Michael E. Miller, Effective Date: 6 November 2016, Term: 36 months.

“EPA - Nanosatellites,” AFIT EPA 2017-03, Collaborator: Michigan Technological University, Faculty Investigator: Col Dane Fuller, Effective Date: 16 November 2016, Term: 48 months.

7.3. PATENTS

PATENT APPLICATIONS

Vaughan, S.L., Mills, R.F., Peterson, G.L., Grimaila, M.R., Rogers, S.K., Oxley, M.E., and Patterson, R.E., “Machine learning by construction of a Qualia Modeling Agent - method and apparatus,” filed 16 May 2017, Air Force Docket No. AFD-1680, US Serial No. 62/506,034 and 62/506,040. [CCR]

Miller, M.E. and Spencer, M.J., “Reactor for Treating water with Ultraviolet light from LEDs,” filed May 2017, Air Force Docket No. AFD-1522, US Serial No. 15/609,589.

Palazotto, Anthony N., “Hexakis Icosahedron Frame-Skin Vacuum Lighter than Air Vehicle,” Air For Docket No. AFD-1585P, US Serial No. 62/439,994.

Cain, Stephen C., Seal, Michael D., “Statistically applied Non-Uniformity Correction (SANUC),” Air Force Docket No. AFD-1753P, US Serial No. 62/560,249.

PATENTS AWARDED

Russi, J.G., Langhals, B.T., Miller, M.E., and Heft, E.L., May 2017. “Stereoscopic 3-D Presentation for Air Traffic Control Digital Radar Displays,” US Patent No. 9,667,947. [ANT]

Doyle, Daniel D., Jennings, Alan L., Black, Jonathan T., July 4, 2017. “Real-Time Camera Tracking Systems using Optical Flow Feature Points,” US Patent No. 9,696,404.

INVENTION DISCLOSURES

Milo W. Hyde IV and Santasri Bose-Pillai, “Generation of Vector Partially Coherent Optical Sources Using Phase-Only Spatial Light Modulators,” filed 3 May 17, Air Force Docket No. AFD-1689. [CDE]

Perram, Glen P., Rice, Christopher A., Haluska, Nathan D., “Diode Pumped Alkali Laser Extended to Novel Wavelengths via Two-Photon Pumping,” Air Force Docket No. AFD-1768. [CDE]

Polanka, Marc D., Rutledge, James L., Crabtree, Brian, Pickle, Carl, Harkless, Christopher, “Reverse Wake Minimizing Wind Tunnel Wake Generator,” Filed 20 Dec 16, Air Force Docket No. ADF-1633.

Kempisty, David M., Stubbs, John E., Russel, Morgan, “Water Treatment System-Cylindrical Teflon® Reactor containing Ultraviolet Light Emitting Diodes with Nano-Sized Tio₂,” filed 19 Jun 17, Air Force Docket No. ADF-1708.

Fiorino, Steven T., McCrae, Jack E., Schmidt, Jason, Zuraski, Steven M., Figlewski, Nathan M., Beecher, Elizabeth A., “Design for an Electro-Optic Testbed Utilizing a Dynamic Range Gated Rayleigh Beacon for Atmospheric Turbulence Profiling,” filed 11 Jul 17, Air Force Docket No. ADF-1721.

Palazotto, Anthony N., Chrissis, James, Schwemmer, Joseph R., “Four Foot Hexakis Icosahedron Vacuum Lighter than Air Vehicle,” filed 13 Jul 17, Air Force Docket No. ADF-1723.

Reber, Patrick A., Sweeney, Patrick J., Stephenson, Mark M., “Dynamic Attestation of Embedded Systems using Field Programmable Logic Arrays,” filed 14 Jul 17, Air Force Docket No. ADF-1725.

Lake, Robert A., Waggoner, Kullen W., Walton, John, Starman, Lavern A., “Segmented Control of Electrostatically Actuated Bi-Morph Beams,” filed 15 Aug 17, Air Force Docket No. ADF-1745.

Cain, Stephen C., Seal, Michael D., Yielding, Nicholas J., Catarius, Adroam, “Statistically applied Non-Uniformity Correction (SANUC),” filed 28 Aug 17, Air Force Docket No. ADF-1753.

APPENDICES

APPENDIX A: POST-DOCTORAL AND OTHER RESEARCH ASSOCIATES' CREDENTIALS

ARCHIBALD, AARON J.,

Research Engineer, Department of Engineering Physics, Appointment Date: 2016 (AFIT/ENP); BS, Engineering Physics, Wright State University, 2010; MS, Nanotechnology, Chuang Yuen Christian University, 2012. Mr. Archibald's research supports the efforts of the Airborne Aero-Optics Laboratory through design, fabrication and operation of experimental laser tracking system. Tel. 937-255-3636 x4758, email: Aaron.Archibald@afit.edu

BRECKLING, SEAN R.

Post-Doctoral Research Associate (through ORISE), Department of Mathematics and Statistics, AFIT Appointment Date: 2017 (AFIT/ENC); BS, University of Wisconsin-Milwaukee, 2010; PhD, University of Nevada, Las Vegas, 2017. Dr. Breckling's research interests include the numerical analysis of partial differential equations. His current research includes finite element analysis of perturbation models of the Navier Stokes equations, specifically in their ability to accurately resolve incompressible multi-physics flows at high Reynolds numbers. Tel. 937-255-6565 x4722, email: Sean.Breckling.ctr@afit.edu

CAHILL, ADAM D.,

AFNWC Post-doctoral Researcher (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, Electrical and Computer Engineering, University of Louisville, 2008; MEng, Electrical and Computer Engineering, University of Louisville, 2009; MS, Plasma Physics, Cornell University, 2014; PhD, Plasma Physics, Cornell University, 2016; Dr. Cahill's research is focused on the development of experimental and computational techniques to understand the response of aircraft skin to a thermal flash. Tel. 937-255-3636 x4698, email: Adam.Cahill.ctr@afit.edu

CAZALAS, EDWARD.,

Post-doctoral Researcher (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS, Astrophysics, BA Philosophy, Pennsylvania State University, 2007; MS, Nuclear Engineering, Oregon State University, 2009; PhD, Nuclear Engineering, Pennsylvania State University, 2015. Dr. Cazalas' research focuses on the application of nuclear and radiation physics and computational methods, specifically to the areas of radiation detection, dosimetry, electrical properties of 2D and thin film materials, and radiation damage/effects.

REFEREED CONFERENCE PAPERS

William J. Erwin, Edward Cazalas, John W. McClory, Justin A. Clinton, James R. Fee, Andrew W. Decker, "Modeling prompt gamma spectra at varying distances from a fast fission reactor," International Symposium on Reactor Dosimetry, Santa Fe, NM (2017).

William J. Erwin, Edward Cazalas, John W. McClory, Justin A. Clinton, James R. Fee, Andrew W. Decker, "Verification and validation of Monte Carlo N-Particle 6 (MCNP6) for evaluating shielding materials against gamma radiation," International Symposium on Reactor Dosimetry, Santa Fe, NM (2017).

REFEREED JOURNAL ARTICLES

Biddut K. Sarker, Edward Cazalas, Ting-Fung Chung, Isaac Childres, Igor Jovanovic, Yong P. Chen, "Position-dependent and millimetre-range photodetection in phototransistors with micrometre-scale graphene on SiC," Nature Nanotechnology Vol. 12, 668-674 (2017).

Edward Cazalas, Biddut K. Sarker, Isaac Childres, Yong P. Chen, Igor Jovanovic, "Modulation of graphene field effect by heavy charged particle irradiation," Applied Physics Letters Vol. 109, 253501 (2016).

DOBOSZCZAK, STEFAN

Post-Doctoral Research Associate (through ORISE), Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, Rensselaer Polytechnic Institute, 2010; PhD, University of Maryland - College Park, 2016. Dr. Doboszczak's research interests include partial differential equations, compressible fluids, multiphase flows, and problems on moving domains. His current research is on applications of control theory for compressible fluids. Tel. 937-255-6565 x4414, email: Stefan.Doboszczak.ctr@afit.edu

ELMORE, BRANNON, J.

Lead Software Developer (through Applied Research Solutions), Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Wright State University, 2014. His research efforts are focused on the continuous improvement of LEEDR and HELEEOS, the core applications of the AFIT Directed Energy and Atmospheric Models (ADAM) software package.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Schmidt, J., Fiorino S.T., J. Burley, and B. Elmore, "Multi-spectral Weather Cubes for atmospheric plume characterization," in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), San Francisco CA, (OSA, 27 June 2017).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., J. Schmidt, B. Elmore, and J. Burley, "Multi-spectral Weather Cubes and 4D Visualizations of Atmospheric and Radiative Effects," UK/US Directed Energy Workshop, Swindon, UK, 12-15 June 2017.

Schmidt, J.E., S.T. Fiorino, B.J. Elmore, J.L. Burley, and K.J. Keefer, "Evaluation of Probabilistic Climatology as a Determiner for HEL System Performance," Directed Energy Professional Society 19th Annual DE Symposium, Huntsville, AL (February 2017)

Burley, J.L., S.T. Fiorino, J.E. Schmidt, and B.J. Elmore, "4D Weather Cubes and CFLOS from Numerical Weather Prediction Data," Directed Energy Professional Society 19th Annual DE Symposium, Huntsville, AL (February 2017)

Fiorino, S.T., J. Burley, B. Elmore, J. Schmidt, "Weather Cubes and 4D Visualizations Including Cloud and Rain Fields Generated from Numerical Weather Prediction Data," 33rd Conference on Environmental Information Processing Technologies, 97th Annual American Meteorological Society Meeting, Seattle, WA, Jan 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Burley, J.L., S.T. Fiorino, B. Elmore, and J. Schmidt, 2017: "A Fast Calculating Two-Stream-Like Multiple Scattering Algorithm that Captures Azimuthal and Elevation Variations" in revision *J. Appl. Meteor. Climatol.*

ESHEL, BEN,

Post-Doctoral Research Associate (through SOCHE), AFIT Appointment Date: 2017 (AFIT/ENP); BA, Physics, Cornell University, 2011; MS, Applied Physics, Air Force Institute of Technology, 2013; PhD, Applied Physics, Air Force Institute of Technology, 2017. Dr. Eshel's work consists of modeling, developing and characterizing high-pressure, large-volume rare gas plasma discharges as gain media for potential near-infrared and mid-infrared laser systems with high-energy laser capability. Tel. 937-255-3636 x4743, email: Ben.Eshel.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Eshel, B., Rice, C. A., and Perram, G. P. "Saturation Spectroscopy in an optically opaque Ar plasma." *Submitted to Appl. Phys. B in Aug. 2017.*

Eshel, B., and Perram, G. P. "A five-level Ar-He discharge model for characterization of a diode-pumped rare gas laser." *Submitted to J. Opt. Soc. Am. B in Sep. 2017.*

HAMMEN, NATHANIEL T.

Post-Doctoral Research Associate (through ORISE), Department of Mathematics and Statistics, AFIT Appointment Date: 2016 (AFIT/ENC); BS, University of Houston, 2009; MS, University of Houston, 2012; PhD, University of Houston, 2015. Dr. Hammen's research interests include applied harmonic analysis, frame theory, and compressed sensing.

KABRE, JULIENNE

Post-Doctoral Research Associate (through ORISE), Department of Mathematics and Statistics, AFIT Appointment Date: 2017 (AFIT/ENC); BS, University of Ouagadougou, 1995; MS, Chicago State University, 2012; PhD, Illinois Institute of Technology, 2017. Dr. Kabre's research interests include numerical analysis of partial differential equations, mathematical modeling and statistical analysis. Her current research is on radial basis function analysis with application to high energy lasers. Tel. 937-255-6565 x4516, email: Julienne.Kabre.ctr@afit.edu

KANEL, SUSHIL R.,

Research Grants Engineer, 2015-2016 (AFIT/ENR); BE, Civil Engineering, Tribhuvan University (Nepal), 1992; MS, Environmental Science and Engineering, Gwangju Institute of Science and Technology (GIST) (South Korea), 2001; PhD, Environmental Science and Engineering, GIST (South Korea), 2006. Since August 2015, in addition to his RGE duties, Dr. Kanel has assisted AFIT faculty and students in the field of environmental and material research (physical chemical treatment, fate and transport of nanomaterials in the subsurface, as well as the application of nanomaterials for various purposes including water remediation). Tel. 937-255-3636 x4545, email: Sushil.Kanel@afit.edu.

REFEREED JOURNAL PUBLICATIONS

Kanel, S. R., Choi, H.. Removal of Arsenic from Groundwater by Industrial byproducts and its comparison with Zero-Valent Iron, J Hazardous Toxic and radioactive Waste (ASCE), 21:3, 1-7, 2017

Pokhrel, L, Ettore, N., Jacobs, Z.L., Zarr, A., Weir, M.H., Scheuerman, S. R. Kanel and Dubey R. Novel carbon nanotube (CNT)-based ultrasensitive sensors for trace mercury (II) detection in water: A review, 574, 1379-1388, 2017

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Russell, M., Kanel, S. R., Kempisty, D., Low-cost, low power technology to destroy organic pollutants in water: ultra-violet light emitting diodes and photo-catalysis, Environmental & Water Resources Institute (EWRI) Congress Conference, Sacramento CA, May 22-25, 2017.

Kanel, S. R., Al-Abed S., Fate and Transport of nanoscale zinc oxide in subsurface environment, 253rd ACS National Meeting, San Francisco, CA, April 2-6, 2017.

Russell, M., Kanel, S. R., Kempisty, D., Nano-sized TiO₂ thin film synthesis and characterization on quartz slides, borosilicate beads and quartz cylinders for use in photocatalytic degradation of organic contaminants, 253rd ACS National Meeting, San Francisco, CA, USA, April 2-6, 2017.

KEEFER, KEVIN J.,

Research Physicist (through Applied Research Solutions), Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Atmospheric Physics, United States Air Force Academy, 1981; MS, Systems Management, University of Southern California, 1983; MS Engineering Physics, Air Force Institute of Technology, 1985; PhD Solid State Physics, Air Force Institute of Technology, 1990; Measurement and Signature Intelligence Certificate, Air Force Institute of Technology, 2004. Dr. Keefer's research interests include atmospheric sciences with special emphasis on atmospheric radiative transfer effects for remote sensing and directed energy applications; microphysical and radiative effects associated with atmospheric molecular and aerosol constituents; and military/geo-political history and implications for development of current and future national security strategy.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Schmidt, J.E., S.T. Fiorino, B. E. Elmore, J. L. Burley, K.J. Keefer. "Evaluation of Probabilistic Climatology as a Determiner for HEL System Performance." Paper presented at the Nineteenth Annual Directed Energy Symposium, Huntsville, AL February 2017.

Fiorino, S. T., K.J. Keefer, B.E. Elmore, D.L. Rigdon, J.E. Schmidt, "Evaluation of HEL System Performance by Coupling Weather Cubes and the Weather Effects Metric." Poster presented at the Twelfth Annual Directed Energy Systems Symposium, Monterrey, CA September 2017.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fiorino, S.T., S. Bose-Pillae, K.J. Keefer, and B.E. Elmore, "HEL-JTO / DEPS Short Course: High Energy Laser End to End Operational Simulation (HELEEOS)." Course sponsored by outside agencies. Air Force Institute of Technology, Wright-Patterson AFB, OH. (March 2017).

Paulding, M., S.T. Fiorino, K.J. Keefer, and B.E. Elmore, "4D Weather Effects Visualization for Speed of Light Combat," DOD High Performance Computing Modernization Program High Performance Computing Intern Program Proceedings, Lorton, VA (March 2017)

Tsai, E., K.J. Keefer, S.T. Fiorino, and B. E. Elmore, "4D Laser Performance Visualization for Speed of Light Effects," DOD High Performance Computing Modernization Program High Performance Computing Intern Program Proceedings, Lorton, VA (March 2017).

Fiorino, S.T., K.J. Keefer, C.A. Rice, J.L. Burley, and J.E. Schmidt, "Characterizing multispectral vertical profiles of aerosol extinction with surface-based measurements," in Imaging and Applied Optics 2017 (3D, AIO, COSI, IS, MATH, pcAOP), OSA Technical Digest (online) (Optical Society of America, June 2017), paper PTu1D.1.

LUTZ, JESSE J.,

Research Assistant Professor of Chemistry (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Chemistry, Grand Valley State University, 2006; PhD, Physical Chemistry, Michigan State University, 2011. Dr. Lutz's research involves the development of new modeling methods for photovoltaic and excitonic materials with applications in renewable energy technologies and quantum information systems. Recent research has been concerned with characterization of the structure and spectral signatures of solid-state defects and nanoclusters, modeling relativistic and finite-nucleus effects in molecules containing heavy atoms, and development of ab initio many-body electronic structure methods for the accurate prediction of energies, geometries, and properties of molecular systems. Tel. 937-255-3636 x4241, email: Jesse.Lutz.ctr@afit.edu.

REFEREED JOURNAL PUBLICATIONS

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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APPENDIX B: SELECTED ACRONYM LIST

There are a number of abbreviations for organizations that are used in this report. This alphabetical listing includes only selected organizations.

711 HPW/RH	711 th Human Performance Wing Human Effectiveness Directorate
ACC	Air Combat Command
AETC	Air Education and Training Command
AFCAA	Air Force Cost Analysis Agency
AFCEC	Air Force Civil Engineering Center
AFGSC	Air Force Global Strike Command
AFIA	Air Force Inspection Agency
AFIMSC	Air Force Installation and Mission Support Center
AFIT	Air Force Institute of Technology
AFLCMC	Air Force Life Cycle Management Center
AFMC	Air Force Materiel Command
AFMOA	Air Force Medical Operations Agency
AFMSA	Air Force Medical Support Agency
AFNWC	Air Force Nuclear Weapons Center
AFRCO	Air Force Rapid Capability Office
AFRL	Air Force Research Laboratory
AFRL/AFOSR	AFRL/Air Force Office of Scientific Research
AFRL/RD	AFRL/Directed Energy Directorate
AFRL/RI	AFRL/Information Directorate
AFRL/RQ	AFRL/Aerospace Systems Directorate
AFRL/RV	AFRL/Space Vehicles Directorate
AFRL/RW	AFRL/Munitions Directorate
AFRL/RX	AFRL/Materials and Manufacturing Directorate
AFRL/RY	AFRL/Sensors Directorate
AF PACE	Air Force Profession of Arms Center of Excellence
AFSC	Air Force Sustainment Center
AFSPC	Air Force Space Command
AFTAC	Air Force Technical Applications Center
AFTPS	Air Force Test Pilot School
AFWA	Air Force Weather Agency
AIAA	American Institute of Aeronautics and Astronautics
AMC	Air Mobility Command
AMEDD	United States Army Medical Department
AMRDEC	Aviation and Missile Research Development and Engineering Center
ASEE	American Society for Engineering Education
ATEC	United States Army Test and Evaluation Command
CAA	Center for Army Analysis
CPM	College of Performance Management
CSDL	The Charles Stark Draper Laboratory, Inc
CyTCoE	Cyberspace Technical Center of Excellence
DAGSI	Dayton Area Graduate Studies Institute
DARPA	Defense Advanced Research Projects Agency
DASD	Deputy Assistant Secretary of Defense
DAU	Defense Acquisition University
DEJTO	Directed Energy Joint Technology Office
DHS	Department of Homeland Security
DISA	Defense Information Systems Agency
DOD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency
EPA	Environment Protection Agency

ERDC	Engineer Research and Development Center
EUCOM	United States European Command
FEMA	Federal Emergency Management Agency
FORSCOM	United States Army Forces Command
IEEE	Institute of Electrical and Electronics Engineers
INCOSE	International Council on Systems Engineering
JASPO	Joint Aircraft Survivability Program Office
JTWC	Joint Typhoon Warning Center
JWAC	Joint Warfare Analysis Center
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LTS	Laboratory for Telecommunications Sciences
MDA	Missile Defense Agency
MIT	Massachusetts Institute of Technology
MORS	Military Operations Research Society
NAMRU-D	Naval Medical Research Unit - Dayton
NASA	National Aeronautics and Space Administration
NASIC	National Air and Space Intelligence Center
NAVSEA	Naval Sea Systems Command
NGA	National Geospatial-Intelligence Agency
NHSRC	National Homeland Security Research Center
NNSA	National Nuclear Security Administration
NPS	Naval Postgraduate School
NSA	National Security Agency
NSF	National Science Foundation
ODASD	Office of the Deputy Assistant Secretary of Defense
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
OSD	Office of the Secretary of Defense
PACAF	United States Pacific Command
SAF	Office of the Secretary of the Air Force
SCOW	635 Supply Chain Operations Wing
SERDP	Strategic Environmental Research and Development Program
SMC	Space and Missiles Systems Center
SPIE	The International Society for Optical Engineering
TuAF	Turkish Air Force
USAACE	United States Army Aviation Center of Excellence
USAF	United States Air Force
USAFA	United States Air Force Academy
USSOCOM	United States Special Operations Command
USSTRATCOM	United States Strategic Command
USTRANSCOM	United States Transportation Command
WPAFB	Wright-Patterson Air Force Base

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