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Air Force Institute of Technology

Research Report 2016

Period of Report: 1 Oct 2015 to 30 Sep 2016

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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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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Air Force Institute of Technology Research Report 2016 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. To maximize value, AFIT's research efforts address strategic priorities identified in guidance such as the *USAF Strategic Master Plan (May 2015)*.

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 and human-machine systems, exploring energy security strategies, and developing defense-related additive manufacturing applications. AFIT advises over 30 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



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1. INTRODUCTION

1.1. OVERVIEW

This Research Report presents the FY16 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 Dr. Michael J. Caylor, 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](#) 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
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
Turbine Aerodynamics
Weapon Aerodynamics

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

Advanced Security-Focused Computing Architectures
Artificial Intelligence
Automatic Target Recognition
Communications/Radar
Computer Communication Networks
Cryptography
Cyber Operations and Security
Electromagnetics/Low Observables
Electro-Optics

Evolutionary Algorithms
Guidance, Navigation, and Control
Hardware Assurance
Information Visualization
Micro- and Nanosystems
Parallel and Distributed Processing
Signal and Image Processing
Software Protection
Wireless Networks
Wireless Sensor Networks

The [Department of Engineering Physics](#) 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, as well as the **Center for Directed Energy** and **Center for Technical Intelligence Studies and Research**. The following list highlights the Department's research specialties within these programs:

Adaptive Optics, Aero-Optics and Beam Control
Atmospheric Characterization and Compensation
Atmospheric Effects on Weapons Systems
Atmospheric Electricity
Aviation Weather Forecasting
Biological and Chemical Weapon Technologies
Computational Physics
Defects in Crystalline Solids
Directed Energy Weapons Effectiveness
High Energy Density Physics
Imaging Science
Lasers and Electro-Optics
Muon Detection
Materials – Bio, Nuclear and Sensor
Microscopic Imaging of Surfaces
Modeling and Simulation of Atmospheric Effects

Molecular Reaction Dynamics
Nanomaterials
Nanomechanics
Nuclear Forensics
Nuclear Survivability
Nuclear Weapons Effects
Numerical Weather Prediction
Physics-Based Scene Modeling
Positron Spectrometry
Radiation and Particle Detection
Radiation Effects on Materials and Electronics
Radiation Transport
Remote Sensing and Signature Analysis
Satellite Meteorology
Semiconductors
Space Physics
Tropical Cyclone Analysis and Forecasting
Weather Radar

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

Acoustic Wave Scattering
Bayesian Analysis
Biostatistics
Categorical Data Analysis
Control Theory
Data Analytics
Design of Experiments
Electromagnetics
Fluid Dynamics
Functional Analysis

Information Fusion
Nonlinear Waves
Numerical Analysis
Optimization
Partial Differential Equations
Rarefied Gas Dynamics
Regression Modeling
Stochastic Processes
Structural Health Monitoring
Wavelets

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
Enterprise Level Depot Sustainment
Evaluation of Autonomous Systems
Facility Location Optimization
Force Structure Analysis Tool Development
Irregular Warfare Model Development
Materials Research Test Planning
Modeling and Simulation

Network Analysis
Repair Network Integration
Robust Decision Making
Robust Mobility Modeling
Social Network Modeling and Analysis
Supply Chain Management and Resource Optimization
Test and Evaluation

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:

Applied Environmental Sciences
Computer and Network Security
Construction Management
Cost Analysis
Design and Analysis of Experiments
Ecological Engineering
Emergency Management
Facility and Infrastructure Management
Fuels Microbiology
Geographical Information Science
Human Systems Integration
Human-Agent Interaction
Image and Display Science
Information Assurance and Security
Infrastructure Asset Management
Knowledge Management
Model-Based Systems Engineering

Neck Injury Biomechanics
Occupational/Environmental Exposures
Operations Research
Organizational Change
Physiologically-Based Pharmacokinetic Modeling Analysis
Product Design and Development
Project Management
Reliability Engineering
Strategic Decision Support
Structural Health Monitoring
Surface Science
Sustainability and Life Cycle Assessment
Systems Engineering
Unmanned Air System Design and Test Vigilance

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/NAVPAR.

The **Center for Cyberspace Research (CCR)** conducts cutting-edge research in all aspects of cyberspace operations, including offense/exploitation, network defense, vulnerability analysis, critical infrastructure protection, human factors, and reverse engineering. Under CCR's leadership, AFIT has been designated by the National Security Agency as a Center of Academic Excellence in Cyber Operations and in Information Assurance Research. AFIT/CCR also plays a prominent role in developing the Air Force's cyberspace operations workforce through execution of the Cyber 200 and Cyber 300 professional continuing education courses. Through these programs,

AFIT/CCR helps produce a cadre of technically educated leaders for the DOD and Federal Government. Finally, as the Air Force's Cyberspace Technical Center of Excellence, CCR faculty and staff advise Air Force and DOD leaders on issues related to force development, cyberspace education, and research activities.

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.

BRIDGMAN, CHARLES J., Professor Emeritus of Nuclear Engineering, Department of Engineering Physics, Fellow of the American Nuclear Society.

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

ELROD, WILLIAM E., 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 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.

HENGHELD, 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, 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 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., Associate 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 Deputy Department Head, Department of Operational Sciences, Fellow of the Southwestern Ohio Council for Higher Education

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)

BINDEWALD, JASON M., Capt, Level 1 Engineering acquisitions certification

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

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

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

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

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

GOLDEN, ERIC M., Maj, APDP Level II Certification – SPRDE Science and Technology Manager, APDP Level II Certification – SPRDE Systems Engineer, APDP Level I Certification – Program Management

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)

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

KEMPISTY, DAVID, Lt Col, Professional Engineer (State of Michigan)

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

LAKE, ROBERT A., Capt, Science and Technology Management Level III.

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

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)

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)

***QUINN, DENNIS W.**, Professional Engineer, (State of Ohio)

RAMSEY, BENJAMIN W., Maj, Certified Information System Security professional (CISSP)

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

RICE, MASON J., LTC, Certified Information System Security Professional (CISSP)

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

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

SHELLEY, MICHAEL L., Certified Air Force Hearing Conservationist

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)

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

VALENCIA, VHANCE V., Maj, Professional Engineer (State of North Carolina)

*Emeritus faculty

2.3 RESEARCH AND TEACHING AWARDS

2.3.1 FACULTY

AKERS, BENJAMIN F,

ENC Instructor of the Quarter, 2016 Winter Quarter.

BADIRU, ADEDEJI B,

Air Education and Training Command National Public Service Award.

2016 Outstanding Global Engineering Education Award, Industrial Engineering and Operations Management (IEOM) award, September 2016, Detroit, MI

COBB, RICHARD G,

2015 Air University Team of the Year Award, Center for Space Research and Assurance

COUTU, RONALD A., Jr.,

Eta Kappa Nu (HKN), Key Chapter Award – Faculty Advisor; Eta Kappa Num (HKN), Outstanding Teaching Award, ENG Faculty Instructor of the Year.

CROWE, DARRELL S., Maj,

2015 Southwest Ohio Council for Higher Education (SOCHE) Excellence in Teaching Award

DECKRO, RICHARD F.,

1st Editor Emeritus, Military Operations Research, 2016

DOUGLAS, MATTHEW A., Lt Col,

2016 AFIT Faculty Research Fellow

FEE, JAMES R. Jr., Lt Col,

Charles Brothers' "Outstanding Volunteer Service Award," March 2016

FICKUS, MATTHEW C,

ENC Instructor of the Year, June 2016

FREELS, JASON K., Maj,

The Lloyd S. Nelson Award: Awarded by the American Society for Quality (Statistics Division)

GUNAWARDENA, SANJEEV,

Civilian Cat III Award, 2016 1st Quarter, School of Engineering and Management, Air Force Institute of Technology, April 2016

HARPER, WILLIE F., Jr.,

2016 John L. McLucas Basic Research Award

HAVRILLA, MICHAEL J.,

Board of Directors Member, Antenna Measurement techniques Association (AMTA), January 2016.

HAZEN, BENJAMIN T., Maj,

2016 Faculty Excellence Award, Southwestern Ohio Council for Higher Education

HILL, RAYMOND R.,

2016 Air Force Outstanding Science and Engineering Educator Award

LOPER, ROBERT D.,

2015 SOCHE Faculty Excellence Award, October 2015

MARTIN, RICHARD K.,

Presidential Volunteer Service Award (silver level), AFIT Engineers Week Team. June 2015;
Presidential Volunteer Service award (gold level), AFIT-NASIC team, May 2016.

MIXON, DUSTIN G., Maj,

ENC Instructor of the Quarter, 2015 Fall Quarter.

OVERSTREET, ROBERT E., Lt Col,

2016 Professor of the Year, Advanced Studies of Air Mobility (ASAM) Program

2016 Outstanding Reviewer (IJLM), Emerald Literati Network Awards for Excellence

PETERSON, JESSE D., Maj,

ENC Instructor of the Quarter, 2016 Summer Quarter.

RAMSEY, BENJAMIN W., Maj,

Best MS Paper at ICCWS' 16 for "Z-Ranger: An Improved Tool Set for ZigBee Warwalking"

REEDER, MARK F.,

Best Technical Presentation – Fluid Dynamics, 41st AIAA Dayton Cincinnati Aerospace Science Symposium, Mar 2016, Research Title: "Flight Tests Conducted to Analyze a Store Experiencing Cavity Flow"

REEGER, JONAH A., Capt,

ENC Instructor of the Quarter, 2016 Spring Quarter

RICE, MASON J., LTC,

Co-author of Top Rated Paper at 10th Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection SRI International, March 2015

RUGGLES-WRENN, MARINA B.,

2015 American Society of Mechanical Engineers (ASME) Pressure Vessel and Piping Division Certificate of Appreciation

RUSNOCK, CHRISTINA, F., Maj,

2016, AETC Educator of the Year, Air University, Maxwell AFB, AL

2016, Safety, Human Factors, and Ergonomics Track Best Paper Award, Institute of Industrial and Systems Engineers

2016, Outstanding Military Faculty Award, Military Officers Association of America

2015 Presidential Volunteer Service Award – Gold (Team Category), Corporation for National and Community Service

2015, Best Poster Award, 2015 Fall Technical Symposium of the Cincinnati-Dayton Chapter of INFORMS

STONE, BRIAN B., Maj,

Air Force Institute of Technology Field Grade Officer of the Quarter, Third Quarter 2015

Combined Air Operations Center, Strategy Division, Field Grade Officer of the Quarter, Second Quarter 2016

SWENSON, ERIC D.,

2015 Air University Team of the Year Award, Center for Space Research and Assurance

TERZUOLI, ANDREW J.,

Annual Citation from IEEE – local joint chapter chair

WHITE, EDWARD D. III,

Dr. Leslie M. Norton Teaching Excellence Award, March 2016

2.3.2 STUDENTS

BOARDMAN, NICHOLAS T.,

2016 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Operational Sciences.
Thesis title: "Heterogeneous Air Defense Battery Location: A Game Theoretic Approach."

BIHL, TREVOR J.,

Civilian Student of the Year

CAMMARATA, JASON A.,

American Nuclear Society Best Thesis Award, March 2016

DEGUZMAN, ERIC D.,

Information Security and Information Operations Academic Research Excellence Award (Association of Old Crows)

FITCH, KYLE E.,

2016 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Engineering Physics.
Thesis title: "Evaluation of the Visible Infrared Imaging Radiometer Suite Cloud Base Height Pixel-Level Retrieval Algorithm for Single-Layer Water Clouds."

FITZPATRICK, BRIAN J.,

2016 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Systems Engineering and Management. Thesis title: "Determining the Optimal Work Breakdown Structure for Defense Acquisition Contracts."

FRANDSEN, BRIAN,

2016 Louis F. Polk Award that recognizes a graduating student who has made an advanced contribution to his/her professional field in direct furtherance of the objectives of the National Defense Industrial Association.

GRAVES, W. THOMPSON Jr.,

2016 Chancellor's Award for the most exceptional master's thesis by a graduating student. Thesis title: "Topology Optimization of a Penetrating Warhead."

2016 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Aeronautics and Astronautics. Thesis title: "Topology Optimization of a Penetrating Warhead."

GULOTTA, PAUL A.,

Art-in-Science Award (3rd Place) – 41st AIAA Dayton Cincinnati Aerospace Science Symposium, Mar 2016

HESS, JOSHUA A.,

Best Technical Presentation – Space Dynamics, 41st AIAA Dayton Cincinnati Aerospace Science Symposium, Mar 2016, Research Title: "Alternate Numerical Solutions to Wahba's Problem for Satellite Attitude Determination."

IGUCHI, TAKAYUKI,

2016 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Mathematics and Statistics. Thesis title: "Clustering Theory and Data-Driven Health Care Strategies."

KODAMA, CHRISTOPHER H.,

2016 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Electrical and Computer Engineering. Thesis title: "Tunable Terahertz Metamaterials with Germanium Telluride Components."

KAPLAN, SERGEY M.,

Best Student Paper – 2015 SEM Annual Conference & Exposition, Research Title: "Measurement of the Electromechanical Response of Capacitors in Dynamic Loading Conditions."

KOSTRUBALA, KAZIMIR M.,

ASAM Honors Graduate

LUKACS, MATHEW W.,

Piergiorgio L.E. Uslenghi Prize Paper Award on antennas and Wireless Propagation, IEEE Antenna and Propagation Society, May 2016

MAYWALD, JACOB,

2016, 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.

MILLER, ALLEN R.,

Student Field Grade Officer of the Year

ROBERTS, MATTHEW,

Outstanding Reviewer at Midwest Academy of Management Conference

SHALLCROSS, NICHOLAS,

2016 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.

WIESE, CONNOR J.,

Best Technical Presentation – Propulsion and Heat Transfer, 41st AIAA Dayton Cincinnati Aerospace Science Symposium, Mar 2016, Research Title: “Comparison of Adiabatic Effectiveness Measurements Obtained from Pressure Sensitive Paint and Infrared Thermography Techniques.”

WHITE, ANTHONELLI,

Best Student Paper at Midwest Academy of Management Conference

YOUNG, SHANNON R.,

“Best Communicated Research Project” at NGA Persistent Infrared Tech Forum, Nov 2015

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 FY16, 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)*	140	17	35	24	23	21	20
Number of Research Faculty (FTE)	11	0	1	9	1	0	0
Refereed Publication Authorships**	250	26	47	51	41	39	46
Refereed Conferences on the Basis of Full Paper Review**	187	5	85	30	18	25	24
Refereed Conferences on the Basis of Abstract Review**	153	5	50	37	18	6	37
Sponsor Funded Projects***	230	7	64	60	30	17	51
Books & Chapters in Books**	20	3	8	0	5	3	1
Patents****	4	0	1	1	0	0	2
Doctoral Dissertations Advised	40	3	12	7	4	1	13
Master's Theses Advised	242	8	54	30	39	56	55
Graduate Research Papers Advised	22	0	0	0	22	0	0

*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

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*	148	32	28	19	20	31	18
Refereed Publication Authorships**	96	13	30	22	27	2	2
Refereed Conferences on the Basis of Full Paper Review**	92	36	24	18	11	3	0
Refereed Conferences on the Basis of Abstract Review**	78	23	4	19	14	11	7
Sponsor Funded Projects	138	30	23	26	25	18	16
Books & Chapters in Books**	10	1	6	0	3	0	0
Patents***	1	0	1	0	0	0	0
Doctoral Dissertations Advised	21	6	6	2	4	2	1
Master's Theses Advised	110	26	18	2	37	24	3
Graduate Research Papers Advised	21	0	0	0	21	0	0

*Some faculty are affiliated with multiple centers.

**Publications/Presentations are counted by faculty authorships.

***Includes: Patents awarded, patent applications, and invention disclosures

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 91% 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.

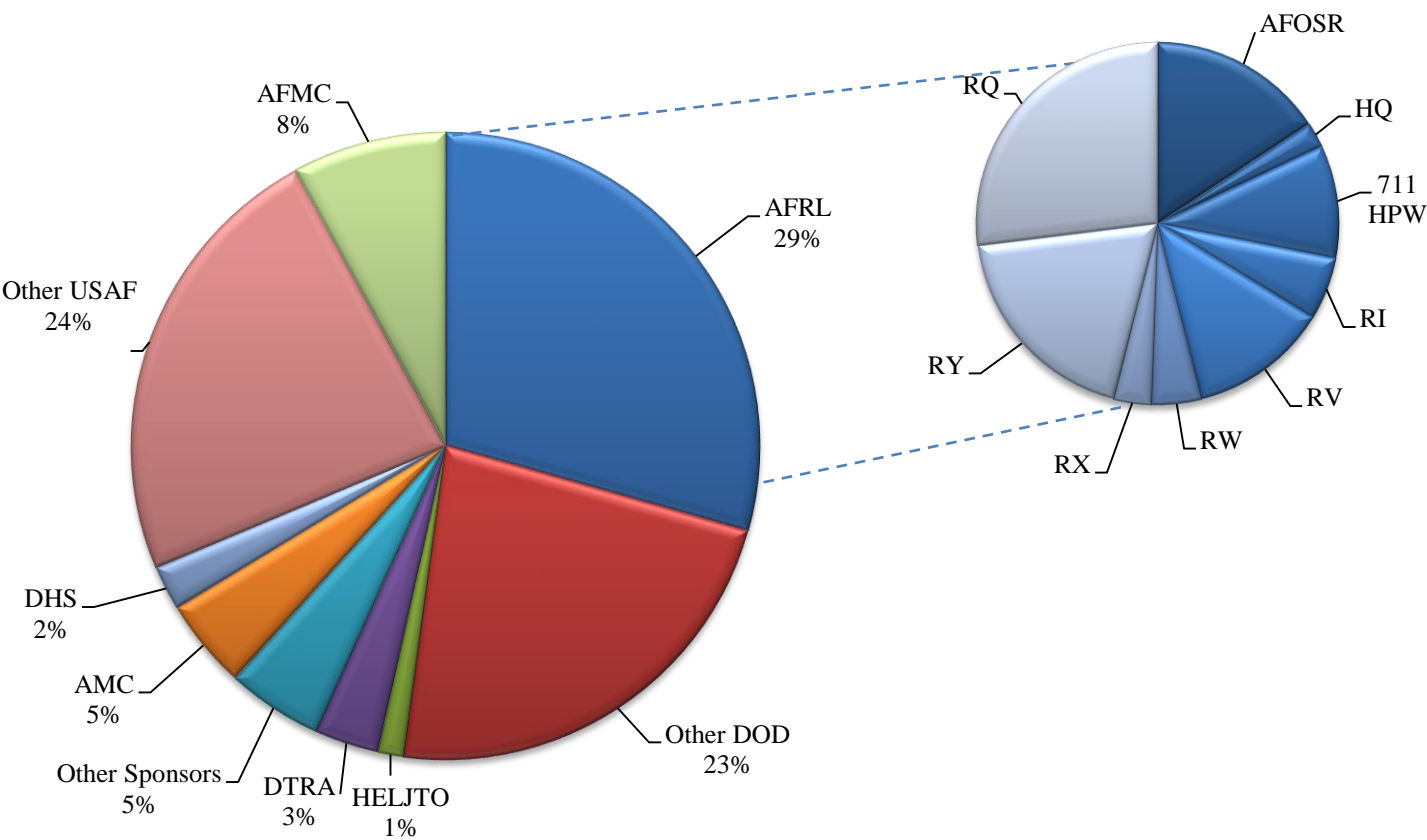


Figure 3.1 Sponsors of AFIT Theses, Dissertations, and Graduate Research Papers

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	1
HQ UNITED STATES AIR FORCE	1	10	4	
AIR COMBAT COMMAND		6	6	
AIR EDUCATION AND TRAINING COMMAND				
AIR FORCE MATERIEL COMMAND	1	6		4
46 th Test Group				1
96 th Test Group		2		
746 th Test Squadron				1
812 th Test Squadron				1
Air Force Life Cycle Management Center	1	10		11
Air Force Nuclear Weapons Center	1	2		1
Air Force Research Laboratory (AFRL)		2		
711 Human Performance Wing (RH)	1	8		8
Air Force Office of Scientific Research (AFOSR)	6	8		30
Aerospace Systems Directorate (RQ)	5	19		18
Directed Energy Directorate (RD)				5
Information Directorate (RI)	1	4		5
Materials & Manufacturing Directorate (RX)	1	2		8
Munitions Directorate (RW)		4		9
Sensors Directorate (RY)	4	13		19
Space Vehicles Directorate (RV)		11		4
Air Force Test Pilot School		1		1
AIR MOBILITY COMMAND		3	11	1
AIR FORCE SPACE COMMAND		1		
AIR FORCE SPECIAL OPERATIONS COMMAND		1		
USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS				
Air Force Civil Engineer Center		4		1
Air Force Cost Analysis Agency		1		
Air Force Inspection Agency				1
Air Force Technical Application Center				2
Air Force Weather Agency		5		
National Air and Space Intelligence Center		1		7
US Air Force Academy		1		
OTHER DEPARTMENT OF DEFENSE		4		31
Defense Advanced Research Projects Agency	1			1
Defense Information Systems Agency		1		
Defense Threat Reduction Agency	1	9		5
High Energy Laser Joint Technology Office	2	2		6
Joint Aircraft Survivability Program Office	1			1
Joint Warfare Analysis Center				3
Laboratory for Telecommunications Sciences		2		
Missile Defense Agency	1	1		1
National Geospatial-Intelligence Agency		3		
National Security Agency		1		2
Office of the Secretary of Defense		9		4
United States Army		9		9
United States Navy		2		6
US Special Operations Command				1
US Transportation Command		3		2

OTHER FEDERAL AGENCIES				
Department of Energy				2
Department of Homeland Security		4		2
Domestic Nuclear Detection Office	1	2		
Environmental Protection Agency		3		2
National Aeronautics and Space Administration				2
National Science Foundation				1
NON-FEDERAL AGENCIES				
Argentine Air Force Materiel General Directorate		1		
Brazilian Armed Forces		1		
Creare, Inc				1
Directed Energy Professional Society				1
Innoflight, Inc				1
Lincoln Laboratory - MIT		3		
Lockheed Martin		3		2
MZA Associates Corporation	1			1
Power Fingerprinting, Inc				1
Raytheon Space and Airborne Systems				1
Saudi Air Force		1		
Spectral Sciences, Inc				1
The Optical Sciences Company				1
The Charles Stark Draper Laboratory, Inc		1		
Turkish Air Force		2		
*TOTALS	30	193	22	230

*NOTE: Some student publications have multiple sponsors; See App B for Selected Acronym List

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 FY16.

Figure 3.2 New Award History FY07-FY16

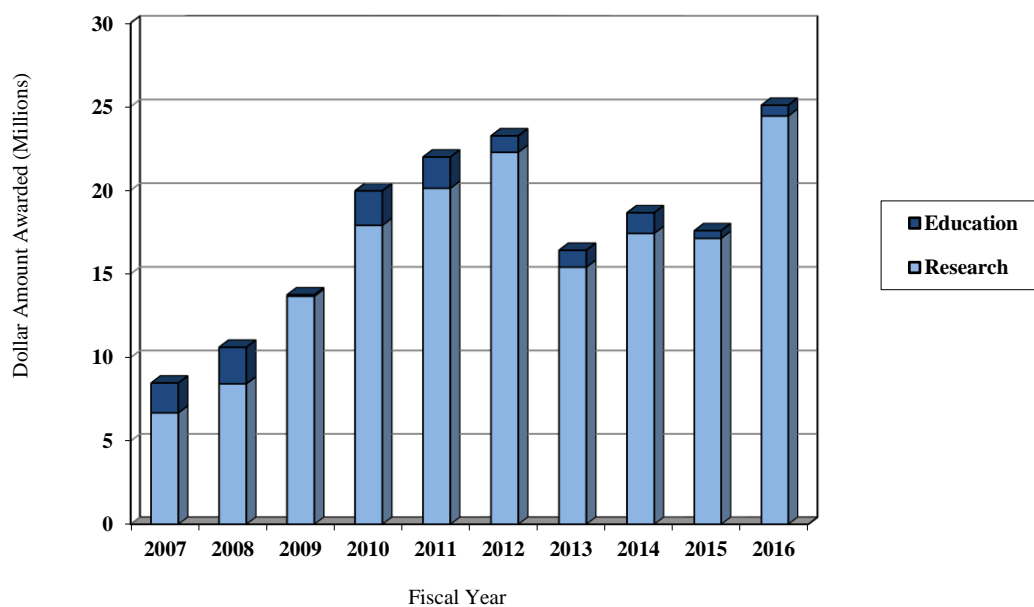


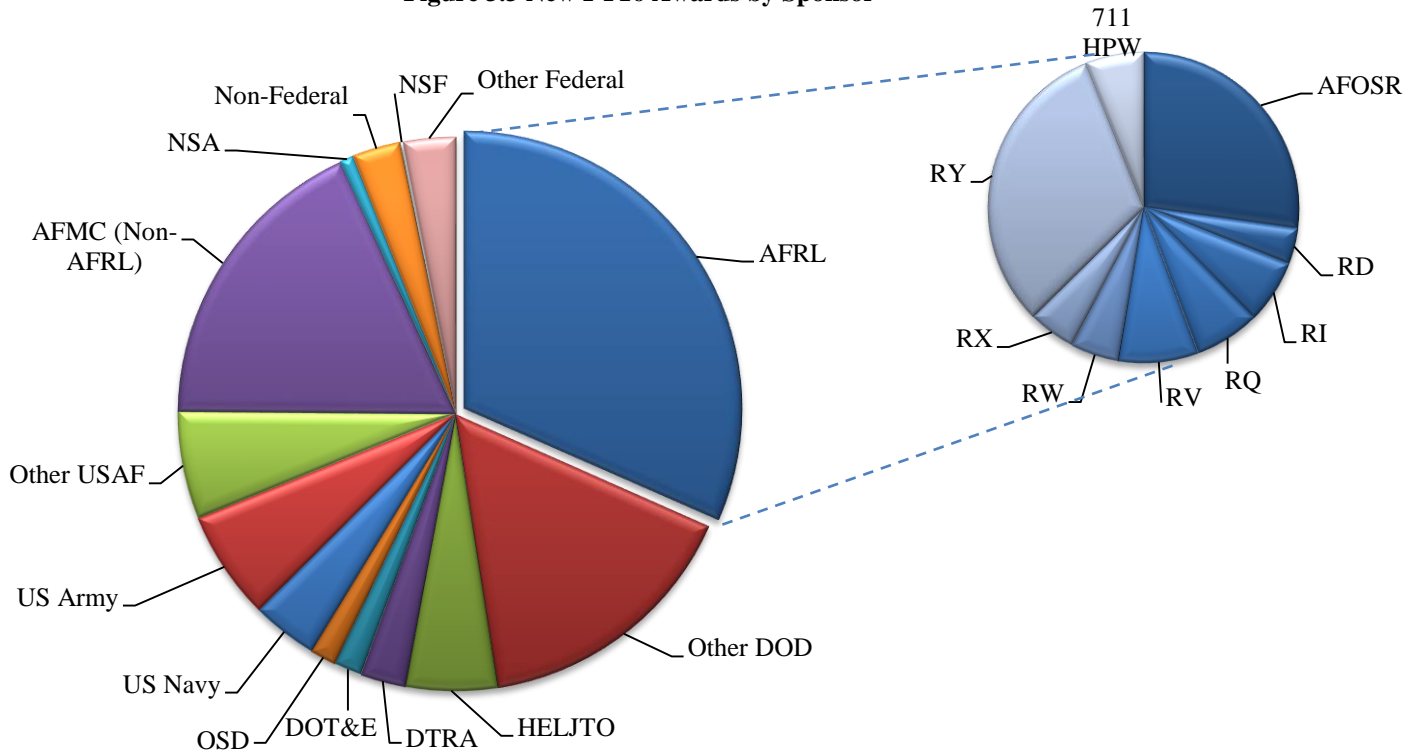
Table 3.3 FY16 External Funding & Research Expenditures for Academic Departments & Research Centers (\$1,000's)

Department	Newly Awarded Research Projects		Newly Awarded Education Projects		Total FY16 Newly Awarded Projects		Total FY16 Research Expenditures
	#	\$k	#	\$k	#	\$k	\$k
Mathematics & Statistics (ENC)	7	544	-	-	7	544	458
Electrical & Computer Eng (ENG)	62	6,225	3	196	65	6,421	5,836
Engineering Physics (ENP)	57	5,576	2	19	59	5,595	5,177
Research & Sponsored Programs (ENR)	1	351	-	-	1	351	-
Operational Sciences (ENS)	27	8,328	3	176	30	8,504	5,518
Systems Eng & Management (ENV)	15	955	2	195	17	1,150	719
Aeronautical & Astronautical Eng (ENY)	48	2,456	3	59	51	2,515	1,985
TOTAL	217	24,435	13	645	230	25,080	19,693

Center							
Autonomy and Navigation Technology (ANT)	29	3,716	1	175	30	3,891	3,447
Center for Cyberspace Research (CCR)	20	1,147	3	196	23	1,343	959
Center for Directed Energy (CDE)	25	3,276	1	9	26	3,285	2,822
Center for Operational Analysis (COA)	23	7,085	2	150	25	7,235	4,555
Center for Space Research and Assurance (CSRA)	18	1,339	-	-	18	1,339	1,266
Center for Tech Intel Studies & Research (CTISR)	15	1,136	1	10	16	1,146	1,294
TOTAL	130	17,699	8	540	138	18,239	14,343

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 FY16 Awards by Sponsor



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

Table 3.4 New FY16 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	358	-	-	138	48	-	544
ENG	3,755	88	284	1,747	275	273	6,422
ENP	1,328	150	728	2,632	410	347	5,595
ENR	351	-	-	-	-	-	351
ENS	275	4,290	20	3,919	-	-	8,504
ENV	498	-	321	262	69	-	1,150
ENY	1,364	-	219	851	-	80	2,514
TOTAL	7,929	4,528	1,572	9,549	802	700	25,080

Note: "Other DOD" in this table includes the DTRA, HELJTO, NGA, NSA, OSD, DASD, and MDA 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	2,701	42	174	834	-	140	3,891
CCR	517	45	-	486	275	20	1,343
CDE	818	150	18	1,734	130	435	3,285
COA	385	4,290	20	2,540	-	-	7,235
CSRA	599	-	-	740	-	-	1,339
CTISR	103	-	415	603	-	24	1,146
TOTAL	5,123	4,527	627	6,937	405	620	18,239

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

COTTON, JAMES A., *Antecedents of Fuel Efficiency*. AFIT/ENS/MS/16M-099. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: SAF/IEN. [COA]

GRADUATE RESEARCH PAPERS

HEIL, MARK A., *The Air Force Building Partnership Capacity Problem: Are We Engaged in the Right Partnerships?* AFIT/ENS/MS/16J-025. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: SAF/IA. [COA]

4.2. HEADQUARTERS UNITED STATES AIR FORCE

DOCTORAL DISSERTATIONS

BELLUCCI, JOSEPH P., *Non-Linear Metamodeling Extensions to the Robust Parameter Design of Computer Simulations*. AFIT/ENS/DS/16S-026. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: HQ USAF/A9. [COA]

MASTER'S THESES

BRADSHAW, AMELIA E., *United States Air Force Officer Manpower Planning Problem via Approximate Dynamic Programming*. AFIT/ENS/MS/16M-092. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: HQ USAF/A1. [COA]

CANSICK, PERRY L., *Determining Air Base Installation Capacity through Multivariate Analysis*. AFIT/ENV/MS/16M-139. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: HQ USAF/A4.

CLAWSON, CHRISTOPHER L., *Consolidating Supply Chain Management Education through Professional Certification*. AFIT/ENS/MS/16M-096. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: HQ USAF/A4. [COA]

ELLIS, TREVOR P., *Lifecycle Cost Evaluation of Flexible Facility Designs*. AFIT/ENV/MS/16M-147. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: HQ USAF/A4.

JANTSCHER, HELEN L., *An Examination of Economic Metrics as Indicators of Air Force Retention*. AFIT/ENS/MS/16M-107. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1. [COA]

MCLEAN, BRENDEN A., *Autoencoded Reduced Clusters for Anomaly Detection Enrichment (Arcade) In Hyperspectral Imagery*. AFIT/ENS/MS/16M-119. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: HQ USAF/A9. [COA]

MONTGOMERY, ROBERT T., *Using Multiple Objective Decision Analysis to Position Federal Product and Service Codes within the Kraljic Portfolio Matrix*. AFIT/ENS/MS/16M-121. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: HQ USAF. [ANT/COA]

STEPHENS, FREDDIE L., *A Model to Enhance Distributed Team Dynamics in a Dynamic Environment*. AFIT/ENV/MS/16M-185. Faculty Advisor: Dr. John J. Elshaw. Sponsor: HQ USAF/A4.

WALTER, RUSSELL W., *Methods to Address Extreme Class Imbalance in Machine Learning Based Network Intrusion Detection Systems*. AFIT/ENS/MS/16M-131. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: HQ USAF/A9. [COA]

ZENS, CHRISTINE L., *Application of Non-Rated Line Officer Attrition Levels and Career Field Stability*. AFIT/ENS/MS/16M-133. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1. [COA]

GRADUATE RESEARCH PAPERS

CASWELL, DAVID C., *USAF Female Pilot Turnover Influence: A Delphi Study of Work-Home Conflict*. AFIT/ENS/MS/16J-019. Faculty Advisor: Dr. Sharon G. Heilmann. Sponsor: HQ USAF/A1.

JOHNSTON, TAYLOR J., *Optimizing the Continental United States Air Refueling Infrastructure*. AFIT/ENS/MS/16J-027. Faculty Advisor: Dr. Jeffrey D. Weir. Sponsor: HQ USAF/A3. [COA]

STUBBENDORFF, JESPER R., *A Commander's First Challenge: Establishing a Pathway of Trust*. AFIT/ENS/MS/16J-034. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AF PACE. [COA]

THORNTON, RYAN K., *AMC Pilot Retention: A Delphi Study*. AFIT/ENS/MS/16J-036. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: HQ USAF/A3. [COA]

4.3. AIR COMBAT COMMAND

MASTER'S THESES

AMEDEE, RYAN M., *An Economic Analysis of the Transition of a Contingency Military Installation to an Enduring Status using Monte Carlo Simulations*. AFIT/ENV/MS/16M-134. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCENT.

DIETRICK, ARTHUR Z., *Measuring the Effectiveness of US Military Humanitarian Construction Projects through Geospatial Analysis of Public Opinion in Belize*. AFIT/ENV/MS/16M-144. Faculty Advisor: Col Paul Cotelleso. Sponsor: 12 AF.

GOLDSMITH, JOSEPH W., *Collecting Unsolicited User-Generated Change Requests*. AFIT/ENV/MS/15D-002. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: 49 OG.

SHIRELY, ERIC M., *Application of System Engineering Leading Indicators to Scrum Agile Projects*. AFIT/ENV/MS/16M-183. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFISRA.

SMITH, CLARK W., *Mission Dependency Index of Air Force Built Infrastructure: Knowledge Discovery with Machine Learning*. AFIT/ENV/MS/16M-184. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCENT.

WITTMAN, CHRISTOPHER E., *Optimizing Allocation of U.S. Humanitarian Civic Assistance Projects In Support of Developing Foreign Democracy*. AFIT/ENV/MS/16M-191. Faculty Advisor: Dr. John J. Elshaw. Sponsor: 12 AF.

GRADUATE RESEARCH PAPERS

AGNES, ALLEN Y., *Improving the Nuclear Reform Implementation for Success*. AFIT/ENS/MS/16S-023. Faculty Advisor: Lt Col Joshua K. Strakos. Sponsor: AFGSC. [COA]

BLACKRICK, JEFFERY M., *Air Force Nuclear Enterprise Organization: A Case Study*. AFIT/ENS/MS/16S-027. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AFGSC. [COA]

BOONE, MATTHEW D., *Senior Leader Perspective on the Air Force Nuclear Enterprise: Today's Issues and the Future*. AFIT/ENS/MS/16S-028. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFGSC. [COA]

EVANS, ROBERT C., *Looking to the Future of the Air Force Nuclear Enterprise*. AFIT/ENS/MS/16S-029. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AFGSC. [COA]

ORTIZ, MARC ANTHONY C., *Assessing the Effects of Organizational Changes within the Office of the Secretary of Defense on the Nuclear Mission*. AFIT/ENS/MS/16S-035. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFGSC. [COA]

PABST, DAVID, *Department of Energy: An Organizational Look at America's Nuclear Deterrent*. AFIT/ENS/MS/16S-036. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AFGSC. [COA]

4.4. AIR EDUCATION AND TRAINING COMMAND

AIR FORCE INSTITUTE OF TECHNOLOGY

DOCTORAL DISSERTATIONS

ANDERSON, JASON R., *An Examination of Commercial Motor Vehicle Hours of Service Safety Regulation*. AFIT/ENS/DS/16S-025. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: N/A. [COA]

ARMSTRONG, ANDREW M., *Synergistic Effects of Phase Folding and Wavelet Denoising with Applications in Light Curve Analysis*. AFIT/ENC/DS/16S-001. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

CALHOUN, SEAN M., *Integrity Determination for Image Rendering Vision Navigation*. AFIT/ENG/DS/16M-251. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A. [ANT]

CRAFT, CHRISTOPHER T., *Formation Flight of Earth Satellites on Low-Eccentricity KAM Tori*. AFIT/ENY/DS/16M-201. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A.

DOUPE, COLE C., *Optimal Attitude Control of Agile Spacecraft using Combined Reaction Wheel and Control Moment Gyroscope Arrays*. AFIT/ENY/DS/15D-042. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

HAMMAN, SETH T., *Improving the Cybersecurity of Cyber-physical Systems through Behavioral Game Theory and Model Checking in Practice and in Education*. AFIT/ENG/DS/16S-010. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

HESS, JOSHUAH A., *Adaptive Estimation and Heuristic Optimization of Nonlinear Spacecraft Attitude Dynamics*. AFIT/ENY/DS/16S-061. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

KOVACH, NICHOLAS S., *A Temporal Framework for Hypergame Analysis of Cyber Physical Systems in Contested Environments*. AFIT/ENG/DS/16S-070. Faculty Advisor: Dr. Gary B. Lamont. Sponsor: N/A. [CCR]

LUKACS, MATHEW W., *Classification of Stimulated Unintended Radiated Emissions (SURE) using Radio-frequency Distinct Native Attributes (RF-DNA)*. AFIT/ENG/DS/16S-014. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A. [ANT/CCR]

WRIGHT, STEVEN P., *Orbit Determination using Vinti's Solution*. AFIT/ENY/DS/16S-067. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A.

MASTER'S THESES

BALL, CHRISTOPHER D., *A Multi-objective Approach to Tactical Maneuvering Within Real Time Strategy Games*. AFIT/ENG/MS/16J-004. Faculty Advisor: Dr. Gary B. Lamont. Sponsor: N/A.

BOARDMAN, NICHOLAS T., *Heterogeneous Air Defense Battery Location: A Game Theoretic Approach*. AFIT/ENS/MS/16M-091. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: N/A. [COA]

BOLLINGER, MICHAEL E., *Design and Analysis of a Retroreflective Array for IR Application*. AFIT/ENG/MS/16M-005. Faculty Advisor: Maj Michael D. Seal. Sponsor: N/A.

BYRD, CHARLES E., *Exposing Inter-virtual Machine Networking Traffic to External Applications*. AFIT/ENG/MS/16M-006. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

CALVO, JAY, *Reducing Energy Consumption in Existing Facilities through Retrofit Prioritization Improvements*. AFIT/ENV/MS/16M-138. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: N/A.

CLISBY, LAUREN E., *EEG-based Classification and Advanced Warning of Epileptic Seizures*. AFIT/ENG/MS/16M-097. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

CUNNINGHAM, PATRICK B., *Geosynchronous Binary Object Detection*. AFIT/ENG/MS/16M-010. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

DAVIS, AUSTIN L., *Deception in Game Theory: A Survey and Multiobjective Model*. AFIT/ENG/MS/16M-011. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

DAVIS, BRANDON T., *Preprocessing Techniques to Support Event Detection Data Fusion on Social Media Data*. AFIT/ENG/MS/16J-001. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A.

DAVIS, MICHAEL T., *Determination of Fire Control Policies via Approximate Dynamic Programming*. AFIT/ENS/MS/16M-100. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: N/A. [COA]

DIAZ, JORGE E., *Satellite Ephemeris Correction via Remote Site Observation for Star Tracker Navigation Performance Improvement*. AFIT/ENG/MS/16M-013. Faculty Advisor: Maj Scott J. Pierce. Sponsor: N/A. [ANT]

FITZPATRICK, BRIAN J., *Determining the Optimal Work Breakdown Structure for Government Acquisition Contracts*. AFIT/ENC/MS/16M-150. Faculty Advisor: Dr. Edward D. White. Sponsor: N/A.

FLETCHER, JUSTIN R., *Synaptic Annealing: Anisotropic Simulated Annealing and its Application to Neural Network Synaptic Weight Selection*. AFIT/ENG/MS/16J-060. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

FULLENKAMP, JONATHAN, *Analysis of Software Defined Radios for Collecting GPS Tracking Data from Terrestrial Transmitters*. AFIT/ENV/MS/16M-210. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

GEISE, BARRY C., *Airborne Directional Networking: Topology Control Protocol Design*. AFIT/ENG/MS/16M-017. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A.

GRAY, JEREMY, *Design and Implementation of a Unified Command and Control Architecture for Multiple Cooperative Unmanned Vehicles Utilizing Commercial off the Shelf Components*. AFIT/ENV/MS/15D-048. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A. [ANT]

GRESZLER, BRIAN S., *Civil Engineer Company Grade Officer Training Needs Analysis for Contingency Operations*. AFIT/ENV/MS/16M-155. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: N/A.

GRIFFITH, DANIEL A., *Epidemiology, Cost, and Aircraft Choice for Aeromedical Evacuation in AFRICOM*. AFIT/ENS/MS/16M-105. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A. [COA]

GRUNZWEIG, NATHAN E., *Statistic Whitelisting for Enterprise Network Incident Response*. AFIT/ENG/MS/16M-019. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

HARNED, SCOTT I., *POCO-MOEA: Using Evolutionary Algorithms to Solve the Controller Placement Problem*. AFIT/ENG/MS/16M-021. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

KIM, JIN K., *Classification of Replicated Signals using RF-DNA*. AFIT/ENG/MS/16M-024. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT/CCR]

KNOBLAUCH, AARON M., *Aerothermodynamic and Infrared Signature Analysis of a Hypersonic Vehicle*. AFIT/ENY/MS/16M-222. Faculty Advisor: Maj Brook I. Bentley. Sponsor: N/A.

KOBZA, CARL L., *Space Qualification Testing of a Deployable Shape Memory Alloy CubeSat Antenna*. AFIT/ENY/MS/16S-064. Faculty Advisor: Dr. Richard Cobb. Sponsor: N/A. [CSRA]

LAPSO, JOSHUA A., *Whitelisting System State in Windows Forensic Memory Visualizations*. AFIT/ENG/MS/16M-029. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

LEMMENES, ADAM G., *Civilian GPS Spoofing Detection and Classification using RF-DNA*. AFIT/ENG/MS/16M-030. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT/CCR]

LEVY, DANIEL E., *Non-Linear Optimization Applied to Angle-of-Arrival Satellite Based Geo-localization for Biased and Time Drifting Sensors*. AFIT/ENG/MS/16M-032. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

LIU, JAMES J., *Analysis of a Modified Equivalent Circuit Model for Lithium-Ion Battery Modules in CubeSats*. AFIT/ENY/MS/16M-224. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

LOUDERMILK, JOSHUA, *A Logic-based Mission Modeling Tool for Designing CubeSats*. AFIT/ENY/MS/16M-226. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

MACHIN, TIMOTHY I., *Real-time Implementation of Vision-aided Monocular Navigation for Small Fixed-wing Unmanned Aerial Systems*. AFIT/ENG/MS/16M-035. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A. [ANT]

MARTYN, ANTON H., *Long-Term Impacts of Military Drawdown on the Industrial Base*. AFIT/ENS/MS/16M-115. Faculty Advisor: Dr. William Cunningham. Sponsor: N/A. [COA]

MCKENNEY, SHAYNA K., *Meeting the DOD's Tactical Weather Needs using CubeSats*. AFIT/ENY/MS/16J-055. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

MRLA, DANIELLE L., *The Impact of the Weapon Systems Acquisition Reform Act and Other Factors on the Cost of Air Force Weapon Systems*. AFIT/ENV/MS/16M-168. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: N/A.

MULLIN, REAGAN A., *Benefits and Challenges with the MC-130J Integrated Systems Architecture*. AFIT/ENV/MS/15D-021. Faculty Advisor: Lt Col Kyle Oyama. Sponsor: N/A.

NEW, DAVID A., *Interference Suppression using Knowledge-aided Subarray Pattern Synthesis*. AFIT/ENG/MS/16M-037. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT]

NICKOLAS, SETH C., *Photoconductive Semiconductor Switch Driven Antenna and Array Design*. AFIT/ENG/MS/16M-038. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

OLTMANN, JEFFREY R., *Efficient Employment of Large Format Sensor Data Transfer Architectures*. AFIT/ENV/MS/16J-042. Faculty Advisor: Dr. Brent T. Langhals. Sponsor: N/A.

PAKISH, CRAIG W., *Low Latency Weather Data from a CubeSat Constellation*. AFIT/ENY/MS/16M-173. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

PALKO, KYLE A., *Diagnosing Autism Spectrum Disorder through Brain Functional Magnetic Resonance Imaging*. AFIT/ENC/MS/16M-123. Faculty Advisor: Lt Col Ryan D. Kappedal. Sponsor: N/A.

PATRICK, RYAN M., *Analysis of a Near Real-Time Optimal Attitude Control for Satellite Simulators*. AFIT/ENY/MS/16M-232. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

PROBST, ZACHARY, *Design and Flight Test of a Weapons-cavity Acoustics and Separation Test Bed*. AFIT/ENY/MS/16M-235. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: N/A.

RAMOS, IKAIKA R., *Extracting Preference using Recommender Systems*. AFIT/ENG/MS/16M-040. Faculty Advisor: Dr. Kenneth. M. Hopkinson. Sponsor: N/A. [CTISR]

SEANOR, COLLIN J., *Comparison of Methods for Radio Position of Non-emitting Dismounts*. AFIT/ENG/MS/16M-044. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A. [ANT]

SINGLETON, JACOB W., *Electro-Mechanical Characterization of Carbon Nanotube Sheets in Simulated Space Environments: The Dawn of "Carbon Spacecraft."* AFIT/ENY/MS/16M-240. Faculty Advisor: Dr. Shankar Mall. Sponsor: N/A.

SUNDHEIM, MICKIE J., *A Simulation-Based Analysis of Chemical and Radiological Hazard Zones Adapted to Physical Boundaries*. AFIT/ENV/MS/16M-188. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: N/A.

TODD, MICHAEL C., *Dynamic Network Security Control using Software Defined Networking*. AFIT/ENG/MS/16M-049. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

WATTS, MALOUPU L., *Radial Basis Function Based Quadrature over Smooth Surfaces*. AFIT/ENC/MS/16M-003. Faculty Advisor: Capt Jonah A. Reeger. Sponsor: N/A.

WATTS, TATSUKI L., *Field-based Phase Retrieval using Under-sampled Data*. AFIT/ENG/MS/16M-051. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

YILDIZ, KADIR, *Scientometric Analysis of Technology & Innovation Management Literature*. AFIT/ENV/MS/16M-193. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: N/A.

4.5. AIR FORCE MATERIEL COMMAND

DOCTORAL DISSERTATIONS

HENDRIX, JEREMY P., *Continuous Decision Support*. AFIT/ENV/DS/15D-018. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFMC/A9.

MILLER, ALLEN R., *The Influence of Education and Experience upon Contextual and Task Performance*. AFIT/ENS/DS/16S-073. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: SCOW. [COA]

MASTER'S THESES

CARDENAS, KEVIN R., *Logistics Simulation for Long Duration Logistics Wargames*. AFIT/ENS/MS/16M-095. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4F. [COA]

KIM, CHANGSUNG, *Simulation Modeling and Analysis of Air Force Depot Engine Repair during Normal and Increased Operational Tempos*. AFIT/ENS/MS/16M-109. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4F. [COA]

LAFIGUERA, GEORGE B., *A "Big Bang" versus a "Small Bang" Approach: A Case Study of the Expeditionary Combat Support System (ECSS) and the Maintenance, Repair, and Overhaul Initiative (MROi)*. AFIT/ENS/MS/16M-110. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFMC/A4P. [COA]

MAXHEIMER, ERICH W., *Analysis of Inpatient Hospital Staff Mental Workload by Means of Discrete-event Simulation*. AFIT/ENV/MS/16M-166. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 88th MDG MSU.

SALGADO, JESSICA A., *Factors Influencing Skill Retention in Multi-Skilled Air Force Aircraft Maintainers*. AFIT/ENS/MS/16M-130. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: AFMC/A4P. [COA]

WOODS, CANDIS A., *Determining the Degree of the Routinization of Additive Manufacturing in the Air Logistics Complexes*. AFIT/ENS/MS/16M-098. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFMC/A4P. [COA]

96TH TEST GROUP

MASTER'S THESES

DOSSETT, JAMES C., *Characterization of Quadcopter Positioning Systems and the Effect of Pose Uncertainties on Field Probe Measurements*. AFIT/ENG/MS/16M-014. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG. [ANT]

LETT, NATHAN, *Utilization of a Geodesic Sphere and Quadcopter as Two-way Field Probe for Electro-Magnetic Field Measurements in an Indoor Radar Cross Section Range*. AFIT/ENG/MS/16M-031. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG. [ANT]

AIR FORCE LIFE CYCLE MANAGEMENT CENTER

MASTER'S THESES

HODSON, ELIZABETH G., *Earned Value Reporting on Agile Software Development Programs within the Department of Defense*. AFIT/ENV/MS/16M-158. Faculty Advisor: Dr. Robert D. Fass. Sponsor: AFLCMC.

JIMENEZ, CHRISTOPHER A., *Predicting Schedule Duration for Defense Acquisition Programs: Program Initiation to Initial Operational Capability*. AFIT/ENC/MS/16M-161. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

JOHNSON, BRANDON J., *A Comparative Study of Learning Curve Models and Factors in Defense Cost Estimating Based on Program Integration, Assembly, and Checkout*. AFIT/ENV/MS/16M-162. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFLCMC. [ANT]

KOZLAK, SCOTT J., *Predicting Cost Growth using Program Reviews and Milestones for DOD Aircraft*. AFIT/ENC/MS/16M-164. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

LAMB, THOMAS W., *Cost Analysis Reform: Where do we go from here? A Delphi Study of Views of Leading Experts*. AFIT/ENV/MS/16M-165. Faculty Advisor: Dr. Robert D. Fass. Sponsor: AFLCMC.

MAGERS, MICHAEL A., *Geolocation of RF Emitters using a Low-Cost UAV-Based Approach*. AFIT/ENV/MS/16M-258. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFLCMC. [ANT]

PENA, ANTHONY H., *Business Software Management: Comparative Analysis of Centralized and Decentralized Acquisition*. AFIT/ENV/MS/16M-175. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

PEREZ, ERIC J., *Air Force Project Risk Management - The Impact of Inconsistent Processes*. AFIT/ENV/MS/16S-047. Faculty Advisor: Lt Col Kyle Oyama. Sponsor: AFLCMC.

SCHELLER, BRIAN K., *A Time-Variant Value-Focused Methodology for Supporting Pre-Acquisition*. AFIT/ENV/MS/16M-236. Faculty Advisor: Lt Col Thomas C. Ford. Sponsor: AFLCMC.

TORF, JASON, *Optimized Cooperative Control for Combat Survivability using an Unmanned Defense Wingman*. AFIT/ENV/MS/16M-243. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFLCMC. [ANT]

AIR FORCE NUCLEAR WEAPONS CENTER

DOCTORAL DISSERTATIONS

GIBB, MICHAEL P., *On Improved Least Squares Regression & Artificial Neural Network Meta-models for Simulation via Control Variates*. AFIT/ENS/DS/16S-030. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: AFNWC. [COA]

MASTER'S THESES

CAMMARATA, JASON A., *COMSOL Modeling of Thermal Flash Experiments*. AFIT/ENP/MS/16M-060. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

LEAHY, JOHN S., *Experimental Testing Of A Van De Graaff Generator As An Electromagnetic Pulse Generator*. AFIT/ENP/MS/16S-075. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

AIR FORCE RESEARCH LABORATORY

MASTER'S THESES

FRANDSEN, BRIAN G., *Gamma Radiation Shielding of Multifunctional Composites*. AFIT/ENP/MS/16M-070. Faculty Advisor: Lt Col Buckley O'Day. Sponsor: HQ AFRL.

SHARPLES, RACHEL E., *Evaluation of the Impact of an Additive Manufacturing Enhanced CubeSat Architecture on the CubeSat Development Process*. AFIT/ENV/MS/16S-049. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: HQ AFRL.

AFRL: 711th HUMAN PERFORMANCE WING

DOCTORAL DISSERTATIONS

MOHD-ZAID, MOHD, *A Statistical Approach to Characterize and Detect Degradation within the Barabasi-Albert Network*. AFIT/ENC/DS/16S-003. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: 711 HPW/RH.

MASTER'S THESES

BINTZ, JEFFREY R., *Image-based Bidirectional Reflectance Distribution Function of Human Skin in the Visible and Near Infrared*. AFIT/ENG/MS/16M-004. Faculty Advisor: Dr. Michael J. Mendenhall. Sponsor: 711 HPW/RH. [CTISR]

GIAMETTA, JOSEPH J., *Cross-subject Continuous Analytic Workload Profiling using Stochastic Discrete Event Simulation*. AFIT/ENG/MS/16M-018. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH.

IGUCHI, TAKAYUKI, *Clustering Theory and Data Driven Health Care Strategies*. AFIT/ENC/MS/16M-001. Faculty Advisor: Capt Jesse D. Peterson. Sponsor: 711 HPW/RH.

KIM, SUNGBIN, *Unmanned Aerial Vehicle (UAV) Operators' Workload Reduction: The Effect of 3D Audio on Operators' Workload and Performance during Multi-Aircraft Control*. AFIT/ENV/MS/16M-163. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH. [ANT]

KLAWUHN, DYLAN L., *The Effects of Ionizing Radiation and Oxidizing Species on Strains of Deinococcus radiodurans Lacking Endogenous Oxidative Protection Methods*. AFIT/ENP/MS/16J-017. Faculty Advisor: LTC Doug R. Lewis. Sponsor: 711 HPW/RH.

TAYLOR, AMANDA R., *Using Artificial Neural Networks to Predict Disease Associations for Chemicals Present in Burn Pit Emissions*. AFIT/ENV/MS/16M-189. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: 711 HPW/USAFSAM.

TETRAULT, ALYSSA S., *The Effects of High Performance Aircraft Respiratory Systems on Pilots*. AFIT/ENS/MS/16M-129. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: 711 HPW/USAFSAM. [COA]

ZINCK, CRAIG M., *Neck Injury Criteria Development for use in System Level Ejection Testing; Characterization of ATD to Human Response Correlation under -Gx Accelerative Input*. AFIT/ENV/MS/16M-194. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: 711 HPW/RH.

AFRL: AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

DOCTORAL DISSERTATIONS

BONAVITA, ANGELO M., *Applications of Correlated 2D-ACAR and CDBAR using a Low-Energy Positron Beam*. AFIT/ENP/DS/16M-056. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: AFOSR.

CRANSTON, BRIAN C., *Conceptual Design, Structural Analysis, and Design Space Exploration of a Vacuum Lighter than Air Vehicle*. AFIT/ENY/DS/16M-202. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

DEGREGORIA, ANTHONY J., *Creep and Oxidation of Hafnium Diboride-Based Ultra High Temperature Ceramics at 1500°C*. AFIT/ENY/DS/15D-040. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

HARDY, TYLER J., *Optical Theory Improvements to Space Domain Awareness*. AFIT/ENG/DS/16S-011. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: AFOSR.

UBER, RICHARD P., *Time Domain Analysis of Electromagnetic Scattering from Multiple Cavities Embedded in a Ground Plane*. AFIT/ENC/DS/16S-004. Faculty Advisor: Dr. Aihua W. Wood. Sponsor: AFOSR.

WUERTEMBERGER, LUKE A., *Evaluation and Correlation of Dynamic flow, Failure, and Microstructural Properties of Heat-treated 4130 Steel*. AFIT/ENY/DS/16S-068. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

MASTER'S THESES

CUNNINGHAM, DAVID A., *Localized Plasma Measurement during Instability Modes in a Hall Thruster*. AFIT/ENY/MS/16M-203. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR. [CSRA]

GILBERT, NICHOLAS A., *Enhanced Flow Migration in Full Annular Ultra Compact Combustor*. AFIT/ENY/MS/16M-211. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFOSR.

GOODMAN, TYLER J., *Understanding Effects of Autonomous Agent Timing on Human-Agent Teams using Iterative Modeling, Simulation and Human-in-the-Loop Experimentation*. AFIT/ENV/MS/16M-154. Faculty Advisor: Dr. Michael E. Miller. Sponsor: AFOSR. [ANT]

KODAMA, CHRISTOPHER H., *Tunable Terahertz Metamaterials with Germanium Telluride Components*. AFIT/ENG/MS/16M-025. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFOSR.

KOKOCZKA, CHRISTOPHER K., *Using Phase Screens to Synthesize Electromagnetic Gaussian-Schell Model Sources with Desired Amplitude, Coherence, and Polarization*. AFIT/ENG/MS/16M-026. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFOSR.

LOHRMAN, JIMMY J., *Characterization for the Development of the Hybrid Multi-junction Silicon Germanium Solar Cell*. AFIT/ENG/MS/16M-033. Faculty Advisor: Dr. Ronald A. Coutu. Sponsor: AFOSR.

O'DANIEL, CHRISTOPHER T., *Neutron Radiation Effects on Ge and GeSn semiconductors*. AFIT/ENP/MS/16M-077. Faculty Advisor: Dr. Yung Kee Yeo. Sponsor: AFOSR.

ROOSMA, ALEXANDER C., *Analysis of Software Design Patterns in Human Cognitive Performance Experiments*. AFIT/ENG/MS/16M-042. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: AFOSR.

AFRL: AEROSPACE SYSTEMS DIRECTORATE

DOCTORAL DISSERTATIONS

ANDRUS, IONIO Q., *Design and Experimentation of a Premixed Rotating Detonation Engine*. AFIT/ENY/DS/16J-059. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

AUSSERER, JOSEPH K., *The Scaling of Loss Pathways and Heat Transfer in Small Scale Internal Combustion Engines*. AFIT/ENY/DS/16S-055. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

HUMPHREYS, CLAY J., *Optimal Control of an Uninhabited Loyal Wingman*. AFIT/ENY/DS/16S-063. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

JODEH, NIDAL M., *Optimal UAS Assignments and Trajectories for Persistent Surveillance and Data Collection from a Wireless Sensor Network*. AFIT/ENY/DS/15S-062. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

RHOBY, MICHAEL R., *Laminar Flame Combustion Diagnostics using Imaging Fourier Transform Spectroscopy*. AFIT/ENP/DS/16J-018. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFRL/RQ. [CTISR]

MASTER'S THESES

BILLS, JACOB D., *Liquid Fuel Film Cooling: a CFD Analysis with Hydrocarbon Fuel*. AFIT/ENY/MS/16M-199. Faculty Advisor: Maj Darrell S. Crowe. Sponsor: AFRL/RQ.

COLSON, KEVIN W., *Toward Automated Aerial Refueling: Relative Navigation with Structure from Motion*. AFIT/ENG/MS/16M-009. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ. [ANT]

DENBY, BRADLEY D., *Towards Automated Aerial Refueling: Real-time Position Estimation with Stereo Vision*. AFIT/ENG/MS/16M-252. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ. [ANT]

DEUTSCH, MATTHEW J., *Spectroscopic Measurement of Gas Temperature in Small Internal Combustion Engines*. AFIT/ENY/MS/16M-207. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

GROSS, KERIANNE H., *Evaluation of Verification Approaches Applied to a Nonlinear Control System*. AFIT/ENY/MS/16M-214. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RQ. [CSRA]

GUARNACCIO, CHASE C., *Aero-throttle Assisted Cold-Start Ignition of a Dual-Mode Scramjet*. AFIT/ENY/MS/16M-215. Faculty Advisor: Maj Brook I. Bentley. Sponsor: AFRL/RQ.

GULOTTA, PAUL A., *Particle Image Velocimetry and Analysis Methods using Cleanly Seeded Particles in Supersonic Flow*. AFIT/ENY/MS/16J-053. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RQ.

HANKS, EVAN T., *Surface Roughness of Electron Beam Melting TI-6AL-4V Effect on Ultrasonic Testing*. AFIT/ENY/MS/16M-216. Faculty Advisor: Maj David Liu. Sponsor: AFRL/RQ.

HENDRICKS, KEVIN J., *The Efficacy of Implementing a Small, Low-Cost, Real Time Kinematic GPS System into a Small Unmanned Aerial System Architecture*. AFIT/ENV/MS/16M-157. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]

- KIM, JOSHUA P., *Evaluation of Unmanned Aircraft Flying Qualities using JSBSim*. AFIT/ENY/MS/16M-221. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ. [ANT]
- MORGAN, BLAKE, *Performance Comparison of Multiple Ionic Liquid Propellants using the Busek BGT-XS Monopropellant Thruster*. AFIT/ENY/MS/16M-230. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]
- MUILENBURG, CONNOR L., *Empirical Determination of Performance Characteristics for Busek 1cm Micro Radio-Frequency Ion Propulsion System*. AFIT/ENY/MS/16M-023. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]
- NOOMEN, MOHAMED, *Mechanical Properties and Fatigue Behavior of Unitized Composite Airframe Structures at Elevated Temperature*. AFIT/ENY/MS/16S-066. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RQ.
- PALMER, CODY G., *Optimizing Multi-Domain System-of-Systems using Model-Based Systems Engineering*. AFIT/ENV/MS/16M-174. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ.
- PETRY, ANDREW K., *Effectiveness Based Design of a Tactical Tanker Aircraft*. AFIT/ENY/MS/16M-233. Faculty Advisor: Lt Col Anthony M. DeLuca. Sponsor: AFRL/RQ.
- SHEPARD, JOSHUA, *Development and Testing of a Rotating Detonation Engine Fueled with JP-8*. AFIT/ENY/MS/16M-238. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.
- STEPHENSON, WILLIAM J., *Characterization of Physical Blockage for Reliable Scramjet Ignition*. AFIT/ENY/MS/16M-242. Faculty Advisor: Maj Brook I. Bentley. Sponsor: AFRL/RQ.
- WIESE, CONNOR J., *Influence of Coolant Flow Rate Parameters in Scaling Gas Turbine Cooling Effectiveness*. AFIT/ENY/MS/16M-245. Faculty Advisor: Maj James L. Rutledge. Sponsor: AFRL/RQ.
- YERLY, ERIC T., *Investigation into Active Spanwise Camber Deformation on the Lateral Stability and Roll Control of the X-56A Compared to Conventional Ailerons*. AFIT/ENY/MS/16M-249. Faculty Advisor: Lt Col Anthony M. DeLuca. Sponsor: AFRL/RQ.

AFRL: INFORMATION DIRECTORATE

DOCTORAL DISSERTATIONS

- BETANCES, JOAN A., *Physical Layer Defenses against Primary User Emulation Attacks*. AFIT/ENG/DS/16S-005. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [ANT/CCR]

MASTER'S THESES

- FULLER, JONATHAN D., *A Misuse-based Intrusion Detection System for ITU-T G.9959 Wireless Networks*. AFIT/ENG/MS/16M-016. Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI. [CCR]
- HALL, JOSEPH L., *A Practical Wireless Exploitation Framework for Z-Wave Networks*. AFIT/ENG/MS/16M-020. Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI. [CCR]
- PAVLIK, JOHN A., *Multihop Rendezvous Algorithm for Frequency Hopping Cognitive Radio Networks*. AFIT/ENG/MS/16M-039. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [ANT/CCR]
- SEITZ, ANDREW P., *A Comparative Analysis of IEEE 802.15.4 Adapters for Wireless Ranging*. AFIT/ENG/MS/16M-045. Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI.

AFRL: MATERIALS AND MANUFACTURING DIRECTORATE

DOCTORAL DISSERTATIONS

ROBERTSON, SCOTT J., *Creep of Hi-Nicalon™ S Ceramic Fiber Tows at 800°C in Air and in Silicic Acid-Saturated Steam*. AFIT/ENY/DS/15S-067. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

MASTER'S THESES

PIPER, MATTHEW W., *Creep of Hi-Nicalon™ S Ceramic Fiber Tows at 700°C in Air and in Silicic Acid-saturated Steam*. AFIT/ENY/MS/16M-234. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

PUBLIC, MICHAEL L., *Fatigue Behavior of an Advanced SiC/SiC Composite at 1300° C in Air and Steam*. AFIT/ENY/MS/16M-223. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

AFRL: MUNITIONS DIRECTORATE

MASTER'S THESES

DEMPSEY, ALLISON A., *Dynamic Properties of Additively Manufactured 15-5PH Stainless Steel*. AFIT/ENY/MS/16M-205. Faculty Advisor: Maj David Liu. Sponsor: AFRL/RW.

GRAVES, WILLIAM T., *Topology Optimization of a Penetrating Warhead*. AFIT/ENY/MS/16M-212. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RW.

HOPE, DANIEL K., *Investigation into Reynolds Number Effects on a Biomimetic Flapping Wing*. AFIT/ENY/MS/16M-219. Faculty Advisor: Lt Col Anthony M. Deluca. Sponsor: AFRL/RW.

SELLERS, JAMES B., *Force and Moment Measurements Applicable to a Flexible Weapons System*. AFIT/ENY/MS/16M-237. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RW.

AFRL: SENSORS DIRECTORATE

DOCTORAL DISSERTATIONS

ALLEN, CHRISTOPHER I., *Demonstration of Inexact Computing Implemented in the JPEG Compression Algorithm using Probabilistic Boolean Logic Applied to CMOS Components*. AFIT/ENG/DS/15D-001. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/RX.

BIHL, TREVOR J., *Feature Selection and Classifier Development for Radio Frequency Device Identification*. AFIT/ENG/DS/15D-003. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RX. [CCR]

VAUGHAN, SANDRA L., *A Novel Machine Learning Classifier Based on a Qualia Modeling Agent (QMA)*. AFIT/ENG/DS/16S-016. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RX. [CCR]

VENABLE, DONALD T., *Improving Real-world Performance of Vision Aided Navigation in a Flight Environment*. AFIT/ENG/DS/16S-017. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/RX. [ANT]

MASTER'S THESES

COLON, EDWIN O., *Prototyping a Log Analysis Capability for the MQ-1 Predator and MQ-9 Reaper Unmanned Aerial Systems using Web Technologies*. AFIT/ENG/MS/16M-008. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/RX.

COOK, RICHARD D., *Capturing Atmospheric Effects on 3-D Millimeter Wave Radar Propagation Patterns*. AFIT/ENP/MS/16M-063. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/RX. [CDE]

FREDA, SAMUEL E., *Microfacet Wavelength Scaling of the BRDF*. AFIT/ENP/MS/16J-015. Faculty Advisor: Maj Samuel D. Butler. Sponsor: AFRL/RV.

FREEMAN, TRAVIS J., *Jamming Cognitive Radios*. AFIT/ENG/MS/16M-015. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV. [CCR]

KAMINSKI, NATHANIEL M., *Radiation Effects in Thin Film Hexagonal Boron Nitride*. AFIT/ENP/MS/16M-072. Faculty Advisor: Lt Col Michael R. Hogsed. Sponsor: AFRL/RV.

KVASAGER, TYREL K., *Superconducting Quantum Interference Device Array Based High Frequency Direction Finding on an Airborne Platform*. AFIT/ENG/MS/16M-028. Faculty Advisor: Lt Col Jeremy Stringer. Sponsor: AFRL/RV.

MONTGOMERY, TURNER J., *Visual-INS using a Human Operator and Converted Measurements*. AFIT/ENG/MS/16M-036. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/RV. [ANT]

RASMUSSEN, ALEC C., *Implementation and Performance of Factorized Backprojection on Low-cost Commercial-off-the-Shelf Hardware*. AFIT/ENG/MS/16M-041. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/RV.

SCHMIDT, DAYNE A., *Hardware Development and Error Characterisation for the AFIT RAIL SAR System*. AFIT/ENG/MS/16M-043. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/RV.

SOVERN, JEFFREY S., *Electromagnetic Characterization of Materials using a Dual Chambered High Temperature Waveguide*. AFIT/ENG/MS/16M-047. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/RV.

STONE, BARRON D., *Comparison of Radio Frequency Distinct Native Attribute and Matched Filtering Techniques for Device Discrimination and Operation Identification*. AFIT/ENG/MS/16M-048. Faculty Advisor: Maj Samuel J. Stone. Sponsor: AFRL/RV.

SUTHERLIN, KARYNN A., *Investigation of Electromagnetic Signatures of a FPGA using an APREL EM-ISIGHT System*. AFIT/ENV/MS/15D-035. Faculty Advisor: Lt Col Kyle Oyama. Sponsor: AFRL/RV.

WYLIE, JUSTIN, *Radio Frequency-based Microcontroller Anomaly Detection*. AFIT/ENG/MS/16M-053. Faculty Advisor: Maj Samuel J. Stone. Sponsor: AFRL/RV. [CCR]

AFRL: SPACE VEHICLES DIRECTORATE

MASTER'S THESES

BASSETT, ERIC A., *Test and Verification of a CubeSat Attitude Determination and Control System in Variable Magnetic Fields*. AFIT/ENY/MS/16J-050. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

BIEHL, SCOTT A., *Multi-CubeSat Deployment Strategies: How Different Satellite Deployment Schemes Affect Satellite Separation and Detection for Various Types of Constellations and Missions*. AFIT/ENY/MS/16M-198. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

DUFFY, LAURA M., *Orbital Resonances in the Vinti Solution*. AFIT/ENY/MS/16M-208. Faculty Advisor: Dr. William E. Wiesel. Sponsor: AFRL/RV.

FLAMOS, STACIE M., *Space Object Self-Tracker On-Board Orbit Determination Analysis*. AFIT/ENY/MS/16M-209. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

HOLT, JASON, *Persistent Surveillance of Geosynchronous Satellites Utilizing CubeSats in Low Earth Orbit*. AFIT/ENY/MS/16M-218. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

LIU, YUEN, *Performance Testing of Various Nozzle Design for Water Electrolysis Thruster*. AFIT/ENY/MS/16M-225. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RV. [CSRA]

MCCAFFERTY, JULIAN P., *Development of a Modularized Software Architecture to Enhance SSA with COTS Telescopes*. AFIT/ENY/MS/16M-227. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

MILLAR, JAMES B., *Short Duration Missions to Earth Crossing Asteroids*. AFIT/ENY/MS/16M-228. Faculty Advisor: Dr. William E. Wiesel. Sponsor: AFRL/RV.

MILLER, DANIEL G., *Vibrational Analysis of a 12U Chassis*. AFIT/ENY/MS/16M-229. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

WILMER, MEREDITH M., *Military Applications of High-Altitude Satellite Orbits in a Multi-Body Dynamical Environment using Numerical Methods and Dynamical Systems Theory*. AFIT/ENY/MS/16M-247. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

ZURITA, ALFREDO G., *Minimum-Fuel Trajectory Design in Multiple Dynamical Environments Utilizing Direct Transcription Methods and Particle Swarm Optimization*. AFIT/ENY/MS/16M-250. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

AIR FORCE TEST PILOT SCHOOL

MASTER'S THESES

TROMBETTA, JOHN V., *Multi-Trajectory Automatic Ground Collision Avoidance System with Flight Tests (Project Have ESCAPE)*. AFIT/ENY/MS/16M-244. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFTPS.

4.6. AIR MOBILITY COMMAND

MASTER'S THESES

MEYER, DAVID R., *Effects of Automation on Aircrew Workload and Situation Awareness in Tactical Airlift Missions*. AFIT/ENV/MS/15D-020. Faculty Advisor: Maj Christina R. Rusnock. Sponsor: 61 AS.

WILSON, CASSIDY L., *Increased Capacity Utilizing Aggregation and Consolidation of Contingency Cargo*. AFIT/ENS/MS/16M-132. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A3. [ANT/COA]

GRADUATE RESEARCH PAPERS

CONKLIN, NICHOLAS J., *AMLO Promotion: Perceptions and Reality*. AFIT/ENS/MS/16J-020. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 18 AF/CV. [COA]

ECHARD, BRET, *Point of Safe Return Minimums...How Low Can You Go?* AFIT/ENS/MS/16J-021. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9. [COA]

EICHNER, CHARLES L., *Extending Service Life of Aircraft through Fleet Management: A Study in C-17 Base and Aircraft Assignments*. AFIT/ENS/MS/16J-022. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AMC/A9. [COA]

GUY, TIMOTHY R., *KC-46 Enterprise Fleet Management*. AFIT/ENS/MS/16J-023. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC. [COA]

HABBESTAD, JOHN M., *463L Pallet Compatibility Implications for Warfighting Capacity in the Civil Reserve Air Fleet*. AFIT/ENS/MS/16J-024. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A9. [COA]

HOOD, MATTHEW L., *The Future of Tactical Airlift: The Application of CRUAS in Afghanistan*. AFIT/ENS/MS/16J-026. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9. [COA]

KING, ADAM P., *Measuring the 'Leading People' Organizational Health of AMC Wings on a Non-interference Basis*. AFIT/ENS/MS/16J-028. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/IG. [COA]

KOSTRUBALA, KAZIMIR M., *United States Transportation Command's Role as a Lead Enabling Agency during Humanitarian and Disaster Relief Events Outside the Contiguous United States*. AFIT/ENS/MS/16J-029. Faculty Advisor: Lt Col Joshua K. Strakos. Sponsor: AMC/A4. [COA]

SLAZINIK, IAN M., *Air Mobility Future: Evolving Command and Control Relationships in the Information Age*. AFIT/ENS/MS/16J-032. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: 618 AOC. [COA]

STEIN, ANDREW M., *Functional Mission Analysis: A Functional Approach to Mission Assurance*. AFIT/ENS/MS/16J-033. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AMC/A6. [COA]

THOMPSON, MICHAEL J., *Additive Manufacturing (3D Printing) Aircraft Parts and Tooling at the Maintenance Group Level*. AFIT/ENS/MS/16J-035. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9. [COA]

4.7. AIR FORCE SPACE COMMAND

MASTER'S THESES

EVERSON, STUART A., *A Service Oriented Architecture Approach for Global Positioning System Quality of Service Monitoring*. AFIT/ENV/MS/16M-149. Faculty Advisor: Lt Col Thomas C. Ford. Sponsor: SMC.

4.8. AIR FORCE SPECIAL OPERATIONS COMMAND

MASTER'S THESES

FITCH, KYLE E., *Evaluation of the Visible Infrared Imaging Radiometer Suite (VIIRS) Cloud Base Height (CBH) Pixel-level Retrieval Algorithm for Single-layer Water Clouds*. AFIT/ENP/MS/16M-069. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: AFSOC.

4.9. USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS

AIR FORCE CIVIL ENGINEERING CENTER

MASTER'S THESES

BUCHHOLTZ, JEFFREY D., *An Investigation in Construction Cost Estimation using a Monte Carlo Simulation*. AFIT/ENV/MS/16M-137. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCEC.

FORBES, JAMES W., *Forensic Schedule Analysis of Construction Delay in Military Projects in the Middle East*. AFIT/ENV/MS/16M-151. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCEC.

MEEKS, MARIA T., *Evaluating Storm Sewer Pipe Condition using Autonomous Drone Technology*. AFIT/ENV/MS/16M-167. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

SHIELDS, BRADFORD L., *United States Air Force Additive Manufacturing Applications for Civil Engineering Tools and Jigs*. AFIT/ENV/MS/16M-182. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

AIR FORCE COST ANALYSIS AGENCY

MASTER'S THESES

HONIOUS, CANDICE M., *An Analysis of the Impact of Configuration Changes to the Learning Curve for Department Of Defense Aircraft Acquisition Programs Substantially Into Production*. AFIT/ENV/MS/16M-256. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFCAA.

AIR FORCE WEATHER AGENCY

MASTER'S THESES

BURNS, DEREK A., *The Reliability and Skill of Air Force Weather's Ensemble Prediction Suites*. AFIT/ENP/MS/16M-059. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: 557 WW.

KING, MATTHEW P., *Forecasting Sea Breeze Enhanced Thunderstorms at Eglin Air Force Base: A Comparison between Empirical Methods and the High Resolution Rapid Refresh Model*. AFIT/ENP/MS/16M-074. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: 557 WW.

REDMOND, SHAYLA K., *Conceptual Architecture to Measure the Effects of Subauroral Polarization Streams on Radar Operations*. AFIT/ENP/MS/16S-072. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 557 WW.

SCHMIDT, FREDRICK R., *Improved Performance by the TIE-GCM with the Inclusion of Helium as a Major Species*. AFIT/ENP/MS/16M-081. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 557 WW.

TOWNSEND, MACLANE A., *Automated Sunspot Classification and Tracking using SDO/HMI Imagery*. AFIT/ENP/MS/16M-083. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 557 WW.

NATIONAL AIR AND SPACE INTELLIGENCE CENTER

MASTER'S THESES

KNOTT, CHRISTINE E., *Statistical Comparison of Tracking Observations from Real-Time Algorithms for Transient, Bright, Moving Targets*. AFIT/ENC/MS/15M-001. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: NASIC.

US AIR FORCE ACADEMY

MASTER'S THESES

DICKINSON, THOMAS W.N., *Simulation, Design, and Test of Square, Apodized Photon Sieves for High-Contrast, Exoplanet Imaging*. AFIT/ENP/MS/16M-065. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: USAFA. [CSRA]

4.10. DEPARTMENT OF DEFENSE

DOCTORAL DISSERTATIONS

LINGENFELTER, ANDREW J., *Cavity Geometric Features and Entrainment Characterization Resulting from a Ballistically Induced Hydrodynamic Ram Event*. AFIT/ENY/DS/16S-065. Faculty Advisor: Maj David Liu. Sponsor: JASPO.

MASTER'S THESES

BARNES, MATTHEW T., *Emissions Characterization of a Proposed Standardized Simulated Military Waste in a 0_5-2 Ton per Day Gasification Waste-to-Energy System for "Extra -Small" and "Small" Contingency Base Camps*. AFIT/ENV/MS/16J-037. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: J81.

CRUTCHFIELD, JOHN A., *Expeditionary Waste Management and Energy Conversion Decision Analysis*. AFIT/ENV/MS/16J-040. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: J81.

LI, HUAN, *A Cost Analysis of Waste-to-Energy Applications for Small Modern Expeditionary Forces*. AFIT/ENV/MS/16M-257. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: J81.

WOLFE, ROBERT A., *Contingency Waste Disposal and Energy Conversion Analysis using Value-Focused Thinking*. AFIT/ENV/MS/16M-192. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: J81.

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

DOCTORAL DISSERTATIONS

CANCIANI, AARON J., *Absolute Positioning using the Earth's Magnetic Anomaly Field*. AFIT/ENG/DS/16S-074. Faculty Advisor: Dr. John F. Raquet. Sponsor: DARPA. [ANT]

DEFENSE INFORMATION SYSTEMS AGENCY

MASTER'S THESES

CIOTTI, BARRIE J., *Defining the Security Posture of DOD Networks using The RedSeal Security Risk Manager*. AFIT/ENG/MS/15M-007. Faculty Advisor: Dr. Michael J. Mendenhall. Sponsor: DISA. [CCR]

DEFENSE THREAT REDUCTION AGENCY

DOCTORAL DISSERTATIONS

SCHMITT, DANIEL T., *Position and Volume Estimation of Atmospheric Nuclear Detonations from Video Reconstruction*. AFIT/ENG/DS/16M-254. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DTRA.

MASTER'S THESES

BORMAN, OLIVIA M., *Neutron versus Gamma Radiation Effects on Ytterbium-doped Optical Fibers*. AFIT/ENP/MS/16M-057. Faculty Advisor: Lt Col Briana J. Singleton. Sponsor: DTRA.

BOTSFORD, ROBERT H., *Optical Fiber Signal Transmission for Nuclear Detonation Forensics*. AFIT/ENP/MS/16M-255. Faculty Advisor: Lt Col Briana J. Singleton. Sponsor: DTRA.

CASTRO, SARAH T., *Nuclear Forensics Applications of Principal Component Analysis on Micro X-ray Fluorescence Images*. AFIT/ENP/MS/16M-061. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA

FERGUSON, AARON J., *Analysis of Neutron Effects for Asteroid Disruption*. AFIT/ENP/MS/16M-068. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA. [CSRA]

GRIJALVA, CRYSTAL E., *Thermal Inactivation of Bacillus Anthracis Spores using Rapid Resistive Heating*. AFIT/ENP/MS/16M-071. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DTRA.

KEDROW, LEN L., *Characterization of 2D Jammed Granular Memristive Copper Arrays*. AFIT/ENP/MS/15M-073. Faculty Advisor: Dr. Alex Li. Sponsor: DTRA.

MANIEGO, EMBER S., *Optically Stimulated Luminescence from Ag-doped Lithium Tetraborate (Li₂B₄O₇)*. AFIT/ENP/MS/16M-075. Faculty Advisor: Maj Eric M. Golden. Sponsor: DTRA.

POULIN, ADAM C., *Radiation Effects on an Active Ytterbium-doped Fiber Laser*. AFIT/ENP/MS/16M-079. Faculty Advisor: Lt Col Briana J. Singleton. Sponsor: DTRA.

WAKELING, MOLLY A., *Differential (p , p') and (p , d) Cross Sections of ⁸⁹Y and ⁹²Zr*. AFIT/ENP/MS/16M-086. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

HIGH ENERGY LASER JOINT TECHNOLOGY OFFICE

DOCTORAL DISSERTATIONS

BURCHETT, LEE R., *Methods for Passive Remote Turbulence Characterization in the Planetary Boundary Layer*. AFIT/ENP/DS/16M-058. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]

HERR, NICHOLAS C., *Degradation of Carbon Fiber Reinforced Polymer and Graphite by Laser Heating*. AFIT/ENP/DS/16S-025. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO.

MASTER'S THESES

OWENS, STEVEN A., *Population Density Measurements of the Excited States of an Optically Excited Argon Discharge using Emission and Absorption Spectroscopy*. AFIT/ENP/MS/16M-078. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO.

SHIREY, STEPHEN M., *A Relative Humidity Based Comparison of Numerically Modeled Aerosol Extinction to LIDAR and Adiabatic Parameterizations*. AFIT/ENP/MS/16M-082. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]

LABORATORY FOR TELECOMMUNICATIONS SCIENCES

MASTER'S THESES

DENTON, JONATHAN C., *Key Detection Rate Modeling and Analysis for Satellite-Based Quantum Key Distribution*. AFIT/ENY/MS/16M-206. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: LTS. [CSRA]

SPECHT, JEREMIAH A., *Pointing Analysis and Design Drivers for Low Earth Orbit Satellite Quantum Key Distribution*. AFIT/ENY/MS/16M-024. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: LTS. [CSRA]

MISSILE DEFENSE AGENCY

DOCTORAL DISSERTATIONS

MILLER, WODDY S., *Temperature Dependent Rubidium-Helium Line Shapes and Fine Structure Mixing Rates*. AFIT/ENP/DS/15S-027. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA.

MASTER'S THESES

WALLERSTEIN, AUSTIN J., *Kinetics of Higher Lying Rb States after Pulsed Excitation of the D2 Transition in the Presence of Helium*. AFIT/ENP/MS/16M-087. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA.

NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

MASTER'S THESES

ARMWOOD, RICKY L., *The Distributed Common Ground System: Architectural Deficiencies and Corrective Actions for Effective Implementation*. AFIT/ENV/MS/15D-011. Faculty Advisor: Maj Jason K. Freels. Sponsor: NGA.

DOANE, BENJAMIN M., *Comparison of Novel Carbonaceous Structures to Treat Nitroaromatic Impacted Water*. AFIT/ENV/MS/15D-047. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: NGA.

YOUNG, SHANNON R., *Improving Detection of Dim Targets: Optimization of Moment-based Detection using Statistical Confidence*. AFIT/ENP/MS/16M-088. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: NGA. [CTISR]

NATIONAL SECURITY AGENCY

MASTER'S THESES

JORDAN, PAUL L., *Data Driven Device Failure Prediction*. AFIT/ENG/MS/16S-071. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: NSA. [CCR]

OFFICE OF THE SECRETARY OF DEFENSE

MASTER'S THESES

ALGHAMDI, KHALID A., *Corrosion Fatigue Crack Growth Behavior at Notched Hole in 7075-T6 under Different Biaxial Stress Ratios*. AFIT/ENY/MS/16S-051. Faculty Advisor: Dr. Mall Shankar. Sponsor: OSD/TCC.

ALSHAHRANI, REJA, *Effect of Stress Ratio on Fatigue Crack Growth Rate at Notched Hole in 7075-T6 Aluminum Alloy under Biaxial Fatigue*. AFIT/ENY/MS/16S-052. Faculty Advisor: Dr. Mall Shankar. Sponsor: OSD/TCC.

CHUA, ZHONGWANG, *Application of Executable Architecture in Early Concept Evaluation using the DOD Architecture Framework*. AFIT/ENV/MS/16S-038. Faculty Advisor: Dr. David R. Jacques. Sponsor: OSD.

DOMINGUEZ, THOMAS, *Characterizing Emissions from Open Burning of Military Food Waste and Packaging from Forward Operating Bases*. AFIT/ENV/MS/16M-145. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: OSD.

EHRlich, JACOB M., *A Response Surface Validation of a Quantum Key Distribution Model*. AFIT/ENS/MS/16M-104. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [COA]

HEFTY, KILEY E., *Application of Reliability Allocation Principles on Statistical Power*. AFIT/ENS/MS/16M-106. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [COA]

OH, SAMUEL D., *Evaluation the Effect of Component Commonality on Procurement Costs of Joint Aircraft Variants*. AFIT/ENV/MS/16M-169. Faculty Advisor: Dr. Robert D. Fass. Sponsor: OSD/CAPE.

POPOVICH, JOVAN, *A Model of Ambient Noise Caused by Wind Flow*. AFIT/ENS/MS/16M-125. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [COA]

POSPISAL, RYAN M., *Application of Executable Architectures in Early Concept Evaluation*. AFIT/ENV/MS/15D-027. Faculty Advisor: Dr. David R. Jacques. Sponsor: ODASD.

UNITED STATES ARMY

MASTER'S THESES

DEERING, PATRICK A., *Validation and Improvement of Reliability Methods for Air Force Building Systems*. AFIT/ENV/MS/16M-143. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: USACE.

DICKEY, THOMAS M., *Modeling and Economy's Dynamics and External Influences through a System of Differential Equations*. AFIT/ENS/MS/16M-102. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]

LEASE, LUCAS J., *The Impact of Reducing Full Time Support Positions in the U.S. Army National Guard and Reserves*. AFIT/ENS/MS/16M-111. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: CAA. [COA]

MCDONALD, JOSHUA L., *Analysis and Modeling of U.S. Army Recruiting Markets*. AFIT/ENC/MS/16M-117. Faculty Advisor: Dr. Edward D. White. Sponsor: USAREC.

MICKELSEN, RICHARD J., *Modeling the Components of an Economy as a Complex Adaptive System*. AFIT/ENS/MS/16M-120. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]

SALGADO, ETHAN L., *Using Approximate Dynamic Programming to Solve the Stochastic Demand Military Inventory Routing Problem with Direct Delivery*. AFIT/ENS/MS/16J-031. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: TRADOC. [COA]

SHALLCROSS, NICHOLAS, *A Logistic Regression and Markov Chain Model for the Prediction of Nation-state Violent Conflicts and Transitions*. AFIT/ENS/MS/16M-128. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]

WATSON, MICHAEL E., *Improving System Design through the Integration of Human Systems and Systems Engineering Models*. AFIT/ENV/MS/16M-190. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: ARL/HRED. [ANT]

UNITED STATES NAVY

MASTER'S THESES

HOLM, ERIC S., *Additive Manufacturing Process Parameter Effects on the Mechanical Properties of Fused Filament Fabrication Nylon*. AFIT/ENV/MS/16M-159. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: NPS.

UNITED STATES TRANSPORTATION COMMAND

MASTER'S THESES

BRADSHAW, CALVIN J., *Contingency Workload Demand Forecast Techniques for Cargo and Flying Hours*. AFIT/ENS/MS/16M-093. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: USTRANSCOM. [COA]

DWYER, JUSTIN J., *Analysis of Military Entry Control Point Queueing*. AFIT/ENS/MS/16M-103. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM. [COA]

MCGRIFF, WARREN B., *Rate Setting Analysis: A Statistical Approach to Outliers in the Rate Setting Process within the United States Transportation Command*. AFIT/ENS/MS/16M-118. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM. [COA]

PARK, JAMES M., *Optimizing Forecasting Methods for USTRANSCOM Railcar Demands*. AFIT/ENS/MS/16M-124. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM. [COA]

4.11. OTHER FEDERAL AGENCIES

DEPARTMENT OF HOMELAND SECURITY

DOCTORAL DISSERTATIONS

YOUNG, CHRISTOPHER M., *Evaluation of Hydrothermally Synthesized Uranium Dioxide for Novel Semiconductor Applications*. AFIT/ENP/DS/16S-027. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO. [CTISR]

MASTER'S THESES

EICHERT, CARL J., *Neutron Spectroscopy Optimization using a Solid State Thermal Neutron Detector*. AFIT/ENP/MS/16M-066. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.

GIRTZ, KYLE A., *Dynamic Honeytrap Configuration for Programmable Logic Controller Emulation*. AFIT/ENG/MS/16M-253. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

QUIGG, MICHAEL D., *Cyberspace and Organizational Structure: An Analysis of the Critical Infrastructure Environment*. AFIT/ENV/MS/16M-177. Faculty Advisor: LTC Mason Rice. Sponsor: DHS. [CCR]

VARGA, STEPHAN A., *Radiation Response from a Novel UO₂ Crystal*. AFIT/ENP/MS/16M-084. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.

YOON, JUNGSANG, *Framework for Evaluating the Readiness of Cyber First Responders Responsible for Critical Infrastructure Protection*. AFIT/ENG/MS/16M-054. Faculty Advisor: LTC Mason Rice. Sponsor: DHS. [CCR]

YOUNG, DEREK R., *A Framework for Incorporating Insurance into Critical Infrastructure Cyber Risk Strategies*. AFIT/ENG/MS/16M-055. Faculty Advisor: LTC Mason Rice. Sponsor: DHS. [CCR]

ENVIRONMENTAL PROTECTION AGENCY

MASTER'S THESES

BROWN, CHRISTOPHER K., *Removal of Perfluorooctanoic Acid from Water using Primitive, Conventional and Novel Carbonaceous Sorbent Materials*. AFIT/ENV/MS/16M-137. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: EPA.

GALLUCCI, DREW D., *Material and Design Considerations for a Portable Ultra-Violet (UV) Light Emitting Diode (LED) Water Purification Device*. AFIT/ENV/MS/16M-152. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA.

STEWART, BRANDON M., *The Effect of pH and Pulsed Ultraviolet Light Emitting Diode Duty Cycles on the First Order Rate Constant and Byproduct Profile of the Advanced Oxidation of Tartrazine*. AFIT/ENV/MS/16M-186. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA.

4.12. NON-FEDERAL SPONSORS

ARGENTINE AIR FORCE MATERIEL GENERAL DIRECTORATE

MASTER'S THESES

MARTIN, SANTIAGO L., *Overhaul Facility Planning and Control Tool Selection and Implementation Analysis*. AFIT/ENS/MS/16M-114. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: Argentine Air Force Materiel General Directorate. [COA]

BRAZILIAN ARMED FORCES

MASTER'S THESES

OLIVEIRA, LEANDRO V., *An Evaluation of Forecasting Methods that could be used in the Brazilian Air Force Uniform Distribution Process*. AFIT/ENS/MS/16M-122. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: Brazilian Air Force. [COA]

LINCOLN LABORATORY – MIT

MASTER'S THESES

JELINEK, DEREK R., *VHF/UHF Antenna Design for Multistatic SAR Imaging Across UAV Classes*. AFIT/ENG/MS/16M-023. Faculty Advisor: Dr. Peter J. Collins. Sponsor: MIT/LL. [ANT]

MCCLEARN, MICHAEL J., *Design, Manufacturing, and Testing of a Small Through-Flow Wave for use within the Brayton Cycle*. AFIT/ENY/MS/16J-054. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: MIT/LL.

WORTH, DEREK B., *An OpenEagles Framework Extension for Hardware-in-the-Loop Swarm Simulation*. AFIT/ENG/MS/16M-052. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL. [ANT]

LOCKHEED MARTIN

MASTER'S THESES

IP, GEORGE, *Experimental and Computational Evaluation of the Aerodynamics of a Retrofiring Missile*. AFIT/ENY/MS/16M-220. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: Lockheed Martin.

JAVID, CLAY C., *Assessing the Military Worth of Advanced Capabilities of the Small Advanced Capabilities Missile through Agent-Based Modeling*. AFIT/ENS/MS/16M-108. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin. [COA]

LIRA, JOHN R., *Agent-Based Modeling for Air-to-Air Missile Combat*. AFIT/ENS/MS/16M-112. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin. [COA]

MZA ASSOCIATES CORPORATION

DOCTORAL DISSERTATIONS

MEIER, DAVID C., *Operational Exploitation of Satellite-Based Sounding Data and Numerical Weather Prediction Models for Directed Energy Applications*. AFIT/ENP/DS/15D-009. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: MZA. [CDE]

SAUDI AIR FORCE

MASTER'S THESES

ALZHRANI, FISAL A., *Applying Lean to the AC-130 Maintenance Process for the Royal Saudi Air Force*. AFIT/ENS/MS/16S-024. Faculty Advisor: Capt Michael P. Kretser. Sponsor: Saudi Air Force.

THE CHARLES STARK DRAPER LABORATORY, INC

MASTER'S THESES

MACALONEY, KURT D., *Navigation from Daytime Imaging of Celestial Objects*. AFIT/ENG/MS/16M-034. Faculty Advisor: Dr. John F. Raquet. Sponsor: CSDL. [ANT]

TURKISH AIR FORCE

MASTER'S THESES

AYKIRI, BAHADIR, *Simulation Modeling of the Sortie Generation Process in Turaf*. AFIT/ENS/MS/16M-090.

Faculty Advisor: Dr. John O. Miller. Sponsor: TURAF. [COA]

SEVIMLI, ABDURRAHMAN, *Sortie Generation Simulation of a Fighter Squadron*. AFIT/ENS/MS/16M-127.

Faculty Advisor: Dr. John O. Miller. Sponsor: TURAF. [COA]

5. ACADEMIC DEPARTMENT PUBLICATIONS AND FUNDING INFORMATION

5.1. DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

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5.1.1. DOCTORAL DISSERTATIONS

ANDRUS, IONIO Q., *Design and Experimentation of a Premixed Rotating Detonation Engine*. AFIT/ENY/DS/16J-059. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

AUSSERER, JOSEPH K., *The Scaling of Loss Pathways and Heat Transfer in Small Scale Internal Combustion Engines*. AFIT/ENY/DS/16S-055. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

CRAFT, CHRISTOPHER T., *Formation Flight of Earth Satellites on Low-Eccentricity KAM Tori*. AFIT/ENY/DS/16M-201. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A.

CRANSTON, BRIAN C., *Conceptual Design, Structural Analysis, and Design Space Exploration of a Vacuum Lighter than Air Vehicle*. AFIT/ENY/DS/16M-202. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

DEGREGORIA, ANTHONY J., *Creep and Oxidation of Hafnium Diboride-Based Ultra High Temperature Ceramics at 1500°C*. AFIT/ENY/DS/15D-040. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

DOUPE, COLE C., *Optimal Attitude Control of Agile Spacecraft using Combined Reaction Wheel and Control Moment Gyroscope Arrays*. AFIT/ENY/DS/15D-042. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

HESS, JOSHUAH A., *Adaptive Estimation and Heuristic Optimization of Nonlinear Spacecraft Attitude Dynamics*. AFIT/ENY/DS/16S-061. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

HUMPHREYS, CLAY J., *Optimal Control of an Uninhabited Loyal Wingman*. AFIT/ENY/DS/16S-063. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

JODEH, NIDAL M., *Optimal UAS Assignments and Trajectories for Persistent Surveillance and Data Collection from a Wireless Sensor Network*. AFIT/ENY/DS/15S-062. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

LINGENFELTER, ANDREW J., *Cavity Geometric Features and Entrainment Characterization Resulting from a Ballistically Induced Hydrodynamic Ram Event*. AFIT/ENY/DS/16S-065. Faculty Advisor: Maj David Liu. Sponsor: JASPO.

ROBERTSON, SCOTT J., *Creep of Hi-Nicalon™ S Ceramic Fiber Tows at 800°C in Air and in Silicic Acid-Saturated Steam*. AFIT/ENY/DS/15S-067. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

WRIGHT, STEVEN P., *Orbit Determination using Vinti's Solution*. AFIT/ENY/DS/16S-067. Faculty Advisor: Dr. William E. Wiesel. Sponsor: N/A.

WUERTEMBERGER, LUKE A., *Evaluation and Correlation of Dynamic Flow, Failure, and Microstructural Properties of Heat-treated 4130 Steel*. AFIT/ENY/DS/16S-068. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

5.1.2. MASTER'S THESES

ALGHAMDI, KHALID A., *Corrosion Fatigue Crack Growth Behavior at Notched Hole in 7075-T6 under Different Biaxial Stress Ratios*. AFIT/ENY/MS/16S-051. Faculty Advisor: Dr. Mall Shankar. Sponsor: OSD/TCC.

ALSHAHRANI, REJA, *Effect of Stress Ratio on Fatigue Crack Growth Rate at Notched Hole in 7075-T6 Aluminum Alloy under Biaxial Fatigue*. AFIT/ENY/MS/16S-052. Faculty Advisor: Dr. Mall Shankar. Sponsor: OSD/TCC.

BASSETT, ERIC A., *Test and Verification of a CubeSat Attitude Determination and Control System in Variable Magnetic Fields*. AFIT/ENY/MS/16J-050. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

BIEHL, SCOTT A., *Multi-CubeSat Deployment Strategies: How Different Satellite Deployment Schemes Affect Satellite Separation and Detection for Various Types of Constellations and Missions*. AFIT/ENY/MS/16M-198. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

BILLS, JACOB D., *Liquid Fuel Film Cooling: a CFD Analysis with Hydrocarbon Fuel*. AFIT/ENY/MS/16M-199. Faculty Advisor: Maj Darrell S. Crowe. Sponsor: AFRL/RQ.

CUNNINGHAM, DAVID A., *Localized Plasma Measurement during Instability Modes in a Hall Thruster*. AFIT/ENY/MS/16M-203. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR. [CSRA]

DEMPSEY, ALLISON A., *Dynamic Properties of Additively Manufactured 15-5PH Stainless Steel*. AFIT/ENY/MS/16M-205. Faculty Advisor: Maj David Liu. Sponsor: AFRL/RW.

DENTON, JONATHAN C., *Key Detection Rate Modeling and Analysis for Satellite-Based Quantum Key Distribution*. AFIT/ENY/MS/16M-206. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: LTS. [CSRA]

DEUTSCH, MATTHEW J., *Spectroscopic Measurement of Gas Temperature in Small Internal Combustion Engines*. AFIT/ENY/MS/16M-207. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

DUFFY, LAURA M., *Orbital Resonances in the Vinti Solution*. AFIT/ENY/MS/16M-208. Faculty Advisor: Dr. William E. Wiesel. Sponsor: AFRL/RV.

FLAMOS, STACIE M., *Space Object Self-Tracker On-Board Orbit Determination Analysis*. AFIT/ENY/MS/16M-209. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

FULLENKAMP, JONATHAN, *Analysis of Software Defined Radios for Collecting GPS Tracking Data from Terrestrial Transmitters*. AFIT/ENY/MS/16M-210. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

GILBERT, NICHOLAS A., *Enhanced Flow Migration in Full Annular Ultra Compact Combustor*. AFIT/ENY/MS/16M-211. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFOSR.

GRAVES, WILLIAM T., *Topology Optimization of a Penetrating Warhead*. AFIT/ENY/MS/16M-212. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RW.

GROSS, KERIANNE H., *Evaluation of Verification Approaches Applied to a Nonlinear Control System*. AFIT/ENY/MS/16M-214. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RQ. [CSRA]

GUARNACCIO, CHASE C., *Aero-throttle Assisted Cold-Start Ignition of a Dual-Mode Scramjet*. AFIT/ENY/MS/16M-215. Faculty Advisor: Maj Brook I. Bentley. Sponsor: AFRL/RQ.

GULOTTA, PAUL A., *Particle Image Velocimetry and Analysis Methods using Cleanly Seeded Particles in Supersonic Flow*. AFIT/ENY/MS/16J-053. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RQ.

HANKS, EVAN T., *Surface Roughness of Electron Beam Melting TI-6AL-4V Effect on Ultrasonic Testing*. AFIT/ENY/MS/16M-216. Faculty Advisor: Maj David Liu. Sponsor: AFRL/RQ.

HOLT, JASON, *Persistent Surveillance of Geosynchronous Satellites Utilizing CubeSats in Low Earth Orbit*. AFIT/ENY/MS/16M-218. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

HOPE, DANIEL K., *Investigation into Reynolds Number Effects on a Biomimetic Flapping Wing*. AFIT/ENY/MS/16M-219. Faculty Advisor: Lt Col Anthony M. Deluca. Sponsor: AFRL/RW.

IP, GEORGE, *Experimental and Computational Evaluation of the Aerodynamics of a Retrofiring Missile*. AFIT/ENY/MS/16M-220. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: Lockheed Martin.

KIM, JOSHUA P., *Evaluation of Unmanned Aircraft Flying Qualities using JSBSim*. AFIT/ENY/MS/16M-221. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ. [ANT]

KNOBLAUCH, AARON M., *Aerothermodynamic and Infrared Signature Analysis of a Hypersonic Vehicle*. AFIT/ENY/MS/16M-222. Faculty Advisor: Maj Brook I. Bentley. Sponsor: N/A.

KOBZA, CARL L., *Space Qualification Testing of a Deployable Shape Memory Alloy CubeSat Antenna*. AFIT/ENY/MS/16S-064. Faculty Advisor: Dr. Richard Cobb. Sponsor: N/A. [CSRA]

LIU, JAMES J., *Analysis of a Modified Equivalent Circuit Model for Lithium-Ion Battery Modules in CubeSats*. AFIT/ENY/MS/16M-224. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

LIU, YUEN, *Performance Testing of Various Nozzle Design for Water Electrolysis Thruster*. AFIT/ENY/MS/16M-225. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RV. [CSRA]

LOUDERMILK, JOSHUA, *A Logic-based Mission Modeling Tool for Designing CubeSats*. AFIT/ENY/MS/16M-226. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

MAGERS, MICHAEL A., *Geolocation of RF Emitters using a Low-Cost UAV-Based Approach*. AFIT/ENY/MS/16M-258. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFLCMC. [ANT]

MCCAFFERTY, JULIAN P., *Development of a Modularized Software Architecture to Enhance SSA with COTS Telescopes*. AFIT/ENY/MS/16M-227. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

MCCLEARN, MICHAEL J., *Design, Manufacturing, and Testing of a Small Through-Flow Wave for use within the Brayton Cycle*. AFIT/ENY/MS/16J-054. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: MIT/LL.

MCKENNEY, SHAYNA K., *Meeting the DOD's Tactical Weather Needs using CubeSats*. AFIT/ENY/MS/16J-055. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

MILLAR, JAMES B., *Short Duration Missions to Earth Crossing Asteroids*. AFIT/ENY/MS/16M-228. Faculty Advisor: Dr. William E. Wiesel. Sponsor: AFRL/RV.

MILLER, DANIEL G., *Vibrational Analysis of a 12U Chassis*. AFIT/ENY/MS/16M-229. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

MORGAN, BLAKE, *Performance Comparison of Multiple Ionic Liquid Propellants using the Busek BGT-XS Monopropellant Thruster*. AFIT/ENY/MS/16M-230. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

MUILENBURG, CONNOR L., *Empirical Determination of Performance Characteristics for Busek 1cm Micro Radio-Frequency Ion Propulsion System*. AFIT/ENY/MS/16M-023. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ. [CSRA]

NOOMEN, MOHAMED, *Mechanical Properties and Fatigue Behavior of Unitized Composite Airframe Structures at Elevated Temperature*. AFIT/ENY/MS/16S-066. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RQ.

PAKISH, CRAIG W., *Low Latency Weather Data from a CubeSat Constellation*. AFIT/ENY/MS/16M-173. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

PATRICK, RYAN M., *Analysis of a Near Real-Time Optimal Attitude Control for Satellite Simulators*. AFIT/ENY/MS/16M-232. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A. [CSRA]

PETRY, ANDREW K., *Effectiveness Based Design of a Tactical Tanker Aircraft*. AFIT/ENY/MS/16M-233. Faculty Advisor: Lt Col Anthony M. DeLuca. Sponsor: AFRL/RQ.

PIPER, MATTHEW W., *Creep of Hi-Nicalon™ S Ceramic Fiber Tows at 700°C in Air and in Silicic Acid-saturated Steam*. AFIT/ENY/MS/16M-234. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

PROBST, ZACHARY, *Design and Flight Test of a Weapons-cavity Acoustics and Separation Test Bed*. AFIT/ENY/MS/16M-235. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: N/A.

PUBLIC, MICHAEL L., *Fatigue Behavior of an Advanced SiC/SiC Composite at 1300° C in Air and Steam*. AFIT/ENY/MS/16M-223. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

SCHELLER, BRIAN K., *A Time-Variant Value-Focused Methodology for Supporting Pre-Acquisition*. AFIT/ENY/MS/16M-236. Faculty Advisor: Lt Col Thomas C. Ford. Sponsor: AFLCMC.

SELLERS, JAMES B., *Force and Moment Measurements Applicable to a Flexible Weapons System*. AFIT/ENY/MS/16M-237. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RW.

SHEPARD, JOSHUA, *Development and Testing of a Rotating Detonation Engine Fueled with JP-8*. AFIT/ENY/MS/16M-238. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

SINGLETON, JACOB W., *Electro-Mechanical Characterization of Carbon Nanotube Sheets in Simulated Space Environments: The Dawn of “Carbon Spacecraft.”* AFIT/ENY/MS/16M-240. Faculty Advisor: Dr. Shankar Mall. Sponsor: N/A.

SPECHT, JEREMIAH A., *Pointing Analysis and Design Drivers for Low Earth Orbit Satellite Quantum Key Distribution*. AFIT/ENY/MS/16M-024. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: LTS. [CSRA]

STEPHENSON, WILLIAM J., *Characterization of Physical Blockage for Reliable Scramjet Ignition*. AFIT/ENY/MS/16M-242. Faculty Advisor: Maj Brook I. Bentley. Sponsor: AFRL/RQ.

TORF, JASON, *Optimized Cooperative Control for Combat Survivability using an Unmanned Defense Wingman*. AFIT/ENY/MS/16M-243. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFLCMC. [ANT]

TROMBETTA, JOHN V., *Multi-Trajectory Automatic Ground Collision Avoidance System with Flight Tests (Project Have ESCAPE)*. AFIT/ENY/MS/16M-244. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFTPS.

WIESE, CONNOR J., *Influence of Coolant Flow Rate Parameters in Scaling Gas Turbine Cooling Effectiveness*. AFIT/ENY/MS/16M-245. Faculty Advisor: Maj James L. Rutledge. Sponsor: AFRL/RQ.

WILMER, MEREDITH M., *Military Applications of High-Altitude Satellite Orbits in a Multi-Body Dynamical Environment using Numerical Methods and Dynamical Systems Theory*. AFIT/ENY/MS/16M-247. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

YERLY, ERIC T., *Investigation into Active Spanwise Camber Deformation on the Lateral Stability and Roll Control of the X-56A Compared to Conventional Ailerons*. AFIT/ENY/MS/16M-249. Faculty Advisor: Lt Col Anthony M. DeLuca. Sponsor: AFRL/RQ.

ZURITA, ALFREDO G., *Minimum-Fuel Trajectory Design in Multiple Dynamical Environments Utilizing Direct Transcription Methods and Particle Swarm Optimization*. AFIT/ENY/MS/16M-250. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV. [CSRA]

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 (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

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kaslow, D., Ayres, B., Cahill, P. T., Chonoles, M.J., Hart, L., Iwata, C.K., Levi, A.G., and Yntema, R., "CubeSat Model-Based Systems Engineering (MBSE) Reference Model - Development and Distribution - Interim Status," AIAA SPACE 2016, SPACE Conferences and Exposition, (AIAA 2016-5551). [CSRA]

BENTLEY, BROOK I., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2013 (AFIT/ENY); BS, Mechanical Engineering, Brigham Young University, 2005; MS, Aeronautical Engineering, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2013. Maj Bentley's research interests include hypersonics, scramjets, fluids, and surface phenomena such as ablation and sublimation. He is a member of AIAA, Phi Kappa Phi, Tau Beta Pi, and Sigma Gamma Tau. Tel. 937-255-3636 x7478, email: Brook.Bentley@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Guarnaccio, C.C., Bentley, B.I., and Ombrello, T.M., "Dynamic Response of Supersonic Flow to Short Duration Normal Flow Injection," 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-2149.

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): CSRA, ANT and CDE. Tel. 937-255-3636 x4559, email: Richard.Cobb@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Automatic Ground Collision Avoidance System Trajectory Optimization - Flight Tests." Sponsor: AFRL/RQ. Funding: \$6,000. [ANT]

"Modeling & Simulation of Space via High Performance Computing." Sponsor: AFRL/RQ. Funding: \$150,000 – Cobb 50%, Swenson 50%. [CSRA]

“Plenoptic Cameras for 3-D Video (PC3V).” Sponsor: Undisclosed. Funding: \$7,670. [CSRA]

“Small Sat Constellation for Weather Applications.” Sponsor: Undisclosed. Funding: \$9,000 – Cobb 50%, Simmons 50%. [CSRA]

“Trajectory Optimization Applications for Loyal Wingman and Missile Avoidance.” Sponsor: AFRL/RQ. Funding: \$30,000. [ANT]

REFEREED JOURNAL PUBLICATIONS

Livermore, R., Lindholm, G., Neal, C., Cobb, R., and Colombi, J., “Heuristic UAS Path Planning for Convoy Overwatch,” *Journal of Unmanned Aerial Systems*, Vol. 2, Issue 1, Summer 2016. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carr, R., Torf, J., and Cobb, R., “Cooperative Control for Missile Evasion,” AIAA Guidance, Navigation, and Control Conference, AIAA SciTech, San Diego, California, USA. 4-8 January 2016. DOI: 10.2514/6.2016-1862. [ANT]

Jodeh, N., Cobb, R. and Livermore, R., “Optimal Flight Paths in Wireless Sensor Networks: Modeling, Simulation, and Flight Test,” AIAA Guidance, Navigation, and Control Conference, AIAA SciTech, San Diego, California, USA. 4-8 January 2016. DOI:10.2514/6.2016-0383. [ANT]

Gross, K., Hoffman, J., Clark, M., Swenson, E., Cobb, R., Whalen, M. and Wagner, L., “Evaluation of Formal Methods Tools Applied to a 6U CubeSat Attitude Control System,” AIAA SPACE 2015 Conference and Exposition, Space Conferences and Exposition, Pasadena, California. 2015. DOI: 10.2514/6.2015-4529. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Torf, J., Carr, R. and Cobb, R., “Optimized Maneuvers and Countermeasures for Specialized Defensive Loyal Wingman,” AIAA Defense 2016 (Missile Sciences Conference), AIAA-Defense2016-9013, Laurel, Maryland, 8–10 March 2016. [ANT]

Humphreys, C., Cobb, R., Jacques, R. and Reeger, J., “Dynamic Re-plan of the Loyal Wingman Optimal Control Problem in a Changing Mission Environment,” AIAA Infotech @ Aerospace, AIAA SciTech, San Diego, California. 4-8 January 2016. DOI: 10.2514/6.2016-0746. [ANT]

Doupe, C., Swenson, E., Cobb, R. and Pierce, S., “Optimal Attitude Control of Agile Spacecraft Using Combined Reaction Wheel and Control Moment Gyroscope Arrays,” AIAA Modeling and Simulation Technologies Conference, AIAA SciTech, San Diego, California, 4-8 January 2016. DOI: 10.2514/6.2016-0675. [ANT/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. Proc. SPIE 9974, Infrared Sensors, Devices, and Applications VI, 99740T (September 19, 2016); DOI:10.1117/12.2238021. [CDE/CSRA]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Humphreys, C. and Cobb, R., “Optimal Control of Uninhabited Loyal Wingman in Stochastic Environment,” ASME 11th Dayton Engineering Sciences Symposium, 2 Nov 2015. [ANT]

Torf, J., Carr, R. and Cobb, R., “Missile Evasion Using Specialized Defensive Wingman,” ASME 11th Dayton Engineering Sciences Symposium, 2 Nov 2015. [ANT]

Sellers, J., Reeder, M. and Cobb R. “Force and Moment Measurements Applicable to a Flexible Weapons System,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

- Carr, R. and Cobb, R., “Finding Pursuit-Evasion Game Equilibrium Solutions Using Direct Orthogonal Collocation,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.
- Torf, J., Carr, R. and Cobb, R., “Optimized Cooperative Control for Combat Survivability Using Unmanned Defensive Wingman,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [ANT]
- Humphreys, C., Cobb, R., Jacques, R. and Reeger, J., “The Loyal Wingman Optimal Control Problem in a Static Threat Environment,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [ANT]
- Loudermilk, J., Cobb, R. and Ayres, B., “A Logic-based Mission Modeling Tool for Designing CubeSats,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [CSRA]
- Pakish, C. and Cobb, R., “Low Latency Weather Data from a CubeSat Constellation,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [CSRA]
- McCafferty, J. and Cobb, R., “Development of a Modularized Software Architecture to Enhance SSA with COTS Telescopes,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [CSRA]
- Wheeler, P. and Cobb, R., “Predicting Spectral Signature Intensities of Satellite Hall Effect Thruster Plumes using Small Telescopes,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [CDE]
- Denton, J. and Cobb, R., “Satellite Quantum Key Distribution Modeling Toolkit Development and the Impact of Channel Effects on Satellite-based Raw Key Generation Rates,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [CDE/CSRA]
- Specht, J. and Cobb, R., “Pointing Analysis and Design Drivers for Low Earth Orbit Satellite Quantum Key Distribution,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016. [CDE/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 JOURNAL PUBLICATIONS

Comer, A. L., Kipouros, T., and Cant, R. S. “Multi-objective, Numerical Investigation of a Generic Airblast Injector Design,” *Journal of Engineering for Gas Turbines and Power*. March 2016. DOI:10.1115/1.4032737

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Comer, A. L., Huang, C., Rankin, B. A., Harvazinski, M. E., and Sankaran, V. “Modeling and Simulation of Bluff Body Stabilized Turbulent Premixed Flames,” *54th AIAA Aerospace Sciences Meeting*, AIAA 2016-1936, San Diego, CA, Jan 2016.

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 Simulations of Fuel Film Cooling II.” Sponsor: AFRL/RQ. Funding: \$8,000 – Crowe 50%, Rutledge 50%.

“Computational Fluid Dynamics Simulations of Serpentine Exhaust Nozzles.” Sponsor: AFRL/RQ. Funding: \$3,330.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bills, J., Crowe, D.S., Rutledge, J., and Coy, E., “Modeling Fuel Film Cooling on Rocket Engine Walls,” 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-2149.

Johnson, L., Martin, C.L., Reeder, M.F., and Crowe, D.S., “Numerical Simulation of Supersonic Jets in Transonic and Supersonic Crossflows Using *Kestrel*,” 34th AIAA Applied Aerodynamics Conference, AIAA Aviation, Washington, D.C., Jun 2016, AIAA Paper 2016-3576.

DELUCA, ANTHONY M., Lt Col,

Assistant Professor of Aerospace Engineering, AFIT Appointment Date: 2013 (AFIT/ENY); BS, Mechanical Engineering, US Military Academy at West Point, 1995; MBA, Technology Management, University of Phoenix/ABQ, 1998; MS, Aeronautical Engineering, Air Force Institute of Technology, 2004; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2013. Lt Col DeLuca's research interests include aerodynamics, fluid mechanics, and biomimetic flight systems. Lt Col DeLuca is a flight test engineer with extensive experience in air-to-air and air-to-ground weapons, and on national ISR systems, conducting flight test in a variety of aircraft. He is a commercial pilot with instrument and high-performance ratings, and a member of Tau Beta Pi, Sigma Gamma Tau, and AIAA. Tel. 937-255-3636 x4537, email: Anthony.Deluca@afit.edu

REFEREED JOURNAL PUBLICATIONS

Just, L., Palazotto, A., and Deluca, A., “Nonlinear Dynamic Analysis of an Icosahedron Frame That Exhibits Chaotic Behavior,” J. of Computational and Nonlinear Dynamics, ASME, 2016.

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, predictive computational uncertainty, and computational turbulence modeling. Lt Col Freeman has experience as the GPS deputy chief engineer at the Space & Missile Systems Center and as assistant professor of aeronautical engineering at the Air Force Academy. He also has experience in computational aircraft-store separation at the Air Force SEEK EAGLE Office; computational, experimental and flight testing of a micro air vehicle; and satellite payload testing, integration, launch and operations for the MightySat II.1 space vehicle for the Air Force Research Lab. He also deployed to Guantanamo Bay, Cuba in support of Operation Enduring Freedom. He is a member of AIAA. Tel. 937-255-3636 x4901, email: Jacob.Freeman@afit.edu

REFEREED JOURNAL PUBLICATIONS

Freeman, J.A. and Roy, C.J., “Global optimization under uncertainty and uncertainty quantification applied to tractor-trailer base flaps,” ASME Journal of Verification, Validation and Uncertainty Quantification, Vol. 1, June 2016. DOI: 10.1115/1.4033289.

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. Tel. 937-255-3636 x4237, email: Christopher.Geisel@afit.edu

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

"An Examination of Hypersonic Wake Phenomenon and Application to Foreign Threat Vehicle Assessment." Sponsor: NASIC. Funding: \$200,560.

"Porosity Effects on Detonation Waves." Sponsor: AFRL/RW. Funding: \$10,355.

"The Use of Chemical Reaction Models in Hydrocode Simulation of Explosives." Sponsor: AFOSR. Funding: \$23,548.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Short Course in Hypersonic Aerothermodynamics for Intelligence Analysts." Sponsor: Undisclosed. Funding: \$10,000.

"Short Course in Hypersonic Aerothermodynamics for Intelligence Analysts." Sponsor: NASIC. Funding: \$3,698.

REFEREED JOURNAL PUBLICATIONS

Alba, C., Greendyke, R., Lewis, S., Morgan, R., McIntyre, T. "Numerical Modeling of Earth Re-entry Flow with Surface Ablation," AIAA Journal of Spacecraft and Rockets, Vol. 53, No. 1, pgs. 84-97, 2016.

Lewis, S., Morgan, R., McIntyre, T., Alba, C., Greendyke, R. "Expansion Tunnel Experiments of Earth Re-entry Flow with Surface Ablation," AIAA Journal of Spacecraft and Rockets, posted online on February 16, 2016. DOI: 10.2514/1.A33267.

Alba, C., Greendyke, R., Marschall, J. "Development of a Nonequilibrium Finite-Rate Ablation Model for Radiating Earth Re-entry Flows," AIAA Journal of Spacecraft and Rockets, Vol. 53, No. 1, pgs. 98-120, 2016.

Alba, C., Greendyke, R. "A Nonequilibrium Finite-Rate Carbon Ablation Model for Earth Re-entry Flows," AIAA Journal of Spacecraft and Rockets, Technical Note, posted online on March 14, 2016. DOI: 10.2514/1.A33399.

Kaplan, S., Greendyke, R., Lowe, R., and Foley, J., "Finite Element Modeling of Dynamic Circuit Board Strain Response under High-G Shock Impact," J. of Surface Mount Technology, Vol. 28, Issue 4, Oct-Dec 2015.

Kaplan, S., Greendyke, R., Lowe, R. and Foley, J., "Measurement of the Electromechanical Response of Capacitors in Dynamic Loading Conditions," Conference Proceedings, Society of Experimental Mechanics Annual Conference and Exhibition, Costa Mesa, CA, Springer, June 2016.

HALE, CHAD S., Lt Col,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS, Mechanical Engineering, Brigham Young University, 1994; MS, Aeronautical Engineering, Air Force Institute of Technology, 1995; PhD, Aeronautical Engineering, Air Force Institute of Technology, 2010. Lt Col Hale is a graduate of the US Air Force Test Pilot School experimental flight test engineer course (Class 00B). Prior to his assignment to AFIT, Lt Col Hale served as the MQ-9 Chief of Test in the Medium Altitude UAS Division, Wright-Patterson AFB, OH. Lt Col Hale has extensive flight test experience as an F-16 developmental engineer, F-15 flight test technical director, and as Deputy Division Chief in HQ AFMC Test and Evaluation Division. His research interests include structural mechanics, weapons and munitions, and flight test. Lt Col Hale deployed to Baghdad, Iraq in support of the Office of Security Cooperation–Iraq. Lt Col Hale is a member of Tau Beta Pi, Sigma Gamma Tau, and ASME. Tel. 937-255-3636 x4628, email: Chad.Hale@afit.edu

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 deputy chair for the technical program and session chair at the 2016 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

"Additive Manufacturing of Optimized Spacecraft Structure." Sponsor: Undisclosed. Funding: \$72,225. [CSRA]

"Additive Manufacturing Structures with Integral Heat Pipes for Thermal Control." Sponsor: Undisclosed. Funding: \$68,600 – Hartsfield 50%, Swenson 50%. [CSRA]

"Design Tools for Direct Digital Fabrication of Hypersonic Systems." Sponsor: AFOSR. Funding: \$37,480.

"Ultra-High Speed Plasma Diagnostics in an ExB Device for the Determination of Anomalous Transport Diffusion." Sponsor: AFOSR. Funding: \$30,090. [CSRA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Combat Aircraft Survivability Education." Sponsor: DOT&E. Funding: \$45,000 – Hartsfield 50%, Hale 50%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Cunningham, D., Liu, D., Hartsfield, C., Mullins, C., Farnell, C., Williams, J.D., Hargus, W.A., "Synchronized Measurement of Plasma Characteristics in a Hall Effect Thruster," 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-1943. [CSRA]

Liu, D., Hartsfield, C., "Empirical Determination of Performance Characteristics for a 1 cm Micro Radio Frequency Ion Propulsion System," 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-1944. [CSRA]

Liu, J.L., Liu, D., Hartsfield, C., "Performance Testing of Various Nozzle Designs for Water Electrolysis Thruster," 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-0954. [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. Proc. SPIE 9974, Infrared Sensors, Devices, and Applications VI, 99740T (September 19, 2016); DOI:10.1117/12.2238021. [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, and optimization. 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. Tel. 937-255-3636 x6190, email: Joshuah.Hess@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hess, J., Swenson, E.D., Leve, F., Black, J., and Goff, G.M., "Adaptive Estimation of Nonlinear Spacecraft Attitude Dynamics with Time-Varying Moments of Inertia Using On-Board Sensors," AIAA Guidance, Navigation, and Control Conference, AIAA SciTech, (AIAA 2016-1855).

Goff, G.M., Black, J., Beck, J.A., and Hess, J., "A Dynamic Sensor Tasking Strategy for Tracking Maneuvering Spacecraft using Multiple Models," AIAA Guidance, Navigation, and Control Conference, AIAA SciTech, (AIAA 2016-1859).

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, Sigma Gamma Tau, and AIAA. Tel. 937-255-3636 x4285, email: Kirk.Johnson@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Johnson, K. W., Vadali, S. R., and Alfriend, K. T., "Simulating Satellite Relative Motion with a Second-order Hoots Theory," 52nd Annual Technical Meeting of the Society of Engineering Science, College Station, TX, Oct 2015.

Johnson, K. W., Vadali, S. R., and Alfriend, K. T., "Comparison of Orbit Element Sets for Modeling Perturbed Satellite Relative Motion," 26th AAS/AIAA Space Flight Mechanics Meeting, Napa, CA, AAS 16-357, Feb 2016.

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

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Komives, J.R., Subbareddy, P.K., and Candler, G.V., "Development and Validation of a LES Turbulence Wall Model for Compressible Flows with Heat Transfer," 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, (AIAA 2016-0586).

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 Aeroflight dynamics 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: \$90,439 – Kunz 50%, Reeder 20%, Cobb 20%, Crowe 10%.

"Flying Qualities for Unmanned Vehicles." Sponsor: AFRL/RQ. Funding: \$20,000.

"Research Support for Joint AFIT/TPS Test Management Projects." Sponsor: USAF TPS. Funding: \$15,095.

"VCCW Modeling and Simulation." Sponsor: AFRL/RQ. Funding: \$19,997.

REFEREED JOURNAL PUBLICATIONS

Tauer, T.M., Kunz, D.L. and Lindsley, N.J., "Visualization of Nonlinear Aerodynamic Phenomena During F-16 Limit-Cycle Oscillation," *Journal of Aircraft*, Vol. 53, No. 3, May-Jun 2016, pp. 865-870, DOI: 10.2514/1.C033534.

Terpening, C.D., Kunz, D.L., and Dickerson, S.M., "Characterization of CH-47D Rotor System Fault Signatures Using a Comprehensive Model," *Journal of the American Helicopter Society*, Vol. 61, No. 2, April 2016, 022012, DOI: 10.4050/JAHS.61.022012.

Gabbard, M.D., Lindsley, N.J., and Kunz, D.L., "Modeling the Effects of Underwing Missile Canards on F-16 Limit Cycle Oscillations," *Journal of Aircraft*, Vol. 53, No. 1, Jan-Feb 2016, pp. 202-216, DOI: 10.2514/1.C033301.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kim, J.P., and Kunz, D.L., "Evaluation of UAV Flying Qualities Using JSBSim," AIAA Atmospheric Flight Mechanics Conference, AIAA Aviation and Aeronautics Forum and Exhibition 2016, AIAA-3542, Washington, D.C., June 2016

BOOKS AND CHAPTERS IN BOOKS

Kunz, D.L., *Intermediate Dynamics for Aeronautics & Astronautics*, Headmaster Press, ISBN: 978-1517141349, October 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Higgins, N.S., and Kunz, D.L., “Developing UAV Flying Qualities Requirements Using JSBSim Physics-Based Modeling,” Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, Ohio, March 2016.

Kim, J.P., and Kunz, D.L., “Evaluation of UAV Flying Qualities Using JSBSim,” Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, Ohio, March 2016.

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; MS, 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. Tel. 937-255-3636 x4282, email: Andrew.Lingenfelter@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lingenfelter, A.J., and Liu, D., “Composition Characterization of Cavity Consisting of Multiple Fluids,” 57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, AIAA SciTech, (AIAA 2016-1245).

Lingenfelter, A.J., and Liu, D., “Characterization of Hydrodynamic Ram Cavity Dynamics to Transient Spray,” 57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, AIAA SciTech, (AIAA 2016-1244).

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. Tel. 937-255-3636 x4587, email: Shankar.Mall@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Applications of carbon nanotube (CNT) fabric in satellites including CubeSat.” Sponsor: Undisclosed. Funding: \$92,800 – Mall 70%, Swenson 20%, Rutledge 10%.

“Characterization of Ceramics Matrix Composite in Gas Turbine Engine Environments.” Sponsor: AFRL/RX. Funding: \$15,000.

“Characterization of cryogenic electromechanical behavior of CNT multi-yarn (conductor).” Sponsor: AFOSR. Funding: \$35,695.

“Further Investigation into Application of Carbon Nanotube Sheet for Improved Thermal System in CubeSat.” Sponsor: Undisclosed. Funding: \$53,845.

REFEREED JOURNAL PUBLICATIONS

Sabelkin, V., Perel, V., Misak, H., Hunt, E. and Mall, S., “Investigation into Crack Initiation from Corrosion Pit in 7075-T6 under Ambient Laboratory and Saltwater Environments,” *Engineering Fracture Mechanics*, 111-123, 2015.

Bertrand D, Sabelkin V, Zawada L, Mall S, “Fatigue Behavior of Sylramic-iBN/BN/CVI SiC Ceramic Matrix Composite in Combustion Environment,” *Journal of Materials Science*, 7437-7448, 2015.

Askarinejad, S., Rahbar, N., Sabelkin, V and Mall, S., “Mechanical Behavior of a Notched Oxide/Oxide Ceramic Matrix Composite in Combustion Environment: Experiment and Simulations,” *Composite Structures*, 77-86, 2015.

Perel, V. Y. and Mall, S., “Initial Trajectories of Propagation of Fatigue Cracks under Biaxial Cyclic Loading with Phase Difference,” *Nonlinear Dynamics and System Theory*, 171-183, 2015.

Sabelkin, V., Zawada, L. and Mall, S., “Effects of Combustion and Salt-fog Exposure on Fatigue Behavior of two Ceramic Matrix Composites and a Superalloy,” *Journal of Materials Science*, 5204-5213, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mall S, “Crack Initiation from Corrosion Pit in Three Aluminum Alloys under Ambient Air and Saltwater Environments,” 2015 DOD Allied Nation Technical Corrosion Conference in Pittsburgh, Pennsylvania, November 16-19, 2015.

Zakrajsek, A. J., Childress, J., Bohun, M. H., Naboulsi, S., Vogel, R. N., Lindsey, N. J., & Mall, S. (2016). Aircraft Tire Spin-Up Wear Analysis through Experimental Testing and Computational Modeling. In 57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, San Diego, CA, 4-8 January 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Singh A., Sabelkin V, Mall S, “Fatigue Behavior of Double-Edge Notched Oxide/Oxide Ceramic Matrix Composite in a Combustion Environment,” ICACC 2016, Daytona Beach, Jan. 28, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Singleton, J., Misak, H., Mall, S. (2015, November). Relationships between carbon nanotube sheet tensile behavior and physical/microstructural parameters. Oral presentation at the 11th Annual Dayton Engineering Sciences Symposium, Dayton, OH.

Singleton, J., Misak, H., Mall, S. (2015, November). Electro-Mechanical Characterization of Carbon Nanotube Sheets in Simulated Space Environments. Poster presented at the 11th Annual Dayton Engineering Sciences Symposium, Dayton, OH.

Singleton, J., Misak, H., Mall, S. (2016, March). Production rate, acid functionalization, and polymer intercalation mechanisms in carbon nanotubes sheet electrical behavior. Oral presentation at the 41st Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, OH.

Singleton, J., Misak, H., Mall, S. (2016, March). Elegance in Chaos. Art in Science photo presented at the 41st Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, OH.

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: \$20,000.

"Unit Cell Optimization of Lattice Structures." Sponsor: AFRL/RW. Funding: \$27,000. [CSRA]

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 236 archival technical publications and more than 550 technical presentations and manuscripts. Dr. Palazotto received the Hetenyi 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

"Additive Manufacturing Related to 15-5 PH Stainless Steel." Sponsor: AFRL/RW. Funding: \$59,000.

"Computational Analysis of Problems Containing both Heat Transfer and Structural Vibration." Sponsor: AFRL/RQ. Funding: \$29,835.

"Determination of the Goodman Diagram Considering Plasticity." Sponsor: AFRL/RQ. Funding: \$24,500.

"Investigation of the effectiveness of laser peening for refurbishment of cracked airframe parts." Sponsor: AFRL/RQ. Funding: \$18,900.

"Nonlinear Transonic Aeroelastic Instabilities." Sponsor: AFRL/RW. Funding: \$15,000.

"The Analysis of Small Lighter Than Air Vehicles." Sponsor: AFOSR. Funding: \$45,510.

REFEREED JOURNAL PUBLICATIONS

Alban, C., Palazotto, A., and Rutledge, J., "Thermal Considerations with Respect to Sliding Contact at High Speed," *Journal of Thermophysics and Heat Transfer*, Vol. 30, No. 1, pp 54-61, January-March, 2016.

Song, R., Muliana, A., and Palazotto, A., "Analyzing Time and Temperature Dependent Response of NARloy-Z," *Computational Materials Science*, Vol. 115, pp 26-40, 2016.

Song, R., Muliana, A., and Palazotto, A., "An Empirical Approach to Evaluate Creep Responses in Polymers and Polymeric Composites and Determination of Design Stress," *Composite Structures*, Vol. 148, pp 207-223, 2016.

Wuertemberger, L., and Palazotto, A., "Evaluation of Flow and Failure Properties of Treated 4130 Steel," *J. Dynamics Behavior*, Vol. 2, pp 207-222, 2016.

Metlen, T., Palazotto, A., and Cranston, B., "Economic Optimization of Cargo Airship," *CEA Aeronautical Journal*, Vol. 7, No. 2, pp 287-298, 2016.

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Yeo, C., Palazotto, A., and Buentello. Hernandez, R., "The Evaluation of Thermomechanical Damage of a Slipper and Rail in a Rocket Sled System," ASTM, J. Testing and Evaluation, 2016.

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Cranston, B., and Palazotto, A., "Design of Unique Structures under an Internal Vacuum," presented at the 57th AIAA/ASCE/AHS/ASC SciTech 2016, San Diego, CA, January, 4-8, 2016, paper # AIAA 2016-0487.

Knapp, K., Palazotto, A., and Scott-Emuakpor, O., "Goodman Data Improved," presented at the 57th AIAA/ASCE/AHS/ASC SciTech 2016, San Diego, CA, January, 4-8, 2016, paper # AIAA 2016-0925.

Graves, W., Liu, D., and Palazotto, A., "Topology Evaluation of a Warhead," presented at the 57th AIAA/ASCE/AHS/ASC SciTech 2016, San Diego, CA, January, 4-8, 2016, paper # AIAA 2016-1509.

Dempsey, A., Liu, D., Palazotto, A., and Abraham, E., "Dynamic Properties of Added Manufactured 15-5 PH Stainless Steel and 3D Micromechanics," presented at the 57th AIAA/ASCE/AHS/ASC SciTech 2016, San Diego, CA, January, 4-8, 2016, paper # AIAA 2016-1510.

Hanks, E., Liu, D., and Palazotto, A., "Surface Roughness Effects on Ultra Testing of Additive Manufactured," presented at the 57th AIAA/ASCE/AHS/ASC SciTech 2016, San Diego, CA, January, 4-8, 2016, paper # AIAA 2016-1512.

PATENTS (INVENTION DISCLOSURE)

Hexakis Icosahedron With and Internal Vacuum, Brain Cranston and Anthony Palazotto, May, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Palazotto, A., and AIGHofailly, M. "Analysis of a 3D Frame of an Icosahedron," presented at the 11th Annual Dayton Engineering Sciences Symposium, WSU, November 2, 2015.

Cranston, B., and Palazotto, A., "Design and Structural Analysis of Unique Structures," presented at the 11th Annual Dayton Engineering Sciences Symposium, WSU, November 2, 2015.

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Deleon, A., and Palazotto, A., "Description of the Penalty Method Utilized by Abaqus When Contact Occurs," presented at the 11th Annual Dayton Engineering Sciences Symposium, WSU, November 2, 2015.

Dempsey, A., Liu, D., Palazotto, A., and Abrahams, R., "Properties of 15-5 Additive manufactured Stainless Steel," presented at the 11th Annual Dayton Engineering Sciences Symposium, WSU, November 2, 2015.

Graves, W., Liu, D., and Palazotto, A., “Topology Optimization of a Penetrating Warhead,” presented at the 11th Annual Dayton Engineering Sciences Symposium, WSU, November 2, 2015.

Wuertemberger, L., and Palazotto, A., “Evaluation of Flow and Failure Properties of Treated 4130 Steel,” presented at the 11th Annual Dayton Engineering Sciences Symposium, WSU, November 2, 2015.

Hanks, E., Liu, D., and Palazotto, A., “Effects of Surface Roughness of Electron Beam Melting ti-6Al-4v on Ultrasonic Testing,” presented at the 11th Annual Dayton Engineering Sciences Symposium, WSU, November 2, 2015.

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Mirmasoudi, S., and Palazotto, A., “High Temperature Transient Creep Analysis of Metals,” Presented at the 41st Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair CC, Dayton, OH, March 2, 2016.

Hanks, E., Liu, D., and Palazotto, A., “Effect of Surface Roughness of Electron Beam Melting Ti-6Al-4v on Ultrasonic Testing,” Presented at the 41st Annual Dayton-Cincinnati Aerospace Science Symposium, Sinclair CC, Dayton, OH, March 2, 2016.

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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 Journal of Turbomachinery, the AIAA Journal of Propulsion and Power, 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. AFIT research center affiliation: ANT. Tel. 937-255-3636 x4714, email: Marc.Polanka@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT Combustion Laboratory Program Concerning UCC and Secondary Reaction Combustion Phenomena.”
Sponsor: AFRL/RQ. Funding: \$35,000.

“Combustion Physics under High Centripetal Acceleration.” Sponsor: AFOSR. Funding: \$58,596 – Polanka 85%, Rutledge 15%.

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Shewhart, A.T., Polanka, M.D., Robertson, J.R., Greiner, N.J., and Rutledge, J.L., “Minimization of Heat Load due to Secondary Reactions in Fuel Rich Environments,” *Journal of Engineering for Gas Turbines and Power*. Vol. 137(12), pg. 121504: 1-10, Dec 2015.

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- Cottle, A.E., and Polanka, M.D., "Numerical and Experimental Results from a Common-Source High-G Ultra-Compact Combustor," GT2016-56215, ASME Turbo Expo 2016, Seoul, Korea, 13-17 June, 2016.
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- Andrus, I.Q., King, P.I., Polanka, M.D., Schauer, F.R., Hoke, J.L., "Experimentation of a Premixed Rotating Detonation Engine Utilizing a Variable Slot Feed Plenum," AIAA SciTech Conference, AIAA-2016-1404, San Diego, CA, Jan 4-8, 2016.
- Deutsch, M.J., Ausserer, J.K., Polanka, M.D., Litke, P.J., Caswell, A.W., Grinstead, K.D., Rein, K.D., "Gas Temperature Measurement using FTIR Spectroscopy in Small Internal Combustion Engines," AIAA SciTech Conference, AIAA-2016-0765, San Diego, CA, Jan 4-8, 2016.
- Mataczynski, M.R., Paxson, D.E., Polanka, M.D., and Hoke, J.L., "Performance and Design Improvements for a Small Scale Pressure Wave Supercharger," AIAA SciTech Conference, AIAA-2016-0768, San Diego, CA, Jan 4-8, 2016.
- McClearn, M.J., Polanka, M.D., Mataczynski, M.R., Schauer, F.R., and Paxson, D.E., "The Design of a Small-Scale Wave Rotor for Use as a Modified Brayton-Cycle Engine," AIAA SciTech Conference, AIAA-2016-0901, San Diego, CA, Jan 4-8, 2016.
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Cottle, A.E., and Polanka, M.D., "Mechanisms for Enhanced Flow Migration from an Annular, High-g Ultra Compact Combustor," AIAA SciTech Conference, AIAA-2016-1392, San Diego, CA, Jan 4-8, 2016.

Gilbert, N. A., Cottle, A.E., Polanka, M.D., and Goss, L.P., "Enhancing Flow Migration and Reducing Emissions in Full Annular Ultra Compact Combustor," AIAA SciTech Conference, AIAA-2016-2122, San Diego, CA, Jan 4-8, 2016.

Cottle, A.E., Polanka, M.D., Goss, L.P., and Goss, C.Z., "Optical Diagnostics in a High-g Combustion Cavity," AIAA Joint Propulsion Conference, AIAA-2016-4560, Salt Lake City, UT, Jul 25-27, 2016.

Andrus, I.Q., King, P.I., Polanka, M.D., Paxson, D. E., Schauer, F.R., and Hoke, J.L., "A Comparison of Experimental and Numeric Rotating Detonation Engines," AIAA Joint Propulsion Conference, AIAA-2016-4765, Salt Lake City, UT, Jul 25-27, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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Deutsch, M.J., Polanka, M.D., Ausserer, J.K., Litke, P.J., Caswell, A.W., Grinstead, K.D., and Rein, K.D., "Internal Combustion Engine In-Cylinder Gas Temperature Measurements Using Fourier Transform Infrared Spectroscopy," AIAA 41DCASS-050, Sinclair Community College, Dayton, OH, 2 Mar 2016.

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Gilbert, N. A., Cottle, A.E., Polanka, M.D., and Goss, L.P., "Temperature Characterization within a Fully Annular Ultra Compact Combustor due to Changes in the Flow Migration," AIAA 41DCASS-073, Sinclair Community College, Dayton, OH, 2 Mar 2016.

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McClearn, M.J., Polanka, M.D., Lapp, K., "Design and Testing of a Low-Flow, High-Temperature Can Combustor for a Brayton Cycle Wave Rotor," AIAA 41DCASS-075, Sinclair Community College, Dayton, OH, 2 Mar 2016.

Shepard, J.J., Polanka, M.D., Naples, A.G., Hoke, J.L., "Heat Transfer Analysis of a Heated Pebble Bed System for Rotating Detonation Engine Development," AIAA 41DCASS-092, Sinclair Community College, Dayton, OH, 2 Mar 2016.

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Andrus, I.Q., King, P.I., Polanka, M.D., Schauer, F.R., and Hoke, J.L., "Design and Experimentation of a Premixed Rotating Detonation Engine," AIAA 41DCASS-103, Sinclair Community College, Dayton, OH, 2 Mar 2016.

Wiese, C.J., Rutledge, J.L., Polanka, M.D., Ashby, R.W., "Comparison of Adiabatic Effectiveness Measurements Obtained from Pressure Sensitive Paint and Infrared Thermography Techniques," AIAA 41DCASS-113, Sinclair Community College, Dayton, OH, 2 Mar 2016.

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

"AFIT/ENY and AFRL/RQV Cooperative Research Agreement." Sponsor: AFRL/RQ. Funding: \$29,000 – Reeder 29%, Dillsaver 27%, Reeder 26%, Bentley 18%.

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

"Flip-Turn' Missile Aerodynamic Characterization." Sponsor: Lockheed Martin. Funding: \$80,000 – Reeder 40%, Miller 40%, Crowe 20%.

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Cleaver, T.A., Gutman, A.J., Martin, C.L., Reeder, M.F. & Hill, R.R., "Using design of experiments methods for applied computational fluid dynamics: A case study," *Quality Engineering*, Vol. 28, Issue 3, May 2016, pp. 280-292.

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Benhassen, F., Polanka, M., Reeder, M.F., "Time Resolved Filtered Rayleigh Scattering Measurement of a Buoyant Jet in a Co-flow," *Journal of Aerospace Engineering*, 2016.

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Johnsen, L., Martin, C., Reeder, M.F., and Crowe, D.S., "Numerical Simulation of Supersonic Jets in Transonic and Supersonic Crossflows Using Kestrel," AIAA Paper 2016-3168, presented at the *AIAA Aviation 2016 Conference*, Washington, DC, 13-17 June 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Gulotta, P., Reeder, M.F., and Hagen, B., "Particle Image Velocimetry using Solid Phase Carbon Dioxide Particles in Supersonic Flow," DCASS presentation, Dayton OH, 2 March 2016.

Sellers, J., Reeder, M.F., & Cobb, R.G. "Force and Moment Measurements Applicable to a Flexible Weapons System," DCASS presentation, Dayton OH, 2 March 2016.

Probst, Z., Reeder, M.F., Grove, J., & Johnson, R., “Flight Tests Conducted to Analyze a Store Experiencing Cavity Flow,” DCASS presentation, Dayton OH, 2 March 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor-in-Chief, International Journal of Micro Air Vehicles, Multi-Science Publishing.

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 140 journal articles and technical reports, and has co-authored 10 books on composite materials and structures and on high-temperature structural design methods. 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: \$50,000.

“Effect of Moisture on Mechanical Properties and Fatigue Behavior of 2D and 3D Woven Polymer Matrix Composite Airframe Structures.” Sponsor: AFRL/RQ. Funding: \$24,998.

“Fatigue of an Advanced SiC/SiC Composite at Elevated Temperature in Air and in Steam.” Sponsor: AFRL/RX. Funding: \$12,500.

“Stressed Oxidation of SiC Fiber in Air and Si(OH)₄ Saturated Steam.” Sponsor: AFRL/RX. Funding: \$20,000.

REFEREED JOURNAL PUBLICATIONS

Ruggles-Wrenn, M.B. and Lanser, R.L., “Tension-compression fatigue of an oxide/oxide ceramic composite at elevated temperature,” Materials Science and Engineering A, Vol. 659, 2016, pp. 279-277.

Ruggles-Wrenn, M.B. and Hilburn, S.R., “Creep in interlaminar shear of an oxide/oxide ceramic composite at elevated temperature,” Journal of Engineering for Gas Turbines and Power, Transactions ASME, Vol. 138, No. 2, February 2016, pp. 021401-1 – 021401-8.

Ruggles-Wrenn, M.B. and Lanser, R.L., “Tension-compression fatigue of a Nextel™720/ alumina composite at 1200° C in air and in steam,” Applied Composite Materials, Vol. 23, No. 3, 2016, pp. 218-229.

Wilkinson, M.P. and Ruggles-Wrenn, M.B., “Fatigue of a 2D unitized polymer/ceramic matrix composite at elevated temperature,” Polymer Testing, September 2016, pp. 203-213.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

DeGregoria, A. J. and Ruggles-Wrenn, M.B., “Oxidation of HfB₂ and HfB₂-20 vol% SiC at 1500°C in Air; Effect of Compressive Stress,” Proceedings of the 9th International Conference on High Temperature Ceramic Matrix Composites –HTCMC 9, Toronto, Canada, June 26-30, 2016.

- Lee M.D. and Ruggles-Wrenn, M.B., “Fatigue Behavior of an Advanced SiC/SiC Ceramic Composite at 1300°C in Air and in Steam,” Proceedings of the 9th International Conference on High Temperature Ceramic Matrix Composites – HTCMC 9, Toronto, Canada, June 26-30, 2016.
- Lanser, R.L. and Ruggles-Wrenn, M.B., “Tension-Compression Fatigue of an Oxide/Oxide Ceramic Composite at Elevated Temperature,” Proceedings of the 40th International Conference & Exposition on Advanced Ceramics & Composites, Daytona Beach FL, January 24-29, 2016.
- Robertson S. J., Sprinkle K. B., Ruggles-Wrenn, M.B., “Facility For Testing SiC Fiber Tows At Elevated Temperature In Silicic Acid-Saturated Steam,” Proceedings of the 40th International Conference & Exposition on Advanced Ceramics & Composites, Daytona Beach FL, January 24-29, 2016.
- Wilkinson M. P. and Ruggles-Wrenn, M.B., “Mechanical Properties and Fatigue Behavior of 2D Woven PMC And Unitized Composite Airframe Structures at Elevated Temperature,” IMECE2015-51433, Proceedings of the ASME 2015 International Mechanical Engineering Congress & Exposition IMECE-2015, Houston, Texas, USA, November 13-19, 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, 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,

Assistant 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. Maj Rutledge’s research interests include experimental and computational investigations of gas turbine heat transfer, unsteady fluid mechanics, inverse heat transfer and aerothermodynamics. He has published articles in several journals and was awarded the Rohsenow Prize in 2008 by ASME. Maj 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: \$8,715 – Rutledge 75%, Freeman 25%.

REFEREED JOURNAL PUBLICATIONS

- Rutledge, J.L., Polanka, M.D., Bogard, D.G., 2016, “The Delta Phi Method of Evaluating Overall Film Cooling Performance,” *Journal of Turbomachinery*, July 2016, Vol. 138, No. 7, pp. 071006-1 - 071006-8.
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- Alban, C.J., Palazotto, A.N., Rutledge, J.L., 2016, “Thermal Considerations With Respect to Sliding Contact at High Speed,” *Journal of Thermophysics and Heat Transfer*, January-March 2016, Vol. 30, No. 1, pp. 54-61.

Shewhart, A.T., Polanka, M.D., Robertson, J.J., Greiner, N.J., Rutledge, J.L., 2015, "Minimization of Heat Load Due to Secondary Reactions in Fuel Rich Environments," *Journal of Engineering for Gas Turbines and Power*, December 2015, Vol. 137, pp. 121504-1 – 121504-10.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Rutledge, J.L., Polanka, M.D., Greiner, N.J., 2016, "CFD Evaluations of Film Cooling Flow Scaling Between Engine and Experimental Conditions," ASME Turbo Expo 2016, 13-17 June 2016, Seoul, Korea, Paper No. GT2016-56760.

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Wiese, C.J., Rutledge, J.L., Polanka, M.D., Ashby, R.W., 2016, "Film Coolant Property Variation in Scaling Gas Turbine Cooling Effectiveness," 54th AIAA Aerospace Sciences Meeting, 4-8 January 2016, San Diego, California, Paper No. AIAA 2016-0904.

Bills, J.D., Crowe, D.S., Rutledge, J.L., Coy, E.B., 2016, "Modeling Fuel Film Cooling on Rocket Engine Walls," 54th AIAA Aerospace Sciences Meeting, 4-8 January 2016, San Diego, California, Paper No. AIAA 2016-2149.

PATENTS

Rutledge, J.L. and McCall, J.F., 19 April 2016, "A Method to Determine Time-Resolved Waveforms of Periodic Unsteady Heat Transfer Coefficient and Adiabatic Wall Temperature," U.S. Patent No. 9,316,547.

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): ANT and CSRA. Tel. 937-255-3636 x7479, email: Eric.Swenson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"AFRL/RV-AFIT 2012 MOA Research." Sponsor: AFRL/RV. Funding: \$250,000 – Swenson 25%, Cobb 25%, Black 25%, Wiesel 25%. [CSRA]

"Blue Force Tracking and Imaging." Sponsor: Undisclosed. Funding: \$74,250. [CSRA]

"Design and Analysis of LEO Constellation for Detecting Optical Signatures." Sponsor: Undisclosed. Funding: \$40,000 – Swenson 50%, Cobb 50%. [CSRA]

"GeoDiscover." Sponsor: Undisclosed. Funding: \$73,500. [CSRA]

"Program Analyst for Integrated Air and Missile Defense." Sponsor: MDA. Funding: \$166,000. [CSRA]

"REBEL Satellite Simulator Control Moment Gyroscope Rotor Shaft Hardening." Sponsor: AFRL/RV. Funding: \$91,000. [CSRA]

"Variable-Speed Control Moment Gyroscope (CMG) Research and Development." Sponsor: Undisclosed. Funding: \$100,000. [CSRA]

REFEREED JOURNAL PUBLICATIONS

Misak, H.E., Rutledge, J.L., Swenson, E.D., Mall, S., “Thermal transport properties of dry spun carbon nanotube sheets,” *Journal of Nanomaterials*, Vol. 2016, 2016. DOI:10.1155/2016/9174085. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Gross, K.H., Patrick, R., Swenson, E.D., Agte, J.S., “Optimal Attitude Control of a 6U CubeSat with a Four-Wheel Pyramid Reaction Wheel Array and Magnetic Torque Coils,” *SciTech – Modeling and Simulation Conference*, San Diego, California, Jan 2016. [CSRA]

Gross, K.H., Clark, M.A., Hoffman, J.A., Fifarek, A.W., Rattan, K.S., Swenson, E.D., Whalen, M.W., Wagner, L., “Formally Verified Run Time Assurance of a 6U CubeSat Attitude Control System,” *SciTech – Modeling and Simulation Conference*, San Diego, California, Jan 2016. [CSRA]

Hess, J., Swenson, E.D., Leve, F., Black, J., and Goff, G.M., “Adaptive Estimation of Nonlinear Spacecraft Attitude Dynamics with Time-Varying Moments of Inertia Using On-Board Sensors,” *AIAA Guidance, Navigation, and Control Conference*, AIAA SciTech, (AIAA 2016-1855). [CSRA]

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 ASEE. Dr. Torvik is a Fellow of AIAA, a Fellow of the ASME, and a Fellow of Ohio Academy of Science.

REFEREED JOURNAL PUBLICATIONS

Torvik, P. J., “Determination of the Damping of Resonant Systems from the Amplitudes at Resonance,” *J. Vibrations and Acoustics* (ASME), Vol. 138 (1), pp. 11008-1-8, Feb, 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board & Member, *International Journal of Turbo & Jet Engines*

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 40 technical papers and has been a member of the department for over 35 years. AFIT research center affiliation(s): CSRA. Tel. 937-255-3636 x4312, email: William.Wiesel@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Navigation, Stationkeeping and Antenna Requirements for Synthetic Aperture Satellite Clusters.” Sponsor: Undisclosed. Funding: \$38,400.

REFEREED JOURNAL PUBLICATIONS

Wiesel, W.E., “Low Eccentricity Earth Satellite KAM Tori,” Journal of the Astronautical Sciences, Vol. 62, pp. 197-211, 2015.

Wiesel, W.E., “Estimating Nongravitational Accelerations on High Area-to-Mass Ratio Objects,” Journal of Guidance, Control, and Dynamics, Vol.39: 1438-1443, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Craft, C., Wiesel, W.E., “Impulsive Control of Earth Satellites on Low-Eccentricity KAM Tori,” Christopher Craft, AIAA Space 2016, Long Beach, CA.

5.2. DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Access Phone: 937-255-2024, DSN 785-2024

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5.2.1. DOCTORAL DISSERTATIONS

ALLEN, CHRISTOPHER I., *Demonstration of Inexact Computing Implemented in the JPEG Compression Algorithm using Probabilistic Boolean Logic Applied to CMOS Components*. AFIT/ENG/DS/15D-001. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/R.Y.

BETANCES, JOAN A., *Physical Layer Defenses against Primary User Emulation Attacks*. AFIT/ENG/DS/16S-005. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [ANT/CCR]

BIHL, TREVOR J., *Feature Selection and Classifier Development for Radio Frequency Device Identification*. AFIT/ENG/DS/15D-003. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y. [CCR]

CALHOUN, SEAN M., *Integrity Determination for Image Rendering Vision Navigation*. AFIT/ENG/DS/16M-251. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A. [ANT]

CANCIANI, AARON J., *Absolute Positioning using the Earth's Magnetic Anomaly Field*. AFIT/ENG/DS/16S-074. Faculty Advisor: Dr. John F. Raquet. Sponsor: DARPA. [ANT]

HAMMAN, SETH T., *Improving the Cybersecurity of Cyber-physical Systems through Behavioral Game Theory and Model Checking in Practice and in Education*. AFIT/ENG/DS/16S-010. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

HARDY, TYLER J., *Optical Theory Improvements to Space Domain Awareness*. AFIT/ENG/DS/16S-011. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: AFOSR.

KOVACH, NICHOLAS S., *A Temporal Framework for Hypergame Analysis of Cyber Physical Systems in Contested Environments*. AFIT/ENG/DS/16S-070. Faculty Advisor: Dr. Gary B. Lamont. Sponsor: N/A. [CCR]

LUKACS, MATHEW W., *Classification of Stimulated Unintended Radiated Emissions (SURE) using Radio-frequency Distinct Native Attributes (RF-DNA)*. AFIT/ENG/DS/16S-014. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A. [ANT/CCR]

SCHMITT, DANIEL T., *Position and Volume Estimation of Atmospheric Nuclear Detonations from Video Reconstruction*. AFIT/ENG/DS/16M-254. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: DTRA.

VAUGHAN, SANDRA L., *A Novel Machine Learning Classifier Based on a Qualia Modeling Agent (QMA)*. AFIT/ENG/DS/16S-016. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/R.Y. [CCR]

VENABLE, DONALD T., *Improving Real-world Performance of Vision Aided Navigation in a Flight Environment*. AFIT/ENG/DS/16S-017. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/R.Y. [ANT]

5.2.2. MASTER'S THESES

BALL, CHRISTOPHER D., *A Multi-objective Approach to Tactical Maneuvering Within Real Time Strategy Games*. AFIT/ENG/MS/16J-004. Faculty Advisor: Dr. Gary B. Lamont. Sponsor: N/A.

BINTZ, JEFFREY R., *Image-based Bidirectional Reflectance Distribution Function of Human Skin in the Visible and Near Infrared*. AFIT/ENG/MS/16M-004. Faculty Advisor: Dr. Michael J. Mendenhall. Sponsor: 711 HPW/RH. [CTISR]

BOLLINGER, MICHAEL E., *Design and Analysis of a Retroreflective Array for IR Application*. AFIT/ENG/MS/16M-005. Faculty Advisor: Maj Michael D. Seal. Sponsor: N/A.

BYRD, CHARLES E., *Exposing Inter-virtual Machine Networking Traffic to External Applications*. AFIT/ENG/MS/16M-006. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

CIOTTI, BARRIE J., *Defining the Security Posture of DOD Networks using The RedSeal Security Risk Manager*. AFIT/ENG/MS/15M-007. Faculty Advisor: Dr. Michael J. Mendenhall. Sponsor: DISA. [CCR]

CLISBY, LAUREN E., *EEG-based Classification and Advanced Warning of Epileptic Seizures*. AFIT/ENG/MS/16M-097. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

COLON, EDWIN O., *Prototyping a Log Analysis Capability for the MQ-1 Predator and MQ-9 Reaper Unmanned Aerial Systems using Web Technologies*. AFIT/ENG/MS/16M-008. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/RV.

COLSON, KEVIN W., *Toward Automated Aerial Refueling: Relative Navigation with Structure from Motion*. AFIT/ENG/MS/16M-009. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ. [ANT]

CUNNINGHAM, PATRICK B., *Geosynchronous Binary Object Detection*. AFIT/ENG/MS/16M-010. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

DAVIS, AUSTIN L., *Deception in Game Theory: A Survey and Multiobjective Model*. AFIT/ENG/MS/16M-011. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

DAVIS, BRANDON T., *Preprocessing Techniques to Support Event Detection Data Fusion on Social Media Data*. AFIT/ENG/MS/16J-001. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A.

DENBY, BRADLEY D., *Towards Automated Aerial Refueling: Real-time Position Estimation with Stereo Vision*. AFIT/ENG/MS/16M-252. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ. [ANT]

DIAZ, JORGE E., *Satellite Ephemeris Correction via Remote Site Observation for Star Tracker Navigation Performance Improvement*. AFIT/ENG/MS/16M-013. Faculty Advisor: Maj Scott J. Pierce. Sponsor: N/A. [ANT]

DOSSETT, JAMES C., *Characterization of Quadcopter Positioning Systems and the Effect of Pose Uncertainties on Field Probe Measurements*. AFIT/ENG/MS/16M-014. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG. [ANT]

FLETCHER, JUSTIN R., *Synaptic Annealing: Anisotropic Simulated Annealing and its Application to Neural Network Synaptic Weight Selection*. AFIT/ENG/MS/16J-060. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

FREEMAN, TRAVIS J., *Jamming Cognitive Radios*. AFIT/ENG/MS/16M-015. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV. [CCR]

FULLER, JONATHAN D., *A Misuse-based Intrusion Detection System for ITU-T G.9959 Wireless Networks*. AFIT/ENG/MS/16M-016. Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI. [CCR]

GEISE, BARRY C., *Airborne Directional Networking: Topology Control Protocol Design*. AFIT/ENG/MS/16M-017. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A.

GIAMETTA, JOSEPH J., *Cross-subject Continuous Analytic Workload Profiling using Stochastic Discrete Event Simulation*. AFIT/ENG/MS/16M-018. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH.

GIRTZ, KYLE A., *Dynamic Honeypot Configuration for Programmable Logic Controller Emulation*. AFIT/ENG/MS/16M-253. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

GRUNZWEIG, NATHAN E., *Statistic Whitelisting for Enterprise Network Incident Response*. AFIT/ENG/MS/16M-019. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

HALL, JOSEPH L., *A Practical Wireless Exploitation Framework for Z-Wave Networks*. AFIT/ENG/MS/16M-020. Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI. [CCR]

HARNED, SCOTT I., *POCO-MOEA: Using Evolutionary Algorithms to Solve the Controller Placement Problem*. AFIT/ENG/MS/16M-021. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

JELINEK, DEREK R., *VHF/UHF Antenna Design for Multistatic SAR Imaging Across UAV Classes*. AFIT/ENG/MS/16M-023. Faculty Advisor: Dr. Peter J. Collins. Sponsor: MIT/LL. [ANT]

JORDAN, PAUL L., *Data Driven Device Failure Prediction*. AFIT/ENG/MS/16S-071. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: NSA. [CCR]

KIM, JIN K., *Classification of Replicated Signals using RF-DNA*. AFIT/ENG/MS/16M-024. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT/CCR]

KODAMA, CHRISTOPHER H., *Tunable Terahertz Metamaterials with Germanium Telluride Components*. AFIT/ENG/MS/16M-025. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFOSR.

KOKOCZKA, CHRISTOPHER K., *Using Phase Screens to Synthesize Electromagnetic Gaussian-Schell Model Sources with Desired Amplitude, Coherence, and Polarization*. AFIT/ENG/MS/16M-026. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFOSR.

KVASAGER, TYREL K., *Superconducting Quantum Interference Device Array Based High Frequency Direction Finding on an Airborne Platform*. AFIT/ENG/MS/16M-028. Faculty Advisor: Lt Col Jeremy Stringer. Sponsor: AFRL/RV.

LAPSO, JOSHUA A., *Whitelisting System State in Windows Forensic Memory Visualizations*. AFIT/ENG/MS/16M-029. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

LEMMENES, ADAM G., *Civilian GPS Spoofing Detection and Classification using RF-DNA*. AFIT/ENG/MS/16M-030. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT/CCR]

LETT, NATHAN, *Utilization of a Geodesic Sphere and Quadcopter as Two-way Field Probe for Electro-Magnetic Field Measurements in an Indoor Radar Cross Section Range*. AFIT/ENG/MS/16M-031. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG. [ANT]

LEVY, DANIEL E., *Non-Linear Optimization Applied to Angle-of-Arrival Satellite Based Geo-localization for Biased and Time Drifting Sensors*. AFIT/ENG/MS/16M-032. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

LOHRMAN, JIMMY J., *Characterization for the Development of the Hybrid Multi-junction Silicon Germanium Solar Cell*. AFIT/ENG/MS/16M-033. Faculty Advisor: Dr. Ronald A. Coutu. Sponsor: AFOSR.

MACALONEY, KURT D., *Navigation from Daytime Imaging of Celestial Objects*. AFIT/ENG/MS/16M-034. Faculty Advisor: Dr. John F. Raquet. Sponsor: CSDL. [ANT]

MACHIN, TIMOTHY I., *Real-time Implementation of Vision-aided Monocular Navigation for Small Fixed-wing Unmanned Aerial Systems*. AFIT/ENG/MS/16M-035. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A. [ANT]

MONTGOMERY, TURNER J., *Visual-INS using a Human Operator and Converted Measurements*. AFIT/ENG/MS/16M-036. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/RV. [ANT]

NEW, DAVID A., *Interference Suppression using Knowledge-aided Subarray Pattern Synthesis*. AFIT/ENG/MS/16M-037. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A. [ANT]

NICKOLAS, SETH C., *Photoconductive Semiconductor Switch Driven Antenna and Array Design*. AFIT/ENG/MS/16M-038. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

PAVLIK, JOHN A., *Multihop Rendezvous Algorithm for Frequency Hopping Cognitive Radio Networks*. AFIT/ENG/MS/16M-039. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [ANT/CCR]

RAMOS, IKAICA R., *Extracting Preference using Recommender Systems*. AFIT/ENG/MS/16M-040. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CTISR]

RASMUSSEN, ALEC C., *Implementation and Performance of Factorized Backprojection on Low-cost Commercial-off-the-Shelf Hardware*. AFIT/ENG/MS/16M-041. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/Ry.

ROOSMA, ALEXANDER C., *Analysis of Software Design Patterns in Human Cognitive Performance Experiments*. AFIT/ENG/MS/16M-042. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: AFOSR.

SCHMIDT, DAYNE A., *Hardware Development and Error Characterisation for the AFIT RAIL SAR System*. AFIT/ENG/MS/16M-043. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/Ry.

SEANOR, COLLIN J., *Comparison of Methods for Radio Position of Non-emitting Dismounts*. AFIT/ENG/MS/16M-044. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A. [ANT]

SEITZ, ANDREW P., *A Comparative Analysis of IEEE 802.15.4 Adapters for Wireless Ranging*. AFIT/ENG/MS/16M-045. Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI.

SOVERN, JEFFREY S., *Electromagnetic Characterization of Materials using a Dual Chambered High Temperature Waveguide*. AFIT/ENG/MS/16M-047. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/Ry.

STONE, BARRON D., *Comparison of Radio Frequency Distinct Native Attribute and Matched Filtering Techniques for Device Discrimination and Operation Identification*. AFIT/ENG/MS/16M-048. Faculty Advisor: Maj Samuel J. Stone. Sponsor: AFRL/Ry.

TODD, MICHAEL C., *Dynamic Network Security Control using Software Defined Networking*. AFIT/ENG/MS/16M-049. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

WATTS, TATSUKI L., *Field-based Phase Retrieval using Under-sampled Data*. AFIT/ENG/MS/16M-051. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: N/A.

WORTH, DEREK B., *An OpenEagles Framework Extension for Hardware-in-the-Loop Swarm Simulation*. AFIT/ENG/MS/16M-052. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL. [ANT]

WYLIE, JUSTIN, *Radio Frequency-based Microcontroller Anomaly Detection*. AFIT/ENG/MS/16M-053. Faculty Advisor: Maj Samuel J. Stone. Sponsor: AFRL/Ry. [CCR]

YOON, JUNGSAUNG, *Framework for Evaluating the Readiness of Cyber First Responders Responsible for Critical Infrastructure Protection*. AFIT/ENG/MS/16M-054. Faculty Advisor: LTC Mason Rice. Sponsor: DHS. [CCR]

YOUNG, DEREK R., *A Framework for Incorporating Insurance into Critical Infrastructure Cyber Risk Strategies*. AFIT/ENG/MS/16M-055. Faculty Advisor: LTC Mason Rice. Sponsor: DHS. [CCR]

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. Tel. 937-255-3636 x3305, email: Joan.Betancesjorge@afit.edu

REFEREED JOURNAL PUBLICATIONS

Betances, J.A., Addison, K. Hopkinson and M. D. Silvius, "Context Aware Routing Managing Architecture for Airborne Networks," IET Networks, Vol. 5, No. 4, pp. 85-92, 2016.

BINDEWALD, JASON R., Capt,

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. Capt Bindewald's research interests include human-machine teaming, machine learning, autonomous agents, and player modeling. He is a member of AAI, CAIAC, and Tau Beta Pi honorary society. AFIT research center affiliation(s): ANT and CCR. Tel. 937-255-3636 x4614, email: Jason.Bindewald@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J. M., G. L. Peterson, M. E. Miller. "Clustering-Based Online Player Modeling," International Joint Conference on Artificial Intelligence (IJCAI) – Computer Games Workshop New York, NY, July 2016. [ANT]

Goodman, T., Miller, M. E., Rusnock, C. F., and Bindewald, J.M., "Timing within Human-Agent Interaction and its Effects on Team Performance and Human Behavior," Proceedings of the 2016 IEEE International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA). San Diego, March 2016. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Spuller, J. M., Bindewald, J.M., "Strategic Planning in Multi-Agent Environments," Graphics Interface (GI 2016). Victoria, British Columbia, June 2016.

BORGHETTI, BRETT J.,

Assistant 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

"Developing a Cyber Multi-Attribute Task Battery and Cognitive Model for Human Performance Evaluation in Cyber Operations." Sponsor: AFOSR. Funding: \$44,606 – Borghetti 50%, Rusnock 50%. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Borghetti, B.J., Giametta, J.J., and Rusnock, C.F., "Estimating Continuous Operator Workload From Small Subject Samples," *Proceedings of the 2016 Human Factors and Ergonomics Society International Conference*, Washington DC, 19-23 Sep 2016. [ANT]

Vieane, A., Funke, G., Mancuso, V., Greenlee, E., Dye, G., Borghetti, B.J., Miller, B., Menke, L., and Brown, R., "Coordinated Displays to Assist Cyber Defenders," *Proceedings of the 2016 Human Factors and Ergonomics Society International Conference*, Washington DC, 19-23 Sep 2016.

Giametta, J.J. and Borghetti, B.J., "EEG-based Secondary Task Detection in a Multiple Objective Operational Environment," *Proceedings of the 2015 IEEE 14th International Conference on Machine Learning and Applications (ICMLA)*, Miami, FL, 9-11 Dec 2015, pp 608-613.

Smith, A.M., Borghetti, B.J., and Rusnock, C.F., "Improving Model Cross-Applicability for Operator Workload Estimation," *Proceedings of the 2015 Human Factors and Ergonomics Society International Conference*, Los Angeles, CA, 26-30 Oct 2015, Vol. 59, pp 681-685.

Rusnock, C.F., Borghetti, B.J., and McQuaid, I.W., "Objective-Analytical Measures of Workload – the Third Pillar of Workload Triangulation" *9th International Conference on Augmented Cognition, 17th International Conference on Human-Computer Interaction* Los Angeles, CA, 2-7 Aug 2015. LLNCS Vol. 9183, pp. 124-135.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Funke, G., Dye, G., Borghetti, B.J., Mancuso, V., Greenlee, E., Miller, B., Menke, L., Brown, R., and Vieane, A., "Development and Validation of the Air Force Cyber Intruder Alert Testbed (CIAT)," *7th International Conference on Applied Human Factors and Ergonomics (AHFE)*, Orlando, FL, 27-31 July 2016. [CCR]

Borghetti, B.J., and Rusnock, C., "Introduction to Real-Time State Assessment," *18th International Conference on Human-Computer Interaction (HCII)*, Toronto, Canada, 17-21 July 2016. [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: \$41,070 – Cain 50%, Vitayaudom 50%.

REFEREED JOURNAL PUBLICATIONS

Stephen C. Cain, Tatsuki Watts, "Nonparaxial Fourier propagation tool for aberration analysis and point spread function calculation," *Opt. Eng.*, Vol. 55, Issue 8, 085104 (2016), DOI: 10.1117/1.OE.55.8.085104, (15 August 2016).

Tyler Hardy, Stephen Cain and Travis Blake, "Unequal a priori probability multiple hypothesis testing in space domain awareness with the space surveillance telescope," *Applied Optics*, Vol. 55, Issue 15, pp. 4036-4046, (May 2016).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Stephen Cain, "Improved space object detection via scintillated short exposure image data," *Proceedings of the SPIE 9982 Unconventional Imaging and Wavefront Sensing XII*, San Diego, CA, August 31, 2016.

David Becker and Stephen Cain, "Improving space object detection using a Fourier likelihood ratio detection algorithm," Proceedings of the SPIE 9982 Unconventional Imaging and Wavefront Sensing XII, San Diego, CA, August 31, 2016.

Nicholas Yielding and Stephen Cain, "Statistically Applied Non-Uniformity Correction (SANUC)," Proceedings of the SPIE 9982 Unconventional Imaging and Wavefront Sensing XII, San Diego, CA, August 31, 2016.

Tyler Hardy and Stephen Cain, "Investigating prior probabilities in a multiple hypothesis test for use in space domain awareness," Proceedings of the SPIE 9839, Sensor and Systems for Space Applications IX, Baltimore, MD, April 18, 2016.

Patrick Cunningham and Stephen Cain, "Optical detection of closely spaced sources for improved space situational awareness," Proceedings of the SPIE 9839, Sensor and Systems for Space Applications IX, Baltimore, MD, April 18, 2016.

CANCIANI, AARON J., Maj,

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. Maj Canciani's research interests include GPS-alternative navigation systems using environmental signals. He is a member of The Institute of Navigation (ION). Tel. 937-255-3636 x4618, email: Aaron.Canciani@afit.edu

REFEREED JOURNAL PUBLICATIONS

Canciani, A.J. and Raquet, J., "Absolute Positioning Using the Earth's Magnetic Anomaly Field," Navigation, Journal of the Institute of Navigation, Vol. 63, No. 2, Summer, 2016, pp. 111-126

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Canciani, A.J. and Raquet, J., "Validation of a Magnetic Anomaly Navigation Model with Flight Test Data," ION GNSS, Institute of Navigation, Portland, OR, September 2016.

Canciani, A.J. and Raquet, J., "Magnetic Anomaly Navigation Accuracy with Respect to Map Quality and Altitude," International Technical Meeting, Institute of Navigation, Monterey, CA, January 2016.

Canciani, A.J. and Raquet, J., "Absolute Positioning Using the Earth's Magnetic Anomaly Field," International Technical Meeting, Institute of Navigation, Laguna Cliffs, CA, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Canciani, A.J. and Raquet, J., "Aerial Navigation Using the Earth's Magnetic Anomaly Field," Joint Navigation Conference, Institute of Navigation, Dayton, OH, June 2016.

CARBINO, TIMOTHY J., Maj,

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): CSRA, ANT, and CCR. Tel. 937-255-3636 x4220, email: Timothy.Carbino@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Development Support for 1553 Bus Fingerprinting." Sponsor: AFRL/RV. Funding: \$25,000. [CCR]

“Evaluation of Guidance, Navigation and Control Algorithms on Jetson TX1.” Sponsor: Undisclosed. Funding: \$250,000 – Carbino 40%, Swenson 40%, Pierce 10%, Nykl 10%. [ANT/CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carbino, Timothy J., Temple, Michael A., and Lopez, Juan Jr., “Conditional Constellation Based-Distinct Native Attribute (CB-DNA) Fingerprinting for Network Device Authentication,” International Conference on Communications (ICC), 2016 IEEE, 2016. Kuala Lumpur, Malaysia 23 – 27 May 2016. [CCR]

CASEY, DANIEL J., Maj,

Instructor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS in Computer Science, United States Air Force Academy, May 2006 ; MS in Computer Science, Southern Methodist University, December 2009. Maj Casey’s research interests include software defined networking and its connections to cyber security. He is a member of Tau Beta Pi Engineering Honor Society. Tel 937-255-3636 x4613, email: Daniel.Casey@afit.edu.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Casey, D.J., and B. Mullins. “SDN shim: Controlling legacy devices.” 2015 IEEE 40th Conference on Local Computer Networks. Clearwater Beach, FL, October 2015.

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

“Enabling Technologies for Radar Scattering Measurements.” Sponsor: AFRL/R.Y. Funding: \$126,511.

“Technical Support: RCS Metrology.” Sponsor: 796 TSS. Funding: \$30,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mathew Lukacs, Peter Collins and Michael Temple “Device Identification Using Active Noise Interrogation and RF-DNA “Fingerprinting” for Non-Destructive Amplifier Acceptance Testing,” *2016 IEEE MTT-S Wireless and Microwave Technology Conference (WAMICON 2016)*, Clearwater Beach, Florida, 11-13 April 2016. [ANT/CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lukacs, Mathew and Collins, Peter J., “Interrogation Signal Optimization for Improved Classifier Performance when using RF DNA for Non-Destructive Antenna Acceptance Testing,” *The 37th Antenna Measurement Techniques Association Symposium*, Long Beach, California, 11-16 October, 2015. [ANT/CCR]

Alexander G. Knisely, Michael J. Havrilla, Peter J. Collins, “Monoclinic Media Analysis and Sample Design for Enhanced Field Control,” *The 37th Annual Meeting and Symposium of the Antenna Measurement Techniques Association (AMTA)*, Long Beach, California, 11-16 October 2015.

S. Nickolas, J. Roos, P. Collins, J. Petrosky, A. J. Terzuoli, T. Zens, “Computational comparison of bow-tie and notch arrays fed via notional PCSS signal,” *EUROEM 2016 European Electromagnetics Symposium*, Imperial College London, UK, 11-14 July 2016.

Alexander G. Knisely, Michael J. Havrilla, Milo W. Hyde, Peter J. Collins and Andrew E. Bogle “Mixed Mode Microstrip Anisotropic Material Characterization,” *International Conference on Electromagnetics in Advanced Applications (ICEAA 2016)*, Cairns, Australia, 19-23 September 2016.

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 and CCR. Tel. 937-255-3636 x4370, email: Phillip.Corbell@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Timing Testbed.” Sponsor: Undisclosed. Funding: \$100,000. [ANT]

“RFI Mitigation Support.” Sponsor: AFRL/RY. Funding: \$60,000. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D. New, P. Corbell, “Interference Suppression Using Knowledge-Aided Subarray Pattern Synthesis,” 2016 IEEE Radar Conference, Philadelphia, PA, May 2-6, 2016. [ANT]

D. New, P. Corbell, “Upgrading EP Through Adaptive Subarray Pattern Synthesis,” 2016 Tri-Service Radar Conference, Boulder, CO, July 11-14 2016. [ANT]

J. Kim, P. Corbell, “Emitter Classification Performance using Radio Frequency Distinct Native Attributes (RF-DNA),” 2016 Tri-Service Radar Conference, Boulder, CO, July 11-14 2016. [ANT/CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

D. New, P. Corbell, “Interference Suppression Using Subarray Pattern Synthesis,” 8th Annual Electronic Warfare Capability Gaps and Enabling Technologies Conference, Crane, IN, May 10-12, 2016. [ANT]

A. Lemmenes, P. Corbell, “A Unified Framework for Detecting and Classifying GPS Spoofers,” Institute of Navigation Joint Navigation Conference, Dayton, OH, June 7-9, 2016. [ANT/CCR]

A. Lemmenes, P. Corbell, “Detailed Analysis of the TEXBAT Datasets Using a High Fidelity SoftwareGPS Receiver,” Consortium of Ohio Universities on Navigation and Timekeeping (COUNT) Annual Workshop, Columbus, OH, April 5-6, 2016. [ANT]

A. Lemmenes, P. Corbell, “Detailed Analysis of the TEXBAT Dataset using a High Fidelity GPS Receiver, Institute of Navigation (ION) GNSS+, Portland, Oregon, September 12-16, 2016. [ANT]

COUTU, RONALD, A., Jr.,

Associate 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.

SPONSOR FUNDED RESEARCH PROJECTS

“Characterizing Ultrathin and Ultrathin Structured Films for Improved Detector Efficiency.” Sponsor: AFOSR. Funding: \$43,884.

“Engineered Surfaces to Reduce Secondary Electron Yield for Multipactor Prevention.” Sponsor: Undisclosed. Funding: \$111,673.

“Experimental Investigation of Thin Film Spreading Resistance Modeling for Improved Micro-Contact Performance.” Sponsor: AFOSR. Funding: \$46,639.

“Low Loss Plasmonic Devices Using Transparent Conducting Oxides.” Sponsor: AFOSR. Funding: \$35,695.

REFEREED JOURNAL PUBLICATIONS

Ren, W., Chang, C, Chen, Y., Xue, S. and Coutu, Jr., R.A., “Investigation of the Surface Adhesion Phenomena and Mechanism of Gold-Plated Contacts at Superlow Making/Breaking Speed,” *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 5, No. 6, pp. 771-778, 2015, (DOI:10.1109/TCPMT.2015.2431494) (# 1.180)

Gwin, A.H., Kodama, C.H., Laurvick, T.V. and Coutu, Jr., R.A., “Improved terahertz modulation using germanium telluride (GeTe) chalcogenide thin films,” *Applied Physics Letters*, Vol. 107 No. 031904, pp. 1-4, (2015). (DOI: 10.1063/1.4927272) – (# 3.302)

Coutu, Jr., R.A., Medvedev, I.R. and Petkie, D.T., “Improved Sensitivity MEMS Cantilever Sensor for Terahertz Photoacoustic Spectroscopy,” *MDPI Journal of Sensors – Special Issue on Infrared and THz Sensing and Imaging*, Vol. 16, No. 251, pp 1-11, 2016. – (# 2.245)

Lake, R.A. and Coutu, Jr., R.A., “Variable Response of a Thermally Tuned MEMS Pressure Sensor,” *Sensors and Actuators A*, Vol.246, pp. 1-12, 2016. (DOI # 10.1016/j.sna.2016.05.018) – (# 1.769).

Coutu, Jr., R.A., LaFleur, R.S., Walton, J.P.K. and Starman, L.A., “Thermal Management using MEMS Bimorph Cantilever Beams,” *Journal of Experimental Mech.*, Vol. 87, pp. 1-12, 2016, (DOI # 10.1007/s11340-016-0170-1) (#1.548)

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sattler, J.M. and Coutu, Jr., R.A., “Design and Fabrication of Phase Change Material Devices – Electrical Properties of GeTe Resistors,” National Aerospace & Electronics Conference & Ohio Innovation Summit (NAECON-OIS), pp. 1-6, Dayton, OH, 2015.

Lake, R.A. and Coutu, Jr., R.A., “Tunable Pressure Sensing Applications of a MEMS Buckled Membrane,” National Aerospace & Electronics Conference & Ohio Innovation Summit (NAECON-OIS), pp. 1-6, Dayton, OH, 2015.

Kodama, C.H., Lohrman, J.J. and Coutu, Jr., R.A., “Mechanical Logic using MEMS,” National Aerospace & Electronics Conference & Ohio Innovation Summit (NAECON-OIS), pp. 1-6, Dayton, OH, 2015.

Lohrman, J.J. and Coutu, Jr., R.A., “Designing, Fabricating and Testing multi-junction Silicon Solar Cells,” National Aerospace & Electronics Conference & Ohio Innovation Summit (NAECON-OIS), pp. 1-6, Dayton, OH, 2015.

Lake, R.A. and Coutu, Jr., R.A., “Variable Response Thermally Tuned MEMS Pressure Sensor,” *Proceedings of Eurosensors XXVIII*, Vol.26, pp. 1-4, Freiburg, Germany, 2015.

Kodama, C.H. and Coutu, Jr., R.A., “Determining the Non-ideal Parallel-Plate Capacitance of a Split-Ring Resonator Gap,” *The 9th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics: Metamaterials 2015*, pp. 1-3, University of Oxford, Oxford, UK, 2015.

Laurvick, T.V. and Coutu, Jr., R.A., "Micro-contact Performance and Reliability under low frequency, low amplitude, alternating current (AC) test conditions," *Proceedings of the 61th IEEE Holm Conference on Electrical Contacts*, pp. 1-5, San Diego, CA, 11-14 October 2015.

Laurvick, T.V. and Coutu, Jr., R.A., "Experimental Validation of External Load Effects on Micro-Switch Performance and Reliability," *Proceedings of the 61th IEEE Holm Conference on Electrical Contacts*, pp.1-5, San Diego, CA, 11-14 Oct 2015.

Laurvick, T.V. and Coutu, Jr., R.A., "Integrating nanosphere lithography in device fabrication," *Proceedings of the SPIE Advanced Lithography Symposium, Advances in Patterning Materials and Processes XXXIII*, Vol. 97791S, pp. 1-13, San Jose, CA, 21-25 February 2016.

Laurvick, T.V. and Coutu, Jr., R.A., "Experimental validation of external load effects for micro-contact under low frequency, low amplitude, alternating current (AC) test conditions," *The 28th International Conference on Electrical Contacts*, pp. 1-5, Edinburgh, UK, 6-9 June, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kodama, C.H. and Coutu, Jr., R.A., "Characterizing Microelectronic Substrates for Fabricating Terahertz Metamaterial Structures," *The XXIV International Materials Research Congress (IMRC)*, Cancún, Mexico, 2015.

Lake, R.A, Laurvick, T.V. and Coutu, Jr., R.A., "Characterizing Reactive Ion Etching of Germanium Telluride with Inductively Coupled BCL3 Plasma," *The XXIV International Materials Research Congress (IMRC)*, Cancún, Mexico, 2015.

Lohrman, J.J. and Coutu, Jr., R.A., "Thin Film Solar Cells using Ge/GeTe," *The 11th Annual Dayton Engineering Sciences Symposium*, Dayton, OH, 2 November 2015.

Kodama, C.H. and Coutu, Jr., R.A., "Optimizing the dimensions of a GeTe, indirect-heating switch for active metamaterial applications," *The 11th Annual Dayton Engineering Sciences Symposium*, Dayton, OH, 2 November 2015.

Sattler, J.M., Laurvick, T.V. and Coutu, Jr., R.A., "Micromachined Surfaces for Multipactor Mitigation," *2016 Solid State Sensor, Actuator, and Microsystems Workshop at Hilton Head*, poster, Hilton Head, SC, 5-9 June 2016.

BOOKS AND CHAPTERS IN BOOKS

Glauvitz, N., Coutu, Jr., R.A., Medvedev, I.R. and Petkie, D.T., (February 2016), Chapter Title: *MEMS-based Terahertz Photoacoustic Chemical Sensing System* (Editor: Dr. Wen Wang), Book Title: *Chemical Sensors*, ISBN: 978-953-51-4653-7, (First Edition, pp. 1-27), InTech Open Access Publisher.

DAVIS, NATHANIEL J., IV,

Professor and Head, 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. Dr. Davis' 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

SPONSOR FUNDED EDUCATIONAL PROJECTS

"ACVAM Course." Sponsor: AFLCMC. Funding: \$2,500. [CCR]

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): ANT and CCR. Tel. 937-255-3636 x4581, email: Scott.Graham@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Avionics Cyber Vulnerability." Sponsor: AFRL/RV. Funding: \$30,000. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Simon, P.E., Graham, S.R., "Comparison of Real-Time, Mobile Data Bus Architectures," *Third International Workshop on Information Integration in Cyber Physical Systems (IICPS 2016)*, Jul 2016. [CCR]

GUNAWARDENA, SANJEEV,

Research Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BSEE and 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. Tel. 937-255-3636 x4659, email: Sanjeev.Gunawardena@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"GNSS Testbed Development." Sponsor: AFRL/RV. Funding: \$1,324,851 – Gunawardena 90%, Raquet 10%. [ANT]

"GPS Waveform Prototyping Platform (GWPP)." Sponsor: AFRL/RV. Funding: \$250,000 – Gunawardena 90%, Raquet 10%. [ANT/CCR]

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S. Gunawardena, J. Raquet, F. van Graas, "A Satellite with Personality: Chip Transition-Edge Based Signal Tracking for Ultra-Precise GNSS Monitoring Applications," *GPS World*, 2015. <http://gpsworld.com/a-satellite-with-personality/>. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

S. Gunawardena, M. Carroll, "Characterization of GNSS Spreading Code Chip Asymmetries," *Proceedings of the 2016 Joint Navigation Conference (Classified Session)*, Dayton, OH, June 9, 2016. [ANT]

- R. Armstrong, J. MacDonald, S. Gunawardena, "GNSS Receiver Design Development Based on ChipShape Correlation," Proceedings of the 2016 Joint Navigation Conference, Dayton, OH, June 8, 2016. [ANT]
- J. Melville, M. Carroll, A. Cerruti, S. Miller, A. Shapiro, B. Armstrong, B. Zhong, M. Neumann, S. Gunawardena, E. Emile, J. Hebert, "Enabling Rapid Multi-GNSS Prototyping using the GNSS Test Architecture (GNSSTA)," Proceedings of 2015 Joint Navigation Conference, Orlando, Florida, 2015. [ANT]
- S. Gunawardena, T. Pany, "Follow-on Report of Activities of the GNSS SDR Metadata Standard Working Group," Proceedings of the 2015 International Technical Meeting of The Institute of Navigation, Dana Point, CA, 2015. [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: JWAC. Funding: \$213,000.

REFEREED JOURNAL PUBLICATIONS

- M. Hyde and M. Havrilla, "A broadband, nondestructive microwave sensor for characterizing magnetic sheet materials," IEEE Sensors Journal, Vol. 16, No. 12, pp. 4740-4748, June 2016.
- M. Hyde, M. Havrilla and A. Bogle, "Nondestructive determination of the permittivity tensor of a uniaxial material using a two-port clamped coaxial probe," IEEE Transactions on Microwave Theory and Techniques, Vol. 64, No. 1, pp. 239-246, January 2016.
- N. Rogers (student) and M. Havrilla, "Dyadic Green's functions for a parallel plate waveguide filled with anisotropic uniaxial media," Progress in Electromagnetic Research B, Vol. 63, pp. 249-261, October 2015.

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- M. Hyde IV and M. Havrilla, "Multimode Analysis of a One-Port Dual Ridged Waveguide Probe," Automatic Radio Frequency Techniques Group, pp. 28-31, San Francisco, California, May 2016.
- M. Havrilla, "Scalar Potential Formulation for Analysis of Gyrotropic Media," Antenna Measurement Techniques Association Conference Proceedings, pp. 471-476, Long Beach, California, October 2015.
- A. Knisely, M. Havrilla and P. Collins, "Monoclinic Media Analysis and Sample Design for Enhanced Field Control," Antenna Measurement Techniques Association Conference Proceedings, pp. 388-391, Long Beach, California, October 2015.
- M. Havrilla, "A Four-Vector Field Based Formulation for Bianisotropic Media," Metamaterials Conference Proceedings, pp. 97-99, Oxford, United Kingdom, 2015.

A. Knisely and M. Havrilla, "Biaxial Anisotropic Sample Design and Rectangular to Square Waveguide Material Characterization System," Metamaterials Conference Proceedings, pp. 346-348, Oxford, United Kingdom, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

M. Havrilla, "Two-Vector Field and Scalar-Potential Formalisms for Gyrotropic Media," URSI National Radio Science Meeting Abstracts, pg. TBD, Puerto Rico, June 2016.

M. Havrilla, "Beyond Two Port S-Parameters," Material Measurement Working Group Abstracts, pg. 6, East Lansing, Michigan, May 2016.

A. Knisely, M. Havrilla, P. Collins, M. Hyde IV and A. Bogle, "Mixed Mode Microstrip Anisotropic Material Characterization – A Work in Progress," Material Measurement Working Group Abstracts, pg. 4, East Lansing, Michigan, May 2016.

J. Sovern and M. Havrilla, "Electromagnetic Characterization of Materials Using a Dual Chambered High Temperature Waveguide," URSI National Radio Science Meeting Abstracts, pg. 07, Boulder, CO, January 2016.

M. Havrilla, "Comparison of Six, Four and Two-Vector Formalisms for Complex Media," URSI National Radio Science Meeting Abstracts, pg. 43, Vancouver, BC, Canada, 2015.

M. Havrilla, "Scalar Potential Formulation and Depolarizing Dyad Artifact Removal for a Gyrotropic Medium," URSI National Radio Science Meeting Abstracts, pg. 05, Boulder, CO, January 2016.

HODSON, DOUGLAS D.,

Assistant 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, AFIT, 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 and COA. Tel. 937-255-3636 x4719, email: Douglas.Hodson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Software Engineering and Human Modeling Improvements to a Simulation Framework." Sponsor: AFLCMC. Funding: \$85,000 – Hodson 70%, Peterson 30%. [ANT/CCR]

"Support of AFNES/RIPR Autonomy Effort." Sponsor: AFRL/RQ. Funding: \$32,500 – Hodson 50%, Peterson 50%. [ANT]

REFEREED JOURNAL PUBLICATIONS

J.R. Millar, D.D. Hodson, G.L. Peterson and D.K. Ahner, "Data Quality Challenges in Distributed Live-Virtual Constructive Test Environments," ACM Journal of Data and Information Quality, Vol. 7, Issue 1-2, June 2016.

L.O. Mailloux, D.D. Hodson, M.R. Grimaila, R.D. Engle, C.V. McLaughlin and G.B. Baumgartner, "Using Modeling and Simulation to Study Photon Number Splitting Attacks," IEEE Access, 4, pp. 2188-2197, April 2016. [CCR]

L.O. Mailloux, M.R. Grimaila, D.D. Hodson, C.V. McLaughlin and G.B. Baumgartner, "Quantum Key Distribution: Boon or Bust?" Journal of Cyber Security & Information Systems (CSAIC), Vol. 4, No 2, June 2016. [CCR]

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Test and Evaluate the Security of Quantum Key Distribution Systems,” The International Test and Evaluation Association (ITEA) Journal, 36(3), pp. 199-207, 2015. [CCR]

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J.R. Millar, D.D. Hodson, R.S. Seymour, “Deriving LVC State Synchronization Parameters from Interaction Requirements,” The 20th IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications, Sept 21-23, 2016.

J.R. Millar, 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, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Roberts, L.O. Mailloux, D.D. Hodson, “Applying Systems Engineering Technical Processes to Assess a Live, Virtual, Constructive Simulation Training Event,” 2016 International Conference on Scientific Computing (CSC16), Las Vegas, NV, July 25-28, 2016.

L.O. Mailloux, M.R. Grimaila, D.D. Hodson, R.D. Engle, C.V. McLaughlin and G.B. Baumgartner, “Studying Decoy State Quantum Key Distribution System Configurations,” 2016 International Conference on Scientific Computing (CSC16), Las Vegas, NV, July 25-28, 2016. [CCR]

HOPKINSON, KENNETH M.,

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, and the use of networks to enhance critical use of 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 Eta Kappa Nu honorary societies. AFIT research center affiliation(s): ANT, CTISR, CCR and CSRA. Tel. 937-255-3636 x4579, email: Kenneth.Hopkinson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“A Cognitive Recommender System for a Closed Feedback Tasking Loop.” Sponsor: NPS. Funding: \$97,548 – Hopkinson 20%, McBee 20%, Oxley 20%, Schubert Kabban 20%, Magnus 20%. [CTISR]

“Cognitive and Mobile Networks.” Sponsor: AFRL/RI. Funding: \$110,000. [CCR]

“Enhancing Satellite Security (New).” Sponsor: Undisclosed. Funding: \$45,000.

“Spectrum Sensing and Sharing by Cognitive Radios in PNT Systems.” Sponsor: Innoflight. Funding: \$40,000 – Hopkinson 75%, Corbell 10%, Gunawardena 10%, Raquet 5%. [ANT]

“Technical Support: Space Vehicles Decision Support Group.” Sponsor: AFRL/RV. Funding: \$68,329. [CTISR]

“Using Cognitive Radios to Enhance Communication Capabilities (Continuation).” Sponsor: Undisclosed. Funding: \$45,000. [CCR]

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HOUPIS, CONSTANTINE H.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
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HYDE, MILO W. IV, Maj,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
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: CDE. Tel. 937-255-3636 x4371, email: Milo.Hyde@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Subaperture Adaptive Optics for Directed Energy Phased Arrays." Sponsor: the Optical Sciences Corporation.
Funding: \$112,500. [CDE]

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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: ANT
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SPONSOR FUNDED RESEARCH PROJECTS

"Design of Experiments and Data Collection for Bistatic/Multi-static Scene Understanding and Exploitation."
Sponsor: AFRL/RV. Funding: \$30,000.

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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. Tel. 937-255-3636 x4550, email: Robert.Lake@afit.edu

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Lake, R.A. and Coutu, Jr. R.A., "Variable Response of a Thermally Tuned MEMS Pressure Sensor," *Sensors and Actuators A: Physical*, Vol. 246, pp. 156-162, 2016. (DOI: 10.1016/j.sna.2016.05.018)

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LAMONT, GARY B.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1970 (AFIT/ENG); Bachelor of 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. AFIT research center affiliation: ANT. Tel. 937-255-3636 x4718, email: Gary.Lamont@afit.edu

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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 machine learning/data mining, space systems, modeling and simulation, and software engineering. He is a member of Tau Beta Pi. AFIT research center affiliation: CCR. Tel. 937-255-3636 x4757, email: Alan.Lin@afit.edu

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Lin, A. C. & Peterson, G. L. (2016), Activity Pattern Discovery from Network Captures. In *IEEE Symposium on Security and Privacy Workshops* (pp. 334–342). San Jose, CA. <http://doi.org/10.1109/SPW.2016.22>. [CCR]

MARTIN, RICHARD K.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); dual 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 affiliations: ANT and CCR. Tel. 937-255-3636 x4625, email: Richard.Martin@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Analytical Support for Hardware Assurance." Sponsor: AFRL/RV. Funding: \$72,150. [CCR]

"Cognitive RF Sensing and Interference Management." Sponsor: AFRL/RV. Funding: \$15,000. [CCR]

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SPONSOR FUNDED EDUCATIONAL PROJECTS

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PATENTS (APPLICATION)

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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.

MENDENHALL, MICHAEL J.,

Assistant Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, Computer Engineering, Oregon State University, 1996; MS, Computer Engineering, AFIT, 2001; PhD, Electrical Engineering, Rice University, 2006. Dr. Mendenhall's research interests include Radio Frequency Intelligence (RFINT), Feature Selection for Intrusion Detection, Dismount Detection and Characterization, persistent Surveillance in Urban Environments, Qualia Exploitation of Sensor Technology (QUEST), and Wind-turbine Radar interaction modeling. AFIT research center affiliation: CCR.

SPONSOR FUNDED RESEARCH PROJECTS

"Hyperspectral Classification and Sensor Fusion for Dismount Skin and Clothing Identification." Sponsor: 711 HPW. Funding: \$54,000.

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 Computational Science and Engineering, Computing Education, Evolutionary Computation, Secure Computing, Space Situational Awareness. AFIT research center affiliation: CCR. Tel. 937-255-3636 x4526, email: Laurence.Merkle@afit.edu

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MULLINS, BARRY E.,

Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BS, Computer Engineering (cum laude), 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 include cyber operations, malware analysis, reverse code engineering, computer/network security, SCADA (supervisory control and data acquisition) security, computer communication networks, embedded (sensor) and wireless networking, and reconfigurable computing systems. AFIT research center affiliation: CCR. Tel. 937-255-3636 x7979, email: Barry.Mullins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Control Systems Security Program Support." Sponsor: DHS. Funding: \$275,000 – Mullins 33%, Rice 33%, Ramsey 33%. [CCR]

"Directed Energy Cyber Effects." Sponsor: AFRL/RD. Funding: \$50,000. [CCR]

"Software Defined Networking Research Support." Sponsor: NSA. Funding: \$80,000. [CCR]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"IASP Tuition and Resource Support for the AFIT Center for Cyberspace Research (CCR)." Sponsor: NIETP. Funding: \$126,603. [CCR]

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NYKL, SCOTT L.,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); B.S. 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

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SPONSOR FUNDED RESEARCH PROJECTS

“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision, Phase II.” Sponsor: AFRL/RQ. Funding: \$130,000 – Nykl 33%, Pecarina 33%, Woolley 33%. [ANT]

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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: ANT and CCR. Tel. 937-255-3636 x7247, email: Meir.Pachter@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Advanced Autonomous Navigation.” Sponsor: AFRL/RQ. Funding: \$16,786. [ANT]

“Control & Estimation in the Presence of Adversarial Action and Uncertainty.” Sponsor: AFOSR. Funding: \$46,104. [ANT]

“Cooperative Control.” Sponsor: AFRL/RQ. Funding: \$20,000. [ANT]

“Self-Defense Missile Guidance.” Sponsor: AFRL/RW. Funding: \$50,000. [ANT]

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- T. Montgomery and M. Pachter: "Visual-INS Using a Human operator and Converted Measurements," Proceedings of the 56th Israel Annual Conference on Aerospace Sciences, Tel-Aviv & Haifa, Israel, March 9-10, 2016. [ANT]
- D. Casbeer, E. Garcia, and M. Pachter: "The Target Defense Differential Game with Two Defenders," Paper WeBTT1.1, 2016 International Conference on Unmanned Aircraft System ICUAS'16, Arlington, VA, June 7-10, 2016. [ANT]
- K. Krishnamoorthy and M. Pachter: "The Role of Prior and Optimal Team Decision in Binary Classification," Paper ThC13.3, American Control Conference, July 6-8 2016, Boston, MA. [ANT]
- T. Montgomery and M. Pachter: "Visual-INS Using Converted Measurements," Proceedings of the 20th IFAC Symposium on Automatic Control in Aerospace, Sherbrooke, Quebec, Canada, August 21-25, 2016. [ANT]
- K. Krishnamoorthy, S. Rathinam, D. Casbeer and M. Pachter: "Optimal Threshold Policy for Sequential Weapon Target Assignment," Proceedings of the 20th IFAC Symposium on Automatic Control in Aerospace, Sherbrooke, Quebec, Canada, August 21-25, 2016. [ANT]

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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. AFIT research center affiliation: ANT and CCR. Tel. 937-255-6565 x3368, email: John.Pecarina@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“CAMAS: Context Aware Mission Auditing System.” Sponsor: AFRL/RI. Funding: \$50,000 – Pecarina 50%, Lin 50%. [CCR]

“Cross Device Usage Analysis for Cyber ISR Research.” Sponsor: AFRL/RI. Funding: \$35,000 – Pecarina 67%, Lin 33%. [CCR]

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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: ANT and CCR. Tel. 937-255-6565 x4281, email: Gilbert.Peterson@afit.edu

REFEREED JOURNAL PUBLICATIONS

Schmitt, D.T., Slaughter, R. and Peterson, G.L., Quantifying 3D Positional Uncertainty of Radiological Material from Nuclear Detonation Video, *Journal of Nuclear Science and Engineering*, Vol. 182, No. 2, pp. 243-255, 2016.

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Lin, A.C. and Peterson, G.L., “Activity Pattern Discovery from Network Captures,” *IEEE Symposium on Security and Privacy Workshop*, 2016, pp. 334-342. [CCR]

Wardell, D.C., Mills, R.F., Peterson, G.L. and Oxley, M.E., “Identifying Security Vulnerabilities in CPS by Modeling Malicious Interaction and Model Checking,” *Complex Adaptive Systems*, 2016, pp. TBD. [CCR]

Bindewald, J.M., Peterson, G.L. and Miller, M.E., “Trajectory Generation with Player Modeling,” *Proceedings of the 28th Canadian Conference on Artificial Intelligence*, 2015, pp. 42-49. [ANT]

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: ANT. Tel. 937-255-3636 x3419, email: Scott.Pierce@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Star Tracker Design for Beaconless Sub-Microradian Spacecraft Pointing Estimation.” Sponsor: Undisclosed. Funding: \$48,195 – Pierce 34%, Cain 33%, Ox 33%. [ANT]

“Star Tracker Integration Modeling for UAV Flight Profiles.” Sponsor: AFRL/RW. Funding: \$75,000 – Pierce 80%, Raquet 20%. [ANT]

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C. Doupe, E.D. Swenson, R.G. Cobb, and S.J. Pierce, “Optimal Attitude Control of Agile Spacecraft Using Combined Reaction Wheel and Control Moment Gyroscope Arrays,” AIAA Modeling and Simulation Technologies Conference, AIAA SciTech, <http://dx.doi.org/10.2514/6.2016-0675>. [ANT]

J.E. Diaz and S.J. Pierce, “Satellite Ephemeris Correction via Remote Site Observation for Star Tracker Navigation Performance Improvement,” Institute of Navigation International Technical Meeting, Jan 2016. [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. AFIT research center affiliation: CCR.

SPONSOR FUNDED RESEARCH PROJECTS

“Cyber Intelligence, Surveillance, and Reconnaissance (ISR) Research.” Sponsor: AFRL/RI. Funding: \$35,000. [CCR]

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A. Seitz and B. Ramsey, "Z-Ranger: An Improved Tool Set for ZigBee Warwalking," *International Conference on Cyber Warfare and Security (ICCWS '16)*, pp. 456-465. (Best MS Student Paper). [CCR]

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H. Patel and B. Ramsey, "Comparison of Parametric and Non-Parametric Statistical Features for Z-Wave Fingerprinting," *IEEE Military Communications Conference (MILCOM '15)*, pp. 378-382. [CCR]

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: ANT. Tel. 937-255-3636 x4580, email: John.Raquet@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"AFIT Support for AFRL Navigation Estimation Optimization (NEO) Program." Sponsor: AFRL/RV. Funding: \$75,000. [ANT]

"ANT Center and Laboratory Support per Attachment 6 of the MOA between AFIT and AFRL." Sponsor: AFRL/RV. Funding: \$200,000 – Raquet 50%, Haker 50%. [ANT]

"GPS/Inertial/Vision Integrated Navigation System (GIVINS) Development." Sponsor: AFRL/RW. Funding: \$50,000 – Raquet 50%, Woolley 25%, Jacques 25%. [ANT]

"Multi-Sensor Navigation Demonstration." Sponsor: USA CERDEC. Funding: \$350,000. [ANT]

"Multi-Sensor Navigation Demonstration." Sponsor: USA CERDEC. Funding: \$150,000. [ANT]

"PNT Collaboration." Sponsor: Lockheed Martin. Funding: \$100,000 – Raquet 60%, Pierce 40%. [ANT]

"Support for Alternative Navigation Research." Sponsor: DARPA. Funding: \$100,000 – Raquet 80%, Pierce 20%. [ANT]

“Trajectory Determination and Analysis Software (TDAS) Development Planning.” Sponsor: 812 TSS. Funding: \$123,805. [ANT]

“Ultra-High Accuracy Reference System (UHARS) Support.” Sponsor: 746 TS. Funding: \$50,000. [ANT]

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Kauffman F, K., J. Raquet, D. Marietta S, J. Kresge S, “Scorpion - Scalable Plug-and-play Bayesian Estimation and Filtering Library for Navigation Research,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016. [ANT]

Machin, T. J. Raquet, D. Jacques F, D. Venable, “Real-Time Absolute Positioning of a UAV Using Vision-Aided Navigation,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016. [ANT]

Smearcheck, E, M., J. Campbell E, A. Baster E, D. Venable E, J. Rohde E, J. Raquet, “Navigation Sensor Smart Cables,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016. [ANT]

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MacAloney, K., J. Raquet, B. Lane E, “Daytime Sensor Performance for Celestial Navigation,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016. [ANT]

REITH, MARK G., Lt Col,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2016 (AFIT/ENG); BS, Computer Science, University of Portland, 1999, MSCE, 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: CCR. Tel. 937-255-3636 x4603, email: Mark.Reith@afit.edu

RICE, MASON J., LTC,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, Electrical Engineering, Florida Institute of Technology, 1995; MS, Electrical and Computer Engineering, University of Florida, 2003; PhD, Computer Science, University of Tulsa, 2011. LTC Rice's research interests are information assurance, networking, and telecommunication systems, cyber-physical systems (SCADA), and cyber-based policy and strategy. AFIT research center affiliation: CCR. Tel. 937-255-3636 x4620, email: Mason.Rice@afit.edu

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J. Fuller, B. Ramsey, J. Pecarina and M. Rice, Wireless intrusion detection of covert channel attacks in ITU-TG.9959-based networks, International Conference on Cyber Warfare and Security (ICCWS), March 2016. [CCR]

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M. Rice and S. Sheno (Eds.), *Critical Infrastructure Protection IX*, Springer, Germany, 2015. [CCR]

K. Girtz, B. Mullins, M Rice and J. Lopez, Practical application layer emulation in industrial control system honeypots, in *Critical Infrastructure Protection X*, February 2016. [CCR]

S. Dunlap, J. Butts, J. Lopez, M. Rice and B. Mullins, Timing-based side-channel analysis for anomaly detection in the industrial control system environment, in *Critical Infrastructure Protection X*, February 2016. [CCR]

M. Quigg, J. Lopez, M. Rice, M. Grimaila and B. Ramsey, Cyberspace and organizational structure: An analysis of the critical infrastructure Environment, in *Critical Infrastructure Protection X*, February 2016. [CCR]

SEAL, MICHAEL D., Maj,

Deputy Department Head, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, EE, University of Missouri-Rolla, 2002; MS, EE, Air Force Institute of Technology, 2007; PhD, EE, 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

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. AFIT research center affiliation: CCR.

SPONSOR FUNDED RESEARCH PROJECTS

"Phase I Support RF-Based Characterization of Systems." Sponsor: AFRL/RY. Funding: \$25,000. [CCR]

“Side-Channel Based Integrity Assessment and Intrusion Detection of Industrial Controllers.” Sponsor: Power Fingerprinting. Funding: \$20,000. [CCR]

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B. Stone, S. Stone, “Comparison of Radio Frequency Based Techniques for Device Discrimination and Operation Identification,” 11th International Conference on Cyber Warfare and Security, Boston University, Boston, MA, Mar 2016. [CCR]

J. Wylie, S. Stone, B. Mullins “Detecting a Weakened Encryption Algorithm in Microcontrollers Using Correlation-Based Anomaly Detection,” 11th International Conference on Cyber Warfare and Security, Boston University, Boston, MA, Mar 2016. [CCR]

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); BS, EE, United States Air Force Academy, 1998; MSEE, Air Force Institute of Technology, 2000; PhD, EE, 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 IEE, HKN, and TBP, Tel. 937-255-3636 x4684, email: Jeremy.Stringer@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Millimeter Wave Radar Topics.” Sponsor: AFRL/RV. Funding: \$45,000.

TEMPLE, MICHAEL A.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1996 (AFIT/ENG); BSE (1985) and MSE (1986), Southern Illinois University, Edwardsville IL; PhD, Air Force Institute of Technology, 1993. Dr. Temple’s research interests include passive emitter identification, tracking and location using RF Distinct Native Attribute (RF-DNA) fingerprinting and complex waveform generation via Spectrally Modulated, and Spectrally Encoded (SMSE) processing. Sponsored research efforts in Command, Control, Communications and Intelligence (C3I), and Electronic Warfare (EW), as adopted by and/or transitioned to agencies within the US Department of Defense, has provided over \$2M in R&D Technology benefit. Senior member of IEEE since Jan 2002. AFIT research center affiliation: CCR. Tel. 937-255-3636 x4279, email: Michael.Temple@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“RF-EW Systems Support.” Sponsor: AFRL/RV. Funding: \$50,000. [CCR]

“RFINT for Commercial Communications.” Sponsor: Undisclosed. Funding: \$55,186. [CCR]

“RFINT for Commercial Communications.” Sponsor: Undisclosed. Funding: \$57,599 – Temple 60%, Corbell 40%. [CCR]

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Bihl, Bauer, Temple, “Feature Selection for RF Fingerprinting with MDA and Using ZigBee Device Emissions,” IEEE Trans on Info Forensics & Security, Vol. 11, Issue 8, pp. 1862-1874, Aug 2016. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carbino, Temple, Lopez, “Conditional Constellation Based-Distinct Native Attribute (CB-DNA) Fingerprinting for Network Device Authentication,” 2016 IEEE Int’l Communications Conf (ICC 2016), Kuala Lumpur, Malaysia, May 2016. [CCR]

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): ANT, CSRA. Tel. 937-255-3636 x4717, email: Andrew.Terzuoli@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Nuclear Command, Control and Communications." Sponsor: AFRL/RI. Funding: \$295,333.

"Remote Sensing and Communications for Advanced Technical Exploitation." Sponsor: NASIC. Funding: \$30,000.

"Structural Design Considerations for Very-Large Space Antenna." Sponsor: AFOSR. Funding: \$50,436. [CSRA]

REFEREED JOURNAL PUBLICATIONS

- T. Wolfe, A. Francis, D. Langley, J. Petrosky, J. Roos, A. Terzuoli, and T. Zens, "Waveguide Mode Formation as a Potential Cause of Switch Failure in High Power Wide Band Gap Photoconductive Switches," IEEE Transactions on Plasma Science, Vol. 43, No 12, Dec 2015, pp 4143-4148.
- T. Wolfe, A. Francis, D. Langley, J. Petrosky, J. Roos, A. Terzuoli, T. Zens, "Integrated Computational Investigation of Photoconductive Semiconductor Switches in Pulsed Power Radio Frequency Applications," IEEE Transactions on Plasma Science, Vol. 44, No 1, Jan 2016, pp 60-70.

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- S. Nickolas, J. Roos, P. Collins, J. Petrosky, A. J. Terzuoli, T. Zens, "Computational Study of Frequency Steered Helical Antennas for High Power Application," Proceedings of the 2016 IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting, Puerto Rico, USA, 25-30 June 2016.
- D Levy, J Roos, J Robinson, W Carpenter, R Martin, C Taylor, J Sugrue, A Terzuoli, "Non-linear Optimization Applied to Angle-of-Arrival Satellite based Geo-localization for Biased and Time-drifting Sensors," Proceedings of the 2016 International Society for Photogrammetry and Remote Sensing (ISPRS 2016) Commission VI WG VI/4 Symposium, Prague, CZ, 11-19 July 2016.
- D. Hesser, L. Burchett, J. Robinson, R. Marhefka, A. Terzuoli, "Design Considerations for Very-Large Space Antenna," AFOSR structural mechanics and prognosis program review. Tec^Edge Center, Dayton, OH, 18-22 July 2016.
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- S. Nickolas, J. Roos, P. Collins, J. Petrosky, A. J. Terzuoli, T. Zens, "Computational Comparison of bow-tie and notch arrays fed via notional PCSS Signal," Proceedings of the 2016 European Electromagnetics Symposium (EUROEM 2016), London, UK, 11-14 July 2016.

WOOLLEY, BRIAN G., Maj,

Computer Science and Engineering Division Chief, Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2012 (AFIT/ENG); BS, Computer Engineering, California State University, Sacramento, 2002; MS Computer Engineering, Air Force Institute of Technology, 2007; PhD, Computer Engineering, University of Central Florida, 2012. Maj Woolley's research interests include artificial intelligence for autonomous vehicles, evolutionary computation of control behaviors, and sensor fusion via computer vision techniques for world modeling. AFIT research center affiliation(s): ANT.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J.S. Tharp and B.G. Woolley, Enhancing Inertial Navigation with Structure from Motion Trajectory Estimates, AIAA Guidance, Navigation, and Control Conference, 4-8 January 2016, San Diego, California, USA. [ANT]

J.R. Christman and B.G. Woolley, "Augmenting Interactive Evolution with Multi-Objective Optimization," in 14th International Conference on Machine Learning and Applications (ICMLA), 9-11 Dec 2015, Miami, FL. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J.S. Tharp and B.G. Woolley, On the Integration of Medium Wave Infrared Cameras for Vision-Based Navigation, In *Proceedings of the Joint Navigation Conference 2016* (JNC'16), June 6 – 9, Dayton, OH, USA. [ANT]

K.P. Werner, B.D. Denby, and B.G. Woolley, Toward Automated Aerial Refueling: Relative Navigation from Stereo Vision, In *Proceedings of the Joint Navigation Conference 2016* (JNC'16), June 6 – 9, Dayton, OH, USA. [ANT]

B.D. Denby and B.G. Woolley, Toward Automated Aerial Refueling: Relative navigation from Stereo Vision, Poster presented at *The 10th annual information meeting of the Consortium of Ohio Universities on Navigation and Timekeeping* (COUNT'16), April 7 – 8, Columbus, OH. [ANT]

VITAYAUDOM, KEVIN P., Maj,

Instructor, Department of Electrical and Computer engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, EE, University of Portland, 2006; MS, EE, Air Force Institute of Technology, 2008. Maj Vitayaudom's research interests are Adaptive Optics, Beam and Wavefront Control, Statistical Signal Processing, Satellite Tracking and Imaging, Imaging through Turbulence, and Wave-optics Simulations. He is a member of Tau Beta Pi, Eta Kappa Nu, SPIE, OSA, and IEEE. Tel. 937-255-3636 x4442, email: Kevin.Vitayaudom@afit.edu

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5.3.1. DOCTORAL DISSERTATIONS

BONAVITA, ANGELO M., *Applications of Correlated 2D-ACAR and CDBAR using a Low-Energy Positron Beam*. AFIT/ENP/DS/16M-056. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: AFOSR.

BURCHETT, LEE R., *Methods for Passive Remote Turbulence Characterization in the Planetary Boundary Layer*. AFIT/ENP/DS/16M-058. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]

HERR, NICHOLAS C., *Degradation of Carbon Fiber Reinforced Polymer and Graphite by Laser Heating*. AFIT/ENP/DS/16S-025. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO.

MEIER, DAVID C., *Operational Exploitation of Satellite-Based Sounding Data and Numerical Weather Prediction Models for Directed Energy Applications*. AFIT/ENP/DS/15D-009. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: MZA. [CDE]

MILLER, WOODY S., *Temperature Dependent Rubidium-Helium Line Shapes and Fine Structure Mixing Rates*. AFIT/ENP/DS/15S-027. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA.

RHOBY, MICHAEL R., *Laminar Flame Combustion Diagnostics using Imaging Fourier Transform Spectroscopy*. AFIT/ENP/DS/16J-018. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFRL/RQ. [CTISR]

YOUNG, CHRISTOPHER M., *Evaluation of Hydrothermally Synthesized Uranium Dioxide for Novel Semiconductor Applications*. AFIT/ENP/DS/16S-027. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO. [CTISR]

5.3.2. MASTER'S THESES

BORMAN, OLIVIA M., *Neutron versus Gamma Radiation Effects on Ytterbium-doped Optical Fibers*. AFIT/ENP/MS/16M-057. Faculty Advisor: Lt Col Briana J. Singleton. Sponsor: DTRA.

BOTSFORD, ROBERT H., *Optical Fiber Signal Transmission for Nuclear Detonation Forensics*. AFIT/ENP/MS/16M-255. Faculty Advisor: Lt Col Briana J. Singleton. Sponsor: DTRA.

BURNS, DEREK A., *The Reliability and Skill of Air Force Weather's Ensemble Prediction Suites*. AFIT/ENP/MS/16M-059. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: 557 WW.

CAMMARATA, JASON A., *COMSOL Modeling of Thermal Flash Experiments*. AFIT/ENP/MS/16M-060. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

CASTRO, SARAH T., *Nuclear Forensics Applications of Principal Component Analysis on Micro X-ray Fluorescence Images*. AFIT/ENP/MS/16M-061. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

COOK, RICHARD D., *Capturing Atmospheric Effects on 3-D Millimeter Wave Radar Propagation Patterns*. AFIT/ENP/MS/16M-063. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/RQ. [CDE]

DICKINSON, THOMAS W.N., *Simulation, Design, and Test of Square, Apodized Photon Sieves for High-Contrast, Exoplanet Imaging*. AFIT/ENP/MS/16M-065. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: USAFA. [CSRA]

EICHERT, CARL J., *Neutron Spectroscopy Optimization using a Solid State Thermal Neutron Detector*. AFIT/ENP/MS/16M-066. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.

FERGUSON, AARON J., *Analysis of Neutron Effects for Asteroid Disruption*. AFIT/ENP/MS/16M-068. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA. [CSRA]

FITCH, KYLE E., *Evaluation of the Visible Infrared Imaging Radiometer Suite (VIIRS) Cloud Base Height (CBH) Pixel-level Retrieval Algorithm for Single-layer Water Clouds*. AFIT/ENP/MS/16M-069. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: AFSOC.

FRANDSEN, BRIAN G., *Gamma Radiation Shielding of Multifunctional Composites*. AFIT/ENP/MS/16M-070. Faculty Advisor: Lt Col Buckley O'Day. Sponsor: HQ AFRL.

FREDA, SAMUEL E., *Microfacet Wavelength Scaling of the BRDF*. AFIT/ENP/MS/16J-015. Faculty Advisor: Maj Samuel D. Butler. Sponsor: AFRL/RV.

GRIJALVA, CRYSTAL E., *Thermal Inactivation of Bacillus Anthracis Spores using Rapid Resistive Heating*. AFIT/ENP/MS/16M-071. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DTRA.

KAMINSKI, NATHANIEL M., *Radiation Effects in Thin Film Hexagonal Boron Nitride*. AFIT/ENP/MS/16M-072. Faculty Advisor: Lt Col Michael R. Hogsed. Sponsor: AFRL/RV.

KEDROW, LEN L., *Characterization of 2D Jammed Granular Memristive Copper Arrays*. AFIT/ENP/MS/15M-073. Faculty Advisor: Dr. Alex Li. Sponsor: DTRA.

KING, MATTHEW P., *Forecasting Sea Breeze Enhanced Thunderstorms at Eglin Air Force Base: A Comparison between Empirical Methods and the High Resolution Rapid Refresh Model*. AFIT/ENP/MS/16M-074. Faculty Advisor: Lt Col Kevin S. Bartlett. Sponsor: 557 WW.

KLAWUHN, DYLAN L., *The Effects of Ionizing Radiation and Oxidizing Species on Strains of Deinococcus radiodurans Lacking Endogenous Oxidative Protection Methods*. AFIT/ENP/MS/16J-017. Faculty Advisor: LTC Doug R. Lewis. Sponsor: 711 HPW/RH.

LEAHY, JOHN S., *Experimental Testing Of A Van De Graaff Generator As An Electromagnetic Pulse Generator*. AFIT/ENP/MS/16S-075. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

MANIEGO, EMBER S., *Optically Stimulated Luminescence from Ag-doped Lithium Tetraborate ($\text{Li}_2\text{B}_4\text{O}_7$)*. AFIT/ENP/MS/16M-075. Faculty Advisor: Maj Eric M. Golden. Sponsor: DTRA.

O'DANIEL, CHRISTOPHER T., *Neutron Radiation Effects on Ge and GeSn semiconductors*. AFIT/ENP/MS/16M-077. Faculty Advisor: Dr. Yung Kee Yeo. Sponsor: AFOSR.

OWENS, STEVEN A., *Population Density Measurements of the Excited States of an Optically Excited Argon Discharge using Emission and Absorption Spectroscopy*. AFIT/ENP/MS/16M-078. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO.

POULIN, ADAM C., *Radiation Effects on an Active Ytterbium-doped Fiber Laser*. AFIT/ENP/MS/16M-079. Faculty Advisor: Lt Col Briana J. Singleton. Sponsor: DTRA.

REDMOND, SHAYLA K., *Conceptual Architecture to Measure the Effects of Subauroral Polarization Streams on Radar Operations*. AFIT/ENP/MS/16S-072. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 557 WW.

SCHMIDT, FREDRICK R., *Improved Performance by the TIE-GCM with the Inclusion of Helium as a Major Species*. AFIT/ENP/MS/16M-081. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 557 WW.

SHIREY, STEPHEN M., *A Relative Humidity Based Comparison of Numerically Modeled Aerosol Extinction to LIDAR and Adiabatic Parameterizations*. AFIT/ENP/MS/16M-082. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]

- TOWNSEND, MACLANE A., *Automated Sunspot Classification and Tracking using SDO/HMI Imagery*. AFIT/ENP/MS/16M-083. Faculty Advisor: Dr. Robert D. Loper. Sponsor: 557 WW.
- VARGA, STEPHAN A., *Radiation Response from a Novel UO₂ Crystal*. AFIT/ENP/MS/16M-084. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DNDO.
- WAKELING, MOLLY A., *Differential (p, p') and (p, d) Cross Sections of ⁸⁹Y and ⁹²Zr*. AFIT/ENP/MS/16M-086. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.
- WALLERSTEIN, AUSTIN J., *Kinetics of Higher Lying Rb States after Pulsed Excitation of the D2 Transition in the Presence of Helium*. AFIT/ENP/MS/16M-087. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA.
- YOUNG, SHANNON R., *Improving Detection of Dim Targets: Optimization of Moment-based Detection using Statistical Confidence*. AFIT/ENP/MS/16M-088. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: NGA. [CTISR]

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.

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. He currently serves as the AFLCMC Geosciences Branch Chief.

REFERRED JOURNAL PUBLICATIONS

Fitch, K., K. Hutchinson, K. Bartlett, R. Wacker, K. Gross, "Assessing VIIRS cloud base height products with data collected from the Department of Energy Atmospheric Radiation Measurement sites," International Journal of Remote Sensing, Vol. 37, No. 11, pp. 2604-2620 (2016).

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

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Jiande Han, Michael C. Heaven, Daniel Emmons, Glen P. Perram, David E. Weeks, and William F. Bailey "Pulsed Discharge Production of Ar Metastables," Proc. SPIE Vol. 9729, No. 97290D, SPIE Photonics West, April 2016. [CDE]

BRIDGMAN, CHARLES J.,

Professor Emeritus of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 1960 (AFIT/ENP); BS, United States Naval Academy, 1952; MS, North Carolina State University, 1958; PhD, North Carolina State University, 1963. Dr. Bridgman's interests centered on nuclear weapon effects and military nuclear power applications. He was associated with nuclear weapon defense since 1952. He was a member of the first military team to be operational on the H-bomb. His research interest was nuclear weapon fallout modeling. He was the author of a textbook, "Introduction to the Physics of Nuclear Weapons Effects," and numerous technical articles in a wide variety of journals. In his 38 years on the AFIT faculty, he chaired over 120 MS theses and PhD dissertations. He received several awards, including Tau Beta Pi Teacher of the Year, the Gage H. Crocker Outstanding Professor Award, and the Order of the Nucleus Award. Dr. Bridgman was a Fellow of the American Nuclear Society.

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; Postdoctoral 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, seven 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: \$15,000.

"Modeling Novel SiC Color Centers in Doped Organosilicon Polymers." Sponsor: AFRL/RX. Funding: \$40,000 – Burggraf 10%, Lutz 90%.

REFERED JOURNAL PUBLICATIONS

Duan, X. F. and Burggraf, L. W., "The closo-Si₁₂C₁₂ molecule from cluster to crystal: A theoretical prediction," Journal of Chemical Physics, Vol. 144(11), article No. 114309/pages 1-11 DOI:10.1063/1.4943957 (2016).

Li, A. G., Burggraf, L. W., and Yun, X., "Nanomechanical Characterization of Bacillus Anthracis Spores by Atomic Force Microscopy," Applied & Environmental Microbiology, Vol. 82(10), pp. 2988-2999. DOI:10.1128/AEM.00431-16 (2016).

Byrd, J. N., Lutz, J. J., Yifan, J., Ranasinghe, D. S., Montgomery Jr., J. A., Perera, A., Duan X.F., Burggraf, L.W. Sanders, B.A. and Bartlett, R. J., "Predictive coupled-cluster isomer orderings for some SinCm (m, n ≤ 12) clusters: A pragmatic comparison between DFT and complete basis limit coupled-cluster benchmarks," Journal Of Chemical Physics, Vol. 145(2), pp. 1-12. DOI:10.1063/1.4955196 (2016).

PATENTS

Burggraf, Larry W., Kowash, Benjamin R., FitzGerald, Jack G. M. 30 August 2016. "Reconfigurable Liquid Attenuated Collimator," US Patent No: 9,431,141 B1.

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 one refereed journal article and four conference presentations. He has also deployed to Afghanistan as a deputy IG in support of Operation Enduring Freedom. Maj Butler is a member of SPIE. AFIT research center affiliation(s): CDE. Tel. 937-255-3636 x4385, email: Samuel.Butler@afit.edu

REFEREED JOURNAL PUBLICATIONS

Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Comparison of micro-facet BRDF model to modified Beckmann-Kirchhoff BRDF model for rough and smooth surfaces," Optics Express Vol. 23, No. 22, pp. 29100-29112, Nov 2015. [CDE]

Freda, S.E., Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Analysis of wave optics BRDF model elements for a moderately rough surface," Proc. SPIE Vol. 9961, p. 15, Aug 2016. [CDE]

Bintz, J.R., Mendenhall, M.J., Marciniak, M.A., Butler S.D., and Lloyd, J.T., "A novel image-based BRDF measurement system for human skin," Proc. SPIE Vol. 9961, p. 7, Aug 2016. [CTISR]

CLINTON, JUSTIN A.,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2013 (AFIT/ENP); BS, Nuclear Engineering, 2004; PhD, Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY,

2011. Dr. Clinton's research interests are in the area of radiation detection, both experimental and theoretical modeling, as it applies to nuclear forensics. His expertise includes particle transport, Monte Carlo methods, analog and digital data acquisition and analysis, and detector development. Dr. Clinton is a member of the American Nuclear Society (ANS) as well as the Institute of Electrical and Electronics Engineers (IEEE). AFIT research center affiliation(s): ANT. Tel. 937-255-6565 x4586, email: Justin.Clinton@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

W. J. Erwin, A. W. Decker, J. A. Clinton, J. W. McClory, "Gamma Radiation Protection Factors for Military Vehicles," *ANS Technical Meeting on Nuclear Energy and Cyber Security* in Annapolis, MD on 18 April 2016.

W. Erwin, J. Clinton, A. Decker, B. Singleton, J. McClory, "Evaluation of the Importance of Model Fidelity for Gamma-Ray Shielding," *IEEE Nuclear Science Symposium*, San Diego, CA (Nov 2015).

W. Erwin, J. Clinton, A. Decker, J. McClory, "Validation of Mcnp6 Generated Bonner Sphere Responses to Complex Neutron Spectra," *IEEE Nuclear Science Symposium*, San Diego, CA (Nov 2015).

T. Kelly, M. Morrison, J. Clinton, B. Kowash, "Deterministic Optimization for Hidden Gamma Source Detection and Verification," *IEEE Nuclear Science Symposium*, San Diego, CA (Nov 2015).

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.

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. Tel. 937-255-6565 x4339, email: Manuel.Ferdinandus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Organic Chromophores for Sensor Hardening." Sponsor: AFOSR. Funding: \$3,016.

REFERED JOURNAL PUBLICATIONS

Reichert, Mattjew, Hu Honghua, Ferdinandus Manuel R., M. Seidel, Zha, T.R. Ensley, D. eceli, J. M. Reed, D. A. Fishman, S. Webster, D.J. Hagan, and Eric W. Van Stryland, "Temporal, spectral, and polarization dependence of the nonlinear optical response of carbon disulfide: erratum." *Optica*, Vol. 3:6, pp. 657-658 (June 2016).

Ensley, Trenton R., Honghua Hu, M. Reichert, M.R. Ferdinandus, D. Peceli, J. W. Hales, J. W. Perry, Z. Li, S.-H. Jang, A.K.-Y. Jen, S. R. Marder, D. J. Hagan, and E.W. Van Stryland, "Quasi-three level model applied to measured spectra of nonlinear absorption and refraction in organic molecules." *Journal of the Optical Society of America B-Optical Physics*, Vol. 33:4, pp. 780-796 (April 2016).

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. Tel. 937-255-3636 x4506, email: Steven.Fiorino@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"2016 AFIT Center for Directed Energy Summer Intern (DESI) Program." Sponsor: HELJTO. Funding: \$60,000. [CDE]

"Additions to AFIT Atmospheric Effects Software Code for AFRL/RV." Sponsor: AFRL/RV. Funding: \$127,513. [CDE]

"AFIT Research in Support of ONR's US-India OSD-DRDO Collaborations." Sponsor: ONR. Funding: \$120,000 – Fiorino 25%, Sritharan 25%, Akers 25%, Reeger 25%. [CDE]

"AFIT's Support to Oak Ridge National Laboratory MIDAS 16 DOE 2276-A066-15 Research (DTRA)." Sponsor: DTRA. Funding: \$100,000. [CDE]

"Airborne Aero-optics Lab Beam Control Collection and Evaluation." Sponsor: HELJTO. Funding: \$120,000. [CDE]

"Atmospheric Characterization for Directed Energy Applications (Phase II SBIR)." Sponsor: MZA. Funding: \$65,496. [CDE]

"CY2016 HELJTO AP TAWG Research and Analysis." Sponsor: HELJTO. Funding: \$375,000. [CDE]

"CY2016 HELJTO M&S TAWG Product Development." Sponsor: HELJTO. Funding: \$400,000. [CDE]

"Directed Energy and Remote Sensing Research, Development and Prototype Demonstration." Sponsor: Raytheon. Funding: \$50,000. [CDE]

"HIP-4D Weather Effects Visualization for Future Fires Decision Aids." Sponsor: USACE. Funding: \$48,000. [CDE]

"LEEDR Weather Datacube Development for SIMAF." Sponsor: AFLCMC. Funding: \$150,000. [CDE]

"Modeling Development for Forward Laser Acoustic Inhibitor (FLAIR)." Sponsor: SPAWAR. Funding: \$125,000. [CDE]

"Modification of AFIT Atmospheric Effects Software Code for AFRL/RV." Sponsor: AFRL/RV. Funding: \$79,532. [CDE]

"Wave Optics of Deep Atmospheric Turbulence: From Underlying Physics towards Predictive Modeling, Mitigation and Exploitation." Sponsor: AFOSR. Funding: \$270,000 – Fiorino 55%, Cusumano 45%. [CDE]

"Wavefront Measurement through Scintillation with Speckle." Sponsor: AFRL/RD. Funding: \$100,000. [CDE]

“Weather Effects for Integrated HEL / KE Weapons Capabilities Analyses.” Sponsor: AFRL/RD. Funding: \$100,000. [CDE]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Directed Energy Short Courses Continued Development and Delivery.” Sponsor: DEPS. Funding: \$9,050. [CDE]

REFEREED JOURNAL PUBLICATIONS

Meier, D.M. and S.T. Fiorino, 2016: “Application of Satellite and NWP Derived Wind Profiles to Military Airdrop Operations,” *J. Appl. Meteor. Climatol.*, 55, 2197–2209, DOI: 10.1175/JAMC-D-15-0296.1. [CDE]

Basu S, J.E. McCrae, S.T. Fiorino, and J. Przelomski, 2016: “Estimation of temporal variations in path-averaged atmospheric refractive index gradient from time-lapse imagery,” *Opt. Eng.* 0001; 55(9):090503. DOI:10.1117/1.OE.55.9.090503. [CDE]

Van Zandt, N.R., J.E. McCrae, and S.T. Fiorino, 2016: “Modeled and measured image-plane polychromatic speckle contrast,” *Opt. Eng.* Vol. 55 No. 2, 024106 DOI: 10.1117/1.OE.55.2.024106. [CDE]

REFEREED CONFERENCE PAPERS ON THE BASIS OF FULL PAPER REVIEW

Fiorino S.T. and D.C. Meier, “Improving the fidelity of the Tatarskii Cn2 Calculation with inclusion of pressure perturbations,” in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), Washington DC, (OSA, 27 June 2016). [CDE]

Burchett, L. and S.T. Fiorino, “Improved Parametrization for Estimating Cn2 from Numerical Weather Prediction,” in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), Washington DC, (OSA, 27 June 2016). [CDE]

Basu, S., J. McCrae, and S.T. Fiorino, “Estimation of atmospheric refractive index gradient variations and Cn2 from time-lapse imagery,” in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), Washington DC invited, (OSA, 28 June 2016). [CDE]

Fiorino, S.T., B. Elmore, J. Schmidt, E. Matchefts, And J. Burley, “A fast calculating two-stream-like multiple scattering algorithm that captures azimuthal and elevation variations,” Proceedings of SPIE, Vol. 9833, 983305, Baltimore, MD, 21 April 2016. [CDE]

McCrae, J, S. Basu, and S.T. Fiorino, “Estimation of atmospheric parameters from time-lapse imagery,” Proceedings of SPIE, Vol. 9833, 983303, Baltimore, MD, 21 April 2016. [CDE]

Cook, RD., S.T. Fiorino, K.J. Keefer, and J. Stringer “Capturing atmospheric effects on 3D millimeter wave radar propagation patterns,” Proceedings of SPIE, Vol. 9833, 98330E, Baltimore, MD, 21 April 2016.

McCrae, J.E. and S.T. Fiorino, “Simulation of array tilt effects in laser phased arrays,” 2016 IEEE Aerospace Conference, Big Sky, MT, March 2016. [CDE]

Basu, S, L.R. Burchett, S.T. Fiorino, and J.E. McCrae, “Comparison of the path-weighted Cn2 derived from time-lapse imagery and weather radar,” 2016 IEEE Aerospace Conference, Big Sky, MT, March 2016. [CDE]

Basu, S., J. McCrae, S.T. Fiorino, L.R. Burchett, and C.A. Rice, “Comparison of atmospheric Cn2 and refractive index gradient variations derived from time-lapse photography to mesoscale modeling and radar measurements,” American Meteorological Society Annual Meeting, New Orleans, LA, Jan 2016. [CDE]

Fiorino, S.T., D.C. Meier, L.R. Burchett, M.F. Via, C.A. Rice, B.J. Elmore, and K.J. Keefer, "High Performance Computing for 4D Weather Cubes and Real-Time, World-Wide Visualization of Radiative Effects," 18th Symposium on Meteorological Observation and Instrumentation, 96th Annual American Meteorological Society Meeting, New Orleans, LA, Jan 2016. [CDE]

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., L. Lamberson, K.J. Keefer, D. Rigdon, J. Schmidt, E. Matchefts, and B. Elmore, "Using Climatology and Numerical Weather Models for Ground-Based HEL Air Defense," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016. [CDE]

Van Zandt, N.R., S.T. Fiorino, J. McCrae, and D. Kunkel, "UImaging and Tracking Modeling including Earth Reflection and Multiple Scattering," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016. [CDE]

Schmidt, J., S.T. Fiorino, J. Burley, and B. Elmore, "Weather Cubes and 4D Visualizations of Atmospheric and Radiative Effects," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016. [CDE]

O'Connor, K.J., S.T. Fiorino, J. Bowers, and K.J. Keefer, "HEL Field Test Forensic Analysis Using High Fidelity Laser Propagation Scaling Law Model and V&V'd Atmospheric Characterization Code," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016. [CDE]

McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, "Investigation of Turbulence Anisotropy using a Hartmann Turbulence Sensor," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016. [CDE]

Burley, J., S.T. Fiorino, B.J. Elmore, J. Schmidt, and M.F. Via, "A Fast Calculating Two-Stream-Like Multiple Scattering Algorithm that Captures Azimuthal and Elevation Variations," 37th Review of Atmospheric Transmission Models Meeting, Woburn, MA, 26 July 2016. [CDE]

Fiorino, S.T., K.J. Keefer, J.E. Schmidt, B.J. Elmore, and E.J. Matchefts "Weather Effects Tools for HEL Mission Planning and Fire Control," Directed Energy Professional Society 18th Annual DE Symposium, Albuquerque, NM (March 2016). [CDE]

Fiorino, S.T., J.E. Schmidt, and K.L. Kremer "A Path-Independent, World-Wide CFLOS Calculator," Directed Energy Professional Society 18th Annual DE Symposium, Albuquerque, NM (March 2016). [CDE]

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 and the American Physical Society. AFIT research center affiliation(s): CSRA and CTISR. Tel. 937-255-3636 x4429, email: Anthony.Franz@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Imaging Chromatographic Spectrometer Experiment (CTEx)." Sponsor: Undisclosed. Funding: \$11,800. [CSRA/CTISR]

"Plenoptic Cameras for 3D Video." Sponsor: Undisclosed. Funding: \$115,350. [CSRA/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

"Next Generation Nonlinear Crystals for High Power Lasers." Sponsor: AFRL/RD. Funding: \$18,500.

REFEREED JOURNAL PUBLICATIONS

B. E. Kananen, E. S. Maniego, E. M. Golden, N. C. Giles, J. W. McClory, V.T. Adamiv, Ya. V. Burak, and L. E. Halliburton, "Optically stimulated luminescence (OSL) from Ag-doped $\text{Li}_2\text{B}_4\text{O}_7$ crystals," *Journal of Luminescence*, Vol. 177, pp. 190-196 (April 2016).

M. S. Holston, E. M. Golden, B. E. Kananen, J. W. McClory, N. C. Giles, and L. E. Halliburton, "*Identification of the zinc-oxygen divacancy in ZnO crystals*," *Journal of Applied Physics*, Vol. 119, article No. 145701 (7 pages) (April 2016).

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E. M. Golden, N. C. Giles, E. Maniego, F. K. Hopkins, K. T. Zawilski, P. G. Schunemann, and L. E. Halliburton, "Identification of native defects (vacancies and antisites) in CdSiP_2 crystals," *Journal of Applied Physics* Vol. 118, article No. 185702 (8 pages) (Nov 2015).

M.S. Holston, I. P. Ferguson, J. W. McClory, N. C. Giles, and L. E. Halliburton, "Oxygen vacancies in LiAlO_2 crystals," *Physical Review B* Vol. 92, article No. 144108 (9 pages) (Oct 2015).

GOLDEN, ERIC M., Maj,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, West Virginia University, 2003; MS, Air Force Institute of Technology, 2008; PhD, Air Force Institute of Technology, 2014. Maj Golden's current research is focused on the characterization of point defects in semiconductors ($\text{Sn}_2\text{P}_2\text{S}_6$, TiO_2 , ZnO) and nonlinear optical materials (CdSiP_2 , KTiOPO_4). Characterization techniques of interest include electron paramagnetic resonance, electron-nuclear double resonance, Fourier transform infrared spectroscopy, and photoluminescence. His previous assignments include the Air Force Research Laboratory Directed Energy and Munitions Directorates where he managed and performed research in space situational awareness and hardware-in-the-loop simulation.

SPONSOR FUNDED RESEARCH PROJECTS

"Characterization of Point Defects in Semiconducting Oxide Crystals." Sponsor: AFOSR. Funding: \$16,720.

"Performance-Modifying Defects in Birefringent and Photorefractive Crystals." Sponsor: AFOSR. Funding: \$10,120.

REFEREED JOURNAL PUBLICATIONS

B. E. Kananen, E. S. Maniego, E. M. Golden, N. C. Giles, J. W. McClory, V.T. Adamiv, Ya. V. Burak, and L. E. Halliburton, "Optically stimulated luminescence (OSL) from Ag-doped $\text{Li}_2\text{B}_4\text{O}_7$ crystals," *Journal of Luminescence*, Vol. 177, pp. 190-196 (April 2016).

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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 24 archival publications in peer reviewed journals and has secured over \$3M in external funding. He has successfully chaired nine MS students, one PhD student, and is currently advising five PhD students. He is a member of the Optical Society of America (OSA), SPIE, and the Combustion Institute. AFIT research center affiliation(s): CTISR and CDE. Tel. 937-255-3636 x4558, email: Kevin.Gross@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Adapting and Improving Atmospheric Correction Algorithms for Wide-Band Hyperspectral Imaging Sensors." Sponsor: NASIC. Funding: \$73,815 – Gross 75%, Fiorino 25%. [CTISR/CDE]

"Fieldable Fireball In-situ and Remote Emission Spectroscopy Sensor Suite (F2IRES3)." Sponsor: Spectral Sciences. Funding: \$24,469. [CTISR]

"Multi-INT Fusion for Anomaly Detection." Sponsor: Undisclosed. Funding: \$34,965. [CTISR]

"Multi-INT Fusion for Anomaly Detection." Sponsor: Undisclosed. Funding: \$80,869 – Gross 25%, McBee 25%, Oxley 25%, Hopkinson 25%. [CTISR]

"Pulmonary Health Biomarker Discovery: MicroRNA Biomarker Discovery Using in Vivo Airborne Hazard Exposures." Sponsor: 711 HPW. Funding: \$5,000. [CTISR]

"Remote Sensing Research Support (RS)²." Sponsor: Undisclosed. Funding: \$19,846. [CTISR]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Open Skies Education Briefing." Sponsor: NASIC. Funding: \$10,000 – Gross 50%, Terzuoli 50%. [CTISR]

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Martin, Jacob A.; Gross, Kevin C. "Estimating index of refraction from Polarimetric hyperspectral imaging measurements." *Optics Express* 24, 17928-17940, Aug 2016. [CTISR]

Fitch, K., K. Hutchinson, K. Bartlett, R. Wacker, K. Gross, “Assessing VIIRS cloud base height products with data collected from the Department of Energy Atmospheric Radiation Measurement sites,” *International Journal of Remote Sensing*, vol. 37, pp. 2604-2620, 2016. [CDE]

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Tim Ombrello, R. Milligan, Z. West, C. Klingshirn, M. Dewitt, T. Hendershott, M. Rhoby, M. Garrett, K. Gross, “Diagnostics of Fueling Strategy for Scramjets,” *Proceedings of the JANNAF 35th Airbreathing Propulsion Subcommittee Meeting*. Hampton, VA, 16–19 May 2016. [CTISR]

Shannon R. Young, Bryan J. Steward, Michael R. Hawks, Kevin C. Gross, “Improving Detection of Low SNR Targets Using Moment-based Detection,” *Proc. SPIE 9828, Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications XIII*, 98280K (2016); <http://dx.doi.org/10.1117/12.2224544>. SPIE Defense and Commercial Sensing, Baltimore, MD, 17-21 April 2016. [CTISR]

Jacob A. Martin, Kevin C. Gross, “Estimating index of refraction for material identification in comparison to existing temperature emissivity separation algorithms,” *Proc. SPIE 9853, Polarization: Measurement, Analysis, and Remote Sensing XII*, 98530N (2016); <http://dx.doi.org/10.1117/12.2222971>. SPIE Defense and Commercial Sensing, Baltimore, MD 17-21 April 2016. [CTISR]

HAWKS, MICHAEL R.,

Research Assistant Professor of Optical Engineering (through ORISE), 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 26 technical papers and reports. He is a member of the Optical Society of America and SPIE and is a retired USAF Lt Col. Tel. 937-255-3636 x4828, email: Michael.Hawks.ctr@afit.edu

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

Shannon R. Young, Bryan J. Steward, Michael R. Hawks, Kevin C. Gross, “Improving Detection of Low SNR Targets Using Moment-based Detection,” *Proc. SPIE 9828, Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications XIII*, 98280K (2016); <http://dx.doi.org/10.1117/12.2224544>. SPIE Defense and Commercial Sensing, Baltimore, MD, 17-21 April 2016. [CTISR]

HENGHELD, 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. Hengehold’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. Hengehold 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.Hengehold@afit.edu

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

"Advanced Dielectric Materials Characterization for Space Based Electronics." Sponsor: Undisclosed. Funding: \$60,000 – Hogsed 75%, McClory 25%.

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, 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, and chemical/biological agent neutralization. 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. Tel. 937-255-3636 x4695, email: Charlton.Lewis@afit.edu

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). His 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

LI, ALEX G.,

Research Associate Professor, Department of Engineering Physics, AFIT Appointment Date: 1995 (AFIT/ENP); BS, Changchun University of Science and Technology, 1982; PhD, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, 1990. Dr. Li has over 20 years of research experience using AFM, SEM, FTIR, Raman, photoluminescence, EPR, ESCA, and XRD to characterize glass, ceramics, semiconductors, polymers, nano-carbon composites, and biological materials. He has published, mostly as the lead author, over two dozen peer-reviewed journal articles, including one top-ten download article of the Institute of Physics (IOP). He also conducted computer modeling of thermal transport and thermal stress in polymers, composites, and other advanced multifunctional materials. Dr. Li invented a novel AFM nano-patterning technique for producing sub-100 nm two-dimensional nanostructures in polymers and held one patent for a proton conductor material. He was a post-doctoral fellow at Nagoya Institute of Technology and Aichi Institute of Technology prior to working for AFIT in 1995. His research included experiment and computer modeling of thermal, mechanical, and electrical properties of granular systems, memristive devices and systems, biomaterials, ceramic matrix composites (CMC), and polymer matrix composites ceramic (PMC).

REFERED JOURNAL PUBLICATIONS

Li, A. G., Burggraf, L. W., and Yun, X. (2016). Nanomechanical Characterization of Bacillus anthracis Spores by Atomic Force Microscopy. Applied & Environmental Microbiology, Vol. 82(10), pp. 2988-2999.
DOI:10.1128/AEM.00431-16

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. Tel. 937-255-3636 x4333, email: Robert.Loper@afit.edu

MAGNUS, AMY L.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2007 (AFIT/ENP); BSEE, Rochester Institute of Technology, 1990; MSEE, Air Force Institute of Technology, 1995; PhD, Air Force Institute of Technology, 2003. Dr. Magnus conducts and manages research in machine intelligence, near and remote sensing, pattern recognition, network science, and distributed intelligence with particular interest in signal to symbol translations and query based intelligence assessments of sensor management systems. She designs dynamic multi-modal experiments for Multi-INT analysis of kinetic events and interactive teams to ensure authoritative reporting of actionable information. She also designs assessment tools that for unobtrusive interrogation of human subjects in order to reveal competency and stress associated with interactions with data, physical interfaces, and other forms of intelligence. 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. Tel. 937-255-3636 x4555, email: Amy.Magnus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Topological Constraints for Integrated Circuits." Sponsor: AFOSR. Funding: \$44,553.

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 26 refereed and 68 other publications and chaired 7 PhD and 49 MS thesis committees. He holds one patent. He is a retired Lt Col, USAF, with 22 years of service. AFIT research center affiliation: CDE 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: \$19,700. [CDE]

“Dynamic Data-Driven Focusing of Light Scattered from Diffuse Reflectors using Phase Modulation.” Sponsor: AFOSR. Funding: \$91,240 – Marciniak 84%, Oxley 16%. [CDE]

“Scattering Effects of Human Skin and Hair.” Sponsor: 711 HPW. Funding: \$30,000. [CTISR]

“Summer Study in IR Plasmonics/Metasurface Design/Fabrication.” Sponsor: Undisclosed. Funding: \$14,535. [CTISR]

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Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., “Comparison of micro-facet BRDF model to modified Beckmann-Kirchhoff BRDF model for rough and smooth surfaces,” Optics Express Vol. 23, No. 22, pp. 29100-29112, Nov 2015. [CDE]

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Burgi, K.W., Marciniak, M.A., Nauyoks, S.E., and Oxley, M.E., “Matrix methods for reflective inverse diffusion,” Proc. SPIE Vol. 9961, p. 23, Aug 2016. [CDE]

Freda, S.E., Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., “Analysis of wave optics BRDF model elements for a moderately rough surface,” Proc. SPIE Vol. 9961, p. 15, Aug 2016. [CDE]

Bintz, J.R., Mendenhall, M.J., Marciniak, M.A., Butler S.D., and Lloyd, J.T., “A novel image-based BRDF measurement system for human skin,” Proc. SPIE Vol. 9961, p. 7, Aug 2016. [CTISR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bintz, J.R., Mendenhall, M.J., and Marciniak, M.A., “Human skin's bidirectional reflectance distribution function and its impact on human skin detection,” presented at the 711 Human Performance Wing Technology Day held on July 2016 at Wright-Patterson AFB OH. [CTISR]

Bintz, J.R., Mendenhall, M.J., Marciniak, M.A., and Lloyd, J.T., “A multispectral bidirectional reflectance distribution model for improved human skin detection,” presented at the Air Force Research Laboratory Automatic Target Recognizers Center Review held on August 2015 at Wright State University, Dayton, OH. [CTISR]

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 (six current) and 30 M.S. students (two current), received 15 research grants, and published 65 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. 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: \$100,000 – McClory 50%, Petrosky 50%.

"Applying Principal Component Analysis to Fallout Characterization: The Link between Actinides and Composition." Sponsor: DTRA. Funding: \$50,000.

"Rapid Location of Radiation Sources Using Polarimetric HSI and Radiation Sensors (Two-Year Extension)." Sponsor: DTRA. Funding: \$342,912 – McClory 40%, Gross 40%, Clinton 10%, Jacques 10%. [ANT/CTISR]

"Support for the US Nuclear Detonation Detection System." Sponsor: DOE/NNSA. Funding: \$49,977 – McClory 50%, Singleton 50%.

"Thermal Studies of Optical Materials Employed in Flashblindness Protection Equipment." Sponsor: AFRL/RX. Funding: \$20,000 – McClory 30%, Marciniak 40%, Petrosky 30%.

REFEREED JOURNAL PUBLICATIONS

B.E. Kananen, E.S. Maniego, E.M. Golden, N.C. Giles, J.W. McClory, V.T. Adamiv, Ya.V. Burak, L.E. Halliburton, "Optically stimulated luminescence (OSL) from Ag-doped $\text{Li}_2\text{B}_4\text{O}_7$ crystals," *Journal of Luminescence*, Vol. 177, pp. 190-196, September 2016. <http://dx.doi.org/10.1016/j.jlumin.2016.04.032>.

D. A. Matters, A. G. Lerch, A. M. Hurst, L. Szentmikl'osi, J. J. Carroll, B. Detwiler, Zs. R'evay, J. W. McClory, S. R. McHale, R. B. Firestone, B. W. Sleaford, M. Krti'cka, and T. Belgia, "Investigation of ^{186}Re via radiative thermal-neutron capture on ^{185}Re ," *Physical Review C*, Vol. 93, issue 5, 054319 (19 pages), May 2016. <http://dx.doi.org/10.1103/PhysRevC.93.0543019>.

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T. D. Kelly, J. C. Petrosky, J. W. McClory, J. M. Mann, J. W. Kolis, "Analysis of oxygen shell splitting in hydrothermally grown single crystal $\text{ThO}_2(200)$," *Physica Status Solidi - Rapid Research Letters*, Vol. 9, No.11, pp. 668-672, November 2015. <http://dx.doi.org/10.1002/pssr.201510235>.

D. A. Matters, N. Fotiades, J. J. Carroll, C. J. Chiara, J. W. McClory, T. Kawano, R. O. Nelson, and M. Devlin, "New transitions and feeding of the $J^\pi = (8^+)$ isomer in ^{186}Re ," *Physical Review C*, Vol. 92, issue 5, 054304, November 2015. <http://dx.doi.org/10.1103/PhysRevC.92.054304>.

M. S. Holston, I. P. Ferguson, J. W. McClory, N. C. Giles, and L. E. Halliburton, "Oxygen vacancies in LiAlO_2 crystals," *Physical Review B*, Vol. 92, issue 14, 144108, October 2015.
<http://dx.doi.org/10.1103/PhysRevB.92.144108>.

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W. J. Erwin, A. W. Decker, J. A. Clinton, B. J. Singleton, J. W. McClory, "Evaluation of the Importance of Model Fidelity for Gamma Ray Shielding," presented at the *2015 IEEE Nuclear Science Symposium* in San Diego, CA on 1 Nov 2015.

W. J. Erwin, A. W. Decker, J. A. Clinton, J. W. McClory, "Validation of MCNP6 Generated Bonner Sphere Responses to Complex Neutron Spectra," presented at the *2015 IEEE Nuclear Science Symposium* in San Diego, CA on 2 Nov 2015.

Christopher Young, James C. Petrosky, James M. Mann, David Turner, Tony Kelly, Sarah Ashley Francis, Justin A. Clinton, John W. McClory, "Novel Radiation Detection with UO_2 Single Crystals," presented at the *2015 IEEE Nuclear Science Symposium* in San Diego, CA on 1 Nov 2015.

A.W. Decker, S.R. McHale, J.A. Clinton, J.W. McClory, M. Millett, "Verification and Validation of Steel Box Neutron Protection Factor Estimates Using Monte Carlo N-Particle Code 6.1 (MCNP6.1) and the White Sands Missile Range Fast Burst Reactor," presented at the *2016 Hardened Electronics and Radiation Technology Conference* in Monterey, CA on 7 April 2016.

M.L. Dexter, J.W. McClory, "Investigation and Development of a Spectrally Dependent Nuclear Yield Correction Factor," presented at the *2016 Hardened Electronics and Radiation Technology Conference* in Monterey, CA on 7 April 2016.

Daniel T. Schmitt, John W. McClory, Gilbert L. Peterson, "Estimating Atmospheric Nuclear Detonation Volume," presented at the *2016 Hardened Electronics and Radiation Technology Conference* in Monterey, CA on 7 April 2016. [CSRA]

B. G. Frandsen and J. W. McClory, "Gamma Radiation Shielding of Multi-Functional Composites," presented at the *2016 Hardened Electronics and Radiation Technology Conference* in Monterey, CA on 7 April 2016. [CSRA]

Matthew Gettings, John McClory, Stephen McHale, Benjamin Kowash, "Estimating Apparent Surface Temperature of Wasp Prime Using Digitized Nuclear Fireball Films," presented at the *2016 Hardened Electronics and Radiation Technology Conference* in Monterey, CA on 7 April 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

D.A. Matters, J. W. McClory, F.G. Kondev, M.P. Carpenter, J.J. Carroll, C.J. Chiara, G. J. Lane, T. Kibedi, E. Ideguchi, H. Watanabe, "Level Structure Above the $T_{1/2} = 2.0 \times 10^5$ yr Isomer in ^{186}Re ," presented at the *April 2016 Meeting of the American Physical Society* in Salt Lake City UT on 18 April 2016.

Molly Wakeling, Jason Burke, Johnathon Koglin, John McClory, "Differential (p, p') and (p, d) Cross Sections of ^{89}Y and ^{92}Zr ," presented at the *April 2016 Meeting of the American Physical Society* in Salt Lake City UT on 16 April 2016.

J.L. Mann, M.A. Tyra, J.L. Molloy, J. Buscaglia, J. Leggitt, K. Pfeuffer, J. Dettman, J. Hietpas, T.D. Kelly, J.W. McClory, D. Turner, S. Jerome, "Surrogate Post-Detonation Urban Debris (SPUD) Standard Reference Material," presented at the *2015 Radiobioassay and Radiochemistry Measurements Conference (RRMC)* in Iowa City, IA on 27 October 2015.

J.W. McClory, "Nuclear Weapons Effects, Policy, and Proliferation Distance Learning Graduate Certificate," *ANS Technical Meeting on Nuclear Energy and Cyber Security* in Annapolis, MD on 19 April 2016.

S.T. Castro, J.W. McClory, T.D. Kelly, B.J. Singleton, "Principle Component Analysis for Nuclear Forensics Applications," *ANS Technical Meeting on Nuclear Energy and Cyber Security* in Annapolis, MD on 18 April 2016.

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A.J. Ferguson, J.W. McClory, "Effects of Neutron Energy Deposition for Asteroid Disruption," *ANS Technical Meeting on Nuclear Energy and Cyber Security* in Annapolis, MD on 19 April 2016. [CSRA]

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 Col, USAF, with 27 years of service. AFIT research center affiliation: CDE. Tel. 937-255-3636 x4739, email: Jack.Mccrae@afit.edu

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Noah R. Van Zandt, Jack E. McCrae, and Steven T. Fiorino, "Modeled and measured image-plane polychromatic speckle contrast," *Opt. Eng.* 55(2):024106 (1-7), (Feb 2016). [CDE]

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Basu, S., J. McCrae, S.T. Fiorino, L.R. Burchett, and C.A. Rice, "Comparison of atmospheric Cn2 and refractive index gradient variations derived from time-lapse photography to mesoscale modeling and radar measurements," *American Meteorological Society Annual Meeting*, New Orleans, LA, Jan 2016. [CDE]

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Van Zandt, N.R., S.T. Fiorino, J. McCrae, and D. Kunkel, "UImaging and Tracking Modeling including Earth Reflection and Multiple Scattering," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016. [CDE]

McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, "Investigation of Turbulence Anisotropy using a Hartmann Turbulence Sensor," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016. [CDE]

Jack E. McCrae, Santasri Basu, and Steven T. Fiorino, "Estimation of atmospheric parameters from time-lapse imagery," Proc. SPIE 9833, Atmospheric Propagation XIII, 983303 (May 13, 2016); DOI:10.1117/12.2223986. [CDE]

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).

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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 weather. Before joining AFIT Faculty Pipeline, he was the Chief of Weather Operations at the Joint Space Operations Center in Vandenberg AFB, CA. He has seven archival publications and presentations. He is also a member of the American Meteorological Society and American Geophysical Union. Tel. 937-255-3636 x4518, email: Omar.Nava@afit.edu

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 counterproliferation, radiation health physics, and radiation detection. LTC O'Day is a basic branch Infantry Officer and a Nuclear Counterproliferation officer. He has advised one PhD students and one MS student received one research grant, and published one journal article 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

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 47 research grants, and published over 88 journal articles during his 27 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: CDE and CTISR. Tel. 937-255-3636 x4504, email: Glen.Perram@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Design and Analysis of Unstable Resonators for Diode Pumped Alkali Lasers." Sponsor: HELJTO. Funding: \$130,487. [CDE]

"Diode Pumped Rare Gas Lasers." Sponsor: HELJTO. Funding: \$255,211. [CDE]

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Nicholas C. Herr, Ashley E. Gonzales, Grady T. Phillips and Glen P. Perram, "Fiber laser irradiated graphite and carbon fiber reinforced polymers using imaging Fourier Transform Spectroscopy," Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM. [CDE]

Steven A. Owen, Ben Eshel, Christopher A. Rice and Glen P. Perram, “Optically Pumped Rare Gas Laser Kinetics,” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM. [CDE]

A.J. Wallerstein, Ricardo Davila, Christopher A. Rice and Glen P. Perram, “Diode Pumped Alkali Laser Kinetics: Higher Lying Excited States” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM. [CDE]

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, 42 Master’s students, and mentored and supported four post-doctoral researchers. Tel. 937-255-3636 x4562, email: James.Petrosky@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Nuclear Survivability Experimentation, Modeling, and Data Verification.” Sponsor: AFNWC. Funding: \$200,000 – Petrosky 35%, McClory 25%, Reeder 25%, Rutledge 15%.

“Removal and Characterization of Pu Contamination in Nuclear Weapon Accidents.” Sponsor: 711 HPW. Funding: \$57,000.

“Rotating Scatter Mask (RSM) Development.” Sponsor: DTRA. Funding: \$68,296 – Petrosky 35%, Burggraf 35%, Clinton 30%.

“Support Activities to Homeland Security.” Sponsor: DHS. Funding: \$150,000 – Petrosky 90%, Hengehold 10%.

“Support to NNSA for QASPR Independent Review.” Sponsor: DOE/NNSA. Funding: \$80,000.

“Technical Means For Nuclear Treaty Monitoring.” Sponsor: AFTAC. Funding: \$47,000.

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Young, C., Petrosky, J., Mann, J. M., Hunt, E. M., Turner, D., & Kelly, T. (2016). The work function of hydrothermally synthesized UO₂ and the implications for semiconductor device fabrication. *Physica Status Solidi - Rapid Research Letters*, 10(9), 687-690. DOI:10.1002/pssr.201600203.

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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: CDE. Tel. 937-255-3636 x4643, email: Grady.Phillips@afit.edu

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Nicholas C. Herr, Ashley E. Gonzales, Grady T. Phillips and Glen P. Perram, "Fiber laser irradiated graphite and carbon fiber reinforced polymers using imaging Fourier Transform Spectroscopy," Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM. [CDE]

RICE, CHRISTOPHER A.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Electrical Engineering, Cedarville University, Cedarville Ohio 2004; MS, Electrical Engineering, AFIT, Wright-Patterson AFB, Ohio, 2006; PhD, Applied Physics, AFIT, Wright-Patterson AFB, Ohio, 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: CDE. Tel. 937-255-6565 x4375, email: Christopher.Rice@afit.edu

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. [CDE]

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A.J. Wallerstein, Ricardo Davila, Christopher A. Rice and Glen P. Perram, "Diode Pumped Alkali Laser Kinetics: Higher Lying Excited States," Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM. [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 Secretary/Treasurer since 2012. 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: \$351,195

SINGLETON, BRIANA J., Lt Col,

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REFEREED CONFERENCE PAPERS ON THE BASIS OF FULL PAPER REVIEW

W. J. Erwin, A. W. Decker, J. A. Clinton, B. J. Singleton, J. W. McClory, "Evaluation of the Importance of Model Fidelity for Gamma Ray Shielding," presented at the 2015 IEEE Nuclear Science Symposium in San Diego, CA on 1 Nov 2015.

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W. Erwin, J. Clinton, A. Decker, B. Singleton, J. McClory, "Evaluation of the Importance of Model Fidelity for Gamma-Ray Shielding," *IEEE Nuclear Science Symposium*, San Diego, CA (Nov 2015).

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

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 13 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: 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]

"Remote Sensor Data Simulation & Algorithm Development." Sponsor: SMC/RSXE. Funding: \$150,000 – Stewart 90%, Gross 10%. [CTISR]

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

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TSENG, H. ROSE, Maj,

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REFEREED JOURNAL ARTICLES

B. Zhao, K. Liou, Yu Gu, C. He, W-L. Lee, X. Chang, Q.B. Li, S. Wang, H.R. Tseng, L. R. Leung, and J.M. Hao, "Impact of buildings on surface solar radiation over urban Beijing," Atmospheric Chemistry and Physics, Vol. 16, pp. 5841-5852 (May 2016).

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 with honors, 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 the development of plasma models to improve the operation of noble gas laser systems. AFIT research center affiliation: CDE. Tel. 937-255-3636 x4561, email: David.Weeks@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Excited State Potential Energy Surfaces of He+Ar." Sponsor: AFOSR. Funding: \$13,320.

"Theoretical Models of Absorption and Emission in Thulium Doped Fiber Lasers." Sponsor: AFRL/RD. Funding: \$30,000. [CDE]

REFEREED CONFERENCE PAPERS 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 Ar Metastables," Proc. SPIE 9729 (2016) 97290D. [CDE]

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. 937-255-0452, 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 PhDs, 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: \$236,300.

REFEREED JOURNAL PUBLICATIONS

Thomas R Harris , Mee-Yi Ryu, Yung Kee Yeo , Buguo Wang, Charutha Lasitha Senaratne, and John Kouvetakis,
“Direct bandgap cross-over point of $\text{Ge}_{1-y}\text{Sn}_y$ grown on Si estimated through temperature-dependent photoluminescence studies,” Journal of Applied Physics, Vol. 120, article No. 085706/8 pages (August 2016).

Hyun Jun Jo, Geun Hyeong Kim, Jong Su Kim, Mee Yi Ryu, Yung Kee Yeo, Thomas R Harris, and J. Kouvetakis,
“Observation of temperature dependent heavy and light hole split direct bandgap and tensile strain from $\text{Ge}_{0.985}\text{Sn}_{0.015}$ using photoreflectance spectroscopy,” Current Applied Physics 16, pp. 83-87 (January 2016).

OTHER SIGNIFICANT RESEARCH ACTIVITY

Invited talk at The 18th International Symposium on the Physics of Semiconductors and Applications (ISPSA 2016), Jeju, Korea, July 2016.

5.4. DEPARTMENT OF MATHEMATICS AND STATISTICS

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5.4.1. DOCTORAL DISSERTATIONS

ARMSTRONG, ANDREW M., *Synergistic Effects of Phase Folding and Wavelet Denoising with Applications in Light Curve Analysis*. AFIT/ENC/DS/16S-001. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

MOHD-ZAID, MOHD, *A Statistical Approach to Characterize and Detect Degradation within the Barabasi-Albert Network*. AFIT/ENC/DS/16S-003. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: 711 HPW/RH.

UBER, RICHARD P., *Time Domain Analysis of Electromagnetic Scattering from Multiple Cavities Embedded in a Ground Plane*. AFIT/ENC/DS/16S-004. Faculty Advisor: Dr. Aihua W. Wood. Sponsor: AFOSR.

5.4.2. MASTER'S THESES

FITZPATRICK, BRIAN J., *Determining the Optimal Work Breakdown Structure for Government Acquisition Contracts*. AFIT/ENC/MS/16M-150. Faculty Advisor: Dr. Edward D. White. Sponsor: N/A.

IGUCHI, TAKAYUKI, *Clustering Theory and Data Driven Health Care Strategies*. AFIT/ENC/MS/16M-001. Faculty Advisor: Capt Jesse D. Peterson. Sponsor: 711 HPW/RH.

JIMENEZ, CHRISTOPHER A., *Predicting Schedule Duration for Defense Acquisition Programs: Program Initiation to Initial Operational Capability*. AFIT/ENC/MS/16M-161. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

KNOTT, CHRISTINE E., *Statistical Comparison of Tracking Observations from Real-Time Algorithms for Transient, Bright, Moving Targets*. AFIT/ENC/MS/15M-001. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: NASIC.

KOZLAK, SCOTT J., *Predicting Cost Growth using Program Reviews and Milestones for DOD Aircraft*. AFIT/ENC/MS/16M-164. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

MCDONALD, JOSHUA L., *Analysis and Modeling of U.S. Army Recruiting Markets*. AFIT/ENC/MS/16M-117. Faculty Advisor: Dr. Edward D. White. Sponsor: USAREC.

PALKO, KYLE A., *Diagnosing Autism Spectrum Disorder through Brain Functional Magnetic Resonance Imaging*. AFIT/ENC/MS/16M-123. Faculty Advisor: Lt Col Ryan D. Kappedal. Sponsor: N/A.

WATTS, MALOUPU L., *Radial Basis Function Based Quadrature over Smooth Surfaces*. AFIT/ENC/MS/16M-003. Faculty Advisor: Capt Jonah A. Reeger. Sponsor: N/A.

5.4.3. 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.

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: CDE. Tel. 937-255-3636 x4522, email: Benjamin.Akers@afit.edu

REFEREED JOURNAL PUBLICATIONS

Akers, B., Ambrose, D., Pond, K., and Wright, J. D., "Overturned internal capillary-gravity waves," *European J. Mechanics – B/Fluids*, Vol. 57, pp 143-151, 2016.

BOOKS AND CHAPTERS IN BOOKS

Akers, B. "HOPS short course: Traveling water waves." *London Mathematical Society Lecture Notes Series*. Vol. 426, 2016, pp 19-29.

Akers, B. "HOPS short course: Stability of traveling water waves." *London Mathematical Society Lecture Notes Series*. Vol. 426, 2016, pp 51-61.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Reeger, J. and Akers, B., "Three-dimensional traveling waves in vortex sheets," SIAM Conference on Nonlinear Waves and Coherent Structures, Philadelphia, PA, 9 August 2016.

Akers, B., "Overturned Interfacial Waves," Woods Hole Oceanographic Institution, Woods Hole, MA, 12 July 2016.

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

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 interests 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. Previous military assignments and deployments include: B-52 test and evaluation, Nuclear Weapon System Evaluation Program, signals

analysis, antenna design, special ops rapid hardware development, AETC course-flow optimization, and Iraqi battlespace, media-space, and public opinion analysis during Operation Iraqi Freedom (OIF).
Tel. 937-255-3636 x4619, email: Travis.Bemrose@afit.edu

BENNETT, BENJAMIN F., Maj,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, USAF Academy, 2000; MBA, University of New Mexico, 2003; MA, University of New Mexico, 2003; PhD, Arizona State University, 2014. Maj Bennett's research interests are in the area of empirical corporate finance, specifically corporate governance, board structure, executive compensation, and incentives.

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

SPONSOR FUNDED RESEARCH PROJECTS

"Improving Exact Algorithms for Finding Efficient Designs and Test Suits for Test and Evaluation." Sponsor: AFOSR. Funding: \$46,491.

REFEREED JOURNAL PUBLICATIONS

Arquette, D. and Bulutoglu, D., "The linear programming relaxation permutation symmetry group of an orthogonal array defining integer linear program," *LMS Journal of Computation and Mathematics*, Vol. 19, No. 1, pp. 206-216, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bulutoglu, D., "Finding the Symmetry Group of a Linear Program," AFOSR Program Meeting, Washington, D.C., 14-15 Dec 2015.

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

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

SPONSOR FUNDED RESEARCH PROJECTS

"ATD: Frame-Theoretic Algorithms for Smart Sensing." Sponsor: NSF. Funding: \$48,232 – Fickus 50%, Mixon 50%.

REFEREED JOURNAL PUBLICATIONS

Bandeira, A., Fickus, M., Mixon, D. and Moreira J., "Derandomizing restricted isometries via the Legendre symbol," *Constructive Approximation*, Vol. 43, No. 3, pp. 409-424, June 2016.

Fickus, M., Marks, J., and Poteet, M., “A generalized Schur-Horn theorem and optimal frame completions,” *Applied Computational Harmonic Analysis*, Vol. 40, No. 3, pp. 505-528, May 2016.

Fickus, M., Mixon, D., and Jasper, J., “Equiangular tight frames from hyperovals,” *IEEE Transactions on Information Theory*, Vol. 62, pp. 5225-5236, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fickus, M., “Equiangular tight frames from hyperovals,” American Mathematical Society Spring Central Section Meeting, Special Session on “Frames, Wavelets and Gabor Systems,” North Dakota State University, Fargo, ND, 16 Apr 2016.

Fickus, M., “Polyphase equiangular tight frames,” International Workshop on Operator Theory and Applications, Special Session on Applied Harmonic Analysis, Frame Theory and Operator Theory, Washington University, St. Louis, Missouri, 18 July 2016.

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

JORDAN, JEREMY D., Maj,

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. Maj Jordan’s research interests include optimization, decision analysis, network theory and big data analysis. Maj 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

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

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Santerre, J., Davis, J., Xia, F., Stevens, S., and Kappedal, R., “Integrating Antimicrobial Resistance Classification and Feature Selection on an Online Bioinformatics Platform,” 29th Annual Conference on Neural Information Processing Systems (NIPS 2015) Poster Presentation, Montreal, Canada, 7-12 Dec 2015.

Gabert, S, Jackson, J. and Kappedal, R., “Estimating PDFs in Heterogeneous Radar Clutter,” Proceedings of the IEEE AP-S Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), Puerto Rico, paper #1156, pp. 1-2, 26 June – 1 July 2016.

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*

MCBEE, BRIAN K., Lt Col,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2011 (AFIT/ENC); BS, Brigham Young University, 1992; MS, University of Colorado, Colorado Springs, 1998; MS, The Ohio State University, 2004; MS, Virginia Polytechnic and State University, 2011; PhD, Virginia Polytechnic and State University, 2011. Lt Col McBee's primary research interests include numerical partial differential equations and control as applied to fluid dynamics, numerical methods with emphasis on finite elements, geodetic science, and applications of mathematics in intelligence gathering. He has served as an intelligence officer providing RC-135 support and reporting, near-real-time space and missile events analysis, foreign counter-space capabilities assessments, battlestaff-level modeling and simulation exercise support, and national-agency-level training and education oversight for Title X training, as well as Advanced Geospatial Intelligence (AGI) and synthetic aperture radar (SAR) exploitation.

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. Tel. 937-255-3636 x4516, email: Dustin.Mixon@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Sampling Strategies for Smarter Sensing." Sponsor: AFOSR. Funding: \$38,150.

"Sampling Theory for Modern Inverse Problems." Sponsor: AFOSR. Funding: \$115,322.

REFEREED JOURNAL PUBLICATIONS

Bandeira, A., Fickus, M., Mixon, D. and Moreira J., "Derandomizing restricted isometries via the Legendre symbol," *Constructive Approximation*, Vol. 43, No. 3, pp. 409-424, June 2016.

Fickus, M., Mixon, D., and Jasper, J., "Equiangular tight frames from hyperovals," *IEEE Transactions on Information Theory*, Vol. 62, pp. 5225-5236, 2016.

Eldar, Y., Hammen, N., and Mixon, D., "Recent advances in phase retrieval," *IEEE Signal Processing Magazine*, Vol. 33, pp. 158-162, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Mixon, D., "Probably certifiably correct k-means clustering," SIAM Conference on Imaging Science, Albuquerque, NM, May 24, 2016.

Mixon, D., "A semidefinite relaxation of k-means clustering," Analysis Seminar, Georgia Institute of Technology, Atlanta, GA, Apr 20, 2016.

Mixon, D., “The Voronoi Means Conjecture,” AMS Spring Central Sectional Meeting, Special Session on Frames, Wavelets and Gabor Systems, North Dakota State University, Fargo, ND, Apr 16, 2016.

Mixon, D., “A semidefinite relaxation of k-means clustering,” Applied Math Colloquium, Massachusetts Institute of Technology, Cambridge, MA, Feb 22, 2016.

Mixon, D., “Probably certifiably correct k-means clustering,” Matheon workshop on Compressed Sensing and its Applications, Technical University of Berlin, Berlin, Germany, Dec 11, 2015.

Mixon, D., “Probably certifiably correct k-means clustering,” Analysis Seminar, University of Houston, Houston, TX, Nov 16, 2015.

Mixon, D., “Probably certifiably correct k-means clustering,” Random Structures Seminar, University of Texas at Austin, Austin, TX, Nov 11, 2015.

OXLEY, MARK E.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1987 (AFIT/ENC); Researcher, Sensor Fusion Laboratory, Center for Operational Analysis (COA); Researcher, Center for Autonomy and Navigation Technology (ANT); and Researcher, Center for Technical Intelligence Studies and Research (CTISR). 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: CTISR. Tel. 937-255-3636 x4515, email: Mark.Oxley@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Oxley, M., Fitch, J., Schubert Kabban, C., and Thorsen, S., “Multi-performance fusion of classification systems,” Proceedings of the SPIE Defense and Security Symposium: Signal Processing, Sensor/Information Fusion, and Target Recognition XXV, 98420G, Baltimore, MD, 17 Apr 2016.

Rogers, S., Culbertson, J., Oxley, M., Clouse, H., Abayowa, B., Patrick, J., Blasch, E., and Trumpfheller, J., “The QuEST for multi-sensor big data ISR situation understanding,” Proceedings of the SPIE Defense and Security Symposium: Ground/Air Multisensor Interoperability, Integration, and Networking for Persistent ISR VII, paper 98310G, 19 Apr 2016.

PETERSON, JESSE D., Maj,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2013 (AFIT/ENC); BS, South Dakota State University, 2006; MS, Air Force Institute of Technology, 2008; PhD, University of Missouri – Columbia, 2013. Maj Peterson's research interests include applied harmonic analysis and frame theory. He has served as an Air Force analytical scientist operationally testing and evaluating A-10C, F-16, F-15C, F-15E, and F-22 aircraft.

REFEREED JOURNAL PUBLICATIONS

Cahill, J., Casazza, P., Peterson, J., and Woodland, L., “Phase retrieval from projections,” *Houston Journal of Mathematics*, Vol. 42, No. 2, pp. 537-558, June 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Rice, J., Mills, R., Temple, M., and Peterson, J., “Increased ambiguity resolution in digital radio frequency receivers,” Proc. IEEE COMCAS (2015) 15678714/1-4, Tel Aviv, Israel, 3 Nov 2015.

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., Capt,

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. Capt 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: CDE. Tel. 937-255-3636 x3320, email: Jonah.Reeger@afit.edu

REFEREED JOURNAL PUBLICATIONS

Humphreys, C., Cobb, R., Jacques, D., and Reeger, J., "A hybrid technique to rapidly solve the intermediate-target optimal control problem," *Global Journal of Technology and Optimization*, Vol. 7, No. 2, pp. 1-8, 2016.

Reeger, J. and Fornberg, B., "Numerical quadrature over the surface of a sphere," *Studies in Applied Mathematics*, Vol. 137, No. 2, pp. 174-188, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Humphreys, C. Cobb, R., Jacques, D., and Reeger, J., "Dynamic Re-Plan of the Loyal Wingman Optimal Control Problem in a Changing Mission Environment," AIAA SciTech Forum and Exhibition 2016. San Diego, CA, 4-8 Jan 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Akers, B. and Reeger, J., "Three-dimensional overturned traveling water waves," The Burgers Program 2016 Summer Research School on Fluid Dynamics: Topics in Nonlinear Water Waves. University of Maryland, College Park, MD, 6 June 2016.

Reeger, J. and Akers, B., "Three-dimensional traveling waves in vortex sheets," SIAM Conference on Nonlinear Waves and Coherent Structures, Philadelphia, PA, 9 August 2016.

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. Professor Reynolds' research interests include management cybernetics, learning theory, and exploring ways computer graphics can support statistical and mathematical education. In 1989, Professor 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, information fusion, modeling and prediction, 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

REFEREED JOURNAL PUBLICATIONS

Brandt, Y., Currier, L., Plante, T.W., Schubert Kabban, C.M., and Tvaryanas, A.P., "A randomized controlled trial of core strengthening exercises in helicopter crewmembers with low back pain," *Aerospace Medicine and Human Performance* Vol. 86, No. 10, pp. 889-894, October 2015.

Parr, J.C., Miller, M.E., Columbi, J.M., Schubert Kabban, C.M., and Pelletiere, J.A., "Development of a side impact (Gy) neck injury criterion for use in ejection system safety evaluation," *IIE Transactions on Occupational Ergonomics and Human Factors*, Vol. 3, No. 3-4, pp. 151-164, October 2015.

Batterton, K.A. and Schubert, C.M., "A nonparametric fiducial interval for the Youden Index in multi-state diagnostic settings," *Statistics in Medicine*, Vol. 35, No. 1, pp. 78-96, 2016.

Barker, S.B., Barker, R.T., McCain, N.L., and Schubert, C.M., "A randomized cross-over exploratory study of the effect of visiting therapy dogs on college student stress before final exams," *Anthrozoos*, Vol. 29, No., pp. 35-46, 2016.

Grap, M.J., Munro, C., Wetzel, P.A., Schubert, C.M., Pepperl, A., Burk, R.S., and Lucas, V., "Backrest elevation and tissue interface pressure by anatomical location during mechanical ventilation," *American Journal of Critical Care*, Vol. 25, No. 3, pp. e56-e63, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Oxley, M., Fitch, J., Schubert Kabban, C., and Thorsen, S., "Multi-performance fusion of classification systems," Proceedings of the SPIE Defense and Security Symposium: Signal Processing, Sensor/Information Fusion, and Target Recognition XXV, 98420G, Baltimore, MD, 17 Apr 2016.

Miller, A., Ogden, J., Schubert Kabban, C., and Schultz, K., "The Influence of Education and Experience upon Contextual and Task Performance in Warehouse Operations," Western Decision Science Institute 45th Annual Meeting, Military Applications Section, p.60, Las Vegas, NV, 5-9 Apr 2016.

BOOKS AND CHAPTERS IN BOOKS

Derriso, M., McCurry, C. and Schubert Kabban, C., "A novel approach for implementing structural health monitoring systems for aerospace structures," *Structural Health Monitoring (SHM) in Aerospace Structures*, F-G. Yuan, ed., Elsevier, 17 Mar 2016, pp. 33-56.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Schubert Kabban, C., "The Optimal Length of a Sequence of Tests for Classification Tasks," ENAR, Austin, TX, 6-9 Mar 2016.

Schubert Kabban, C., "A Metric for the Optimal Length of a Sequence of Tests for Classification Tasks," Joint Statistical Meetings 2016, Section on Medical Devices and Diagnostics, Chicago, IL, 30 July - 4 Aug 2016.

Mohd-Zaid, M.F., Schubert Kabban, C.M., White, E., and Deckro, R., "Hypothesis Testing for Classifying and Detecting Changes within a Barabási-Albert Network," Joint Statistical Meetings 2016, Section on Statistical Learning and Data Science, Chicago, IL, 30 July-4 Aug 2016.

Miller, A., Ogden, J., Schubert Kabban, C., and Schultz, K., “The Influence of Education and Experience upon Contextual and Task Performance in Warehouse Operations,” INFORMS Annual Meeting, Behavioral Operations Management Cluster, Philadelphia, PA, 1-4 Nov 2015.

Miller, A., Ogden, J., Schubert Kabban, C., and Schultz, K., “The Influence of Education and Experience upon Contextual and Task Performance in Warehouse Operations,” Western Decision Science Institute 45th Annual Meeting, Military Applications Section, Las Vegas, NV, 5-9 Apr 2016.

Miller, A., Ogden, J., Schultz, K., and Schubert Kabban, C., “The Influence of Education and Experience upon Contextual and Task Performance in Warehouse Operations,” Production and Operations Management Science (POMS) 27th Annual Conference, Behavior and Logistics Session, Behavior in Operations Management Track, 065-1732, Orlando, FL, 6-9 May 2016.

Miller, A., Ogden, J., Schultz, K., and Schubert Kabban, C., “The Influence of Education and Experience upon Contextual and Task Performance in Warehouse Operations,” INFORMS International Meeting 2016, Session TA03 – The Value of Information, Waikoloa Village, HI, 12-15 June 2016.

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.

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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 Annual IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications, London, England, 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; Ph.D., 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: CDE.

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SPONSOR FUNDED RESEARCH PROJECTS

“Stochastic Analysis and Control of Compressible Flow With General Levy Noise.” Sponsor: ARO. Funding: \$138,350.

REFEREED JOURNAL PUBLICATIONS

Suvinthra, M., Sritharan, S., and Balachandran, S., “Large deviations of stochastic tidal dynamics equations,” *Communications on Stochastic Analysis*, Vol. 9, No. 4, pp. 477-502, Dec 2015.

Kukreja, V., Moshman, N., Sritharan, S., and DeGrassie, J., “Inversion methods for laser parameter extraction with phenomenological model based on off-axis sensor measurements,” *Inverse Problems in Science and Engineering*, Vol. 24, No. 4, pp. 604-624, 2016.

Mohan, M. and Sritharan, S., “New methods for local solvability of quasilinear symmetric hyperbolic systems,” *Evolution Equation and Control Theory*, Vol. 5, No. 2, pp. 273-302, June 2016.

Mohan, M. and Sritharan, S., “Stochastic Euler equations of fluid dynamics with Levy noise,” *Asymptotic Analysis*, Vol. 99, No. 1-2, pp. 67-103, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Sritharan, S., “Rigorous Aspects of Compressible and Incompressible Flow,” Wright State University Mathematics Colloquium, Dayton, OH, 6 Nov 2015.

Sritharan, S., “Stochastic Analysis and Control of Fluid Dynamics,” Workshop on Stochastic Partial Differential Equations, University of Pittsburgh, Pittsburgh, PA, 5 Dec 2015.

Sritharan, S., “Rigorous Aspects of Compressible and Incompressible Flow,” Air Force Institute of Technology Mathematics Colloquium, Wright-Patterson AFB, OH, 26 Feb 2016.

Sritharan, S., “Is general Relativity Pure Mathematics?” International Industrial Mathematics Conference, Colombo, Sri Lanka, 5 June 2016.

Sritharan, S., “The Clay Institute Millennium Prize Problem in Fluid Dynamics,” International Industrial Mathematics Conference, Colombo, Sri Lanka, 3 June 2016.

Sritharan, S., “An Invitation to Stochastic Navier-Stokes Equation with Levy Noise,” University of Colombo Colloquium, Colombo, Sri Lanka, 2 June 2016.

Sritharan, S., “Stochastic Navier-Stokes Equations,” Sri Lanka Institute of Information Technology Colloquium, Colombo, Sri Lanka, 2 June 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, *Communications on Stochastic Analysis* and *International Journal of Analysis*

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. 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

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

SPONSOR FUNDED RESEARCH PROJECTS

“Analyzing the Longitudinal Epidemiology of Medical Diagnoses and Healthcare Issues Among Remotely Piloted Aircraft Crewmembers.” Sponsor: 711 HPW. Funding: \$110,000. [COA]

REFEREED JOURNAL PUBLICATIONS

Brown, G., White, E., Ritschel, D., and Seibel, M., “Time phasing aircraft R&D using the Weibull and Beta distributions,” *Journal of Cost Analysis and Parametrics*, Vol. 8, No. 3, pp. 150–164, December 2015.

Smith, N., White, E., Ritschel, J., and Thal, A., “Counteracting harmful incentives in DoD acquisition through test and evaluation oversight,” *The ITEA Journal of Test and Evaluation*, Vol. 37, No. 3, pp. 218–226, September 2016.

Hoff, R., Hammond, G., Feng, P., and White, E., "Wartime Construction Project Outcomes as a Function of Contract Type," *Defense Acquisition Research Journal*, Vol.23, No. 3, pp. 331–358, July 2016.

Jimenez, C., White, E., Brown, G., Ritschel, J., Lucas, B., and Seibel, N., "Using Pre-Milestone B Data to Predict Schedule Duration for Defense Acquisition Programs," *Journal of Cost Analysis and Parametrics*, Vol. 9, No. 2, pp. 112–126, August 2016.

Boehmke, B., Johnson, A., White, E., Weir, J., and Gallagher, M., "Tooth-to-Tail Impact Analysis: Combining Econometric Modeling and Bayesian Networks to Assess Support Cost Consequences Due to Changes in Force Structure," *Journal of Cost Analysis and Parametrics*, Vol. 9, No. 1, pp. 2–31, April 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ellis, T., Valencia, V., White, E., and Oyama, K., "Evaluating lifecycle cost savings by designing flexible Air Force facilities," Proceedings of the IIE Industrial and Systems Engineering Research Conference, Anaheim, CA, 21-24 May 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Kozlak, S. and White, E., "Analyzing Cost Growth At Program Stages For DoD Aircraft," 84th Military Operations Research Society (MORS) Symposium, Quantico, VA, 20-23 June 2016.

Jimenez, C. and White E., "Predicting Schedule Duration for Defense Acquisition Programs: Program Initiation to Initial Operational Capability," 84th Military Operations Research Society (MORS) Symposium, Quantico, VA, 20-23 June 2016.

Ellis, T., Valencia, V., White, E. and Oyama, K., "Evaluating Lifecycle Cost Savings by Designing Flexible Air Force Facilities," Industrial and Systems Engineering Research Conference, 66th IIE Annual Conference and Expo, Anaheim, CA, 21-24 May 2016.

Maupin, G., Tvaryanas, A., White, E., and Lysfjord, H., "Relationship Between Deployment-Related Exposures and Incident Post-Deployment Mental Health Diagnoses Among United States Air Force Medical Service Personnel," Society of Federal Health Professionals (AMSUS) Annual Meeting, San Antonio, TX, 1-4 December 2015.

WOOD, AIHUA W.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1994 (AFIT/ENC); BS, Beijing 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

"Distributional Monte Carlo Methods for Rarefied Gas Dynamics." Sponsor: AFOSR. Funding: \$47,871

REFEREED JOURNAL PUBLICATIONS

Charnley, M. and Wood, A., "Through-the-wall radar detection analysis via numerical modeling of Maxwell's Equations," *Journal of Computational Physics*, Vol. 313, No. C, pp. 532-548, May 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Wood, A., "The Art of Proof," Dayton Math Circle, Wright State University, Dayton, OH, 11 Dec 2015.

Wood, A., "Addressing Unconscious Bias: Steps towards Equity, Diversity, and Inclusion," Office of Diversity and Inclusion, Pentagon, Washington, D.C., 27 Jan 2016.

Wood, A., “The Art of Proof,” Greater Dayton Honors Seminar, Tec^Edge Innovation & Collaboration Center, Dayton, OH, 23 Feb 2016.

Wood, A., “Finite Element Analysis of a Carpet Cloak,” EMN Metamaterials Meeting, Dubrovnik, Croatia, 10 May 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, *Advances in Applied Mathematics and Mechanic*.

5.5. DEPARTMENT OF OPERATIONAL SCIENCES

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5.5.1. DOCTORAL DISSERTATIONS

ANDERSON, JASON R., *An Examination of Commercial Motor Vehicle Hours of Service Safety Regulation*. AFIT/ENS/DS/16S-025. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: N/A. [COA]

BELLUCCI, JOSEPH P., *Non-Linear Metamodeling Extensions to the Robust Parameter Design of Computer Simulations*. AFIT/ENS/DS/16S-026. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: HQ USAF/A9. [COA]

GIBB, MICHAEL P., *On Improved Least Squares Regression & Artificial Neural Network Meta-models for Simulation via Control Variates*. AFIT/ENS/DS/16S-030. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: AFNWC. [COA]

MILLER, ALLEN R., *The Influence of Education and Experience upon Contextual and Task Performance*. AFIT/ENS/DS/16S-073. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: SCOW. [COA]

5.5.2. MASTER'S THESES

ALZAHIRANI, FISAL A., *Applying Lean to the AC-130 Maintenance Process for the Royal Saudi Air Force*. AFIT/ENS/MS/16S-024. Faculty Advisor: Capt Michael Kretser. Sponsor: Saudi Air Force.

AYKIRI, BAHADIR, *Simulation Modeling of the Sortie Generation Process in Turaf*. AFIT/ENS/MS/16M-090. Faculty Advisor: Dr. John O. Miller. Sponsor: TURAF. [COA]

BOARDMAN, NICHOLAS T., *Heterogeneous Air Defense Battery Location: A Game Theoretic Approach*. AFIT/ENS/MS/16M-091. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: N/A. [COA]

BRADSHAW, AMELIA E., *United States Air Force Officer Manpower Planning Problem via Approximate Dynamic Programming*. AFIT/ENS/MS/16M-092. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: HQ USAF/A1. [COA]

BRADSHAW, CALVIN J., *Contingency Workload Demand Forecast Techniques for Cargo and Flying Hours*. AFIT/ENS/MS/16M-093. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: USTRANSCOM. [COA]

CARDENAS, KEVIN R., *Logistics Simulation for Long Duration Logistics Wargames*. AFIT/ENS/MS/16M-095. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4F. [COA]

CLAWSON, CHRISTOPHER L., *Consolidating Supply Chain Management Education through Professional Certification*. AFIT/ENS/MS/16M-096. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: HQ USAF/A4. [COA]

COTTON, JAMES A., *Antecedents of Fuel Efficiency*. AFIT/ENS/MS/16M-099. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: SAF/IEN. [COA]

DAVIS, MICHAEL T., *Determination of Fire Control Policies via Approximate Dynamic Programming*. AFIT/ENS/MS/16M-100. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: N/A. [COA]

DICKEY, THOMAS M., *Modeling and Economy's Dynamics and External Influences through a System of Differential Equations*. AFIT/ENS/MS/16M-102. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]

DWYER, JUSTIN J., *Analysis of Military Entry Control Point Queueing*. AFIT/ENS/MS/16M-103. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM. [COA]

EHRlich, JACOB M., *A Response Surface Validation of a Quantum Key Distribution Model*. AFIT/ENS/MS/16M-104. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [COA]

GRIFFITH, DANIEL A., *Epidemiology, Cost, and Aircraft Choice for Aeromedical Evacuation in AFRICOM*. AFIT/ENS/MS/16M-105. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A. [COA]

HEFTY, KILEY E., *Application of Reliability Allocation Principles on Statistical Power*. AFIT/ENS/MS/16M-106. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [COA]

JANTSCHER, HELEN L., *An Examination of Economic Metrics as Indicators of Air Force Retention*. AFIT/ENS/MS/16M-107. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1. [COA]

JAVID, CLAY C., *Assessing the Military Worth of Advanced Capabilities of the Small Advanced Capabilities Missile through Agent-Based Modeling*. AFIT/ENS/MS/16M-108. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin. [COA]

KIM, CHANGSUNG, *Simulation Modeling and Analysis of Air Force Depot Engine Repair during Normal and Increased Operational Tempos*. AFIT/ENS/MS/16M-109. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4F. [COA]

LAFIGUERA, GEORGE B., *A “Big Bang” versus a “Small Bang” Approach: A Case Study of the Expeditionary Combat Support System (ECSS) and the Maintenance, Repair, and Overhaul Initiative (MROi)*. AFIT/ENS/MS/16M-110. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFMC/A4P. [COA]

LEASE, LUCAS J., *The Impact of Reducing Full Time Support Positions in the U.S. Army National Guard and Reserves*. AFIT/ENS/MS/16M-111. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: CAA. [COA]

LIRA, JOHN R., *Agent-Based Modeling for Air-to-Air Missile Combat*. AFIT/ENS/MS/16M-112. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin. [COA]

MARTIN, SANTIAGO L., *Overhaul Facility Planning and Control Tool Selection and Implementation Analysis*. AFIT/ENS/MS/16M-114. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: Argentine Air Force Material General Directorate. [COA]

MARTYN, ANTON H., *Long-Term Impacts of Military Drawdown on the Industrial Base*. AFIT/ENS/MS/16M-115. Faculty Advisor: Dr. William Cunningham. Sponsor: N/A. [COA]

MAYWALD, JACOB D., *Reducing Airlift Inefficiency through Aircraft Selection Modeling*. AFIT/ENS/MS/16M-116. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: 618 AOC.

MCGRUFF, WARREN B., *Rate Setting Analysis: A Statistical Approach to Outliers in the Rate Setting Process within the United States Transportation Command*. AFIT/ENS/MS/16M-118. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM. [COA]

MCLEAN, BRENDEN A., *Autoencoded Reduced Clusters for Anomaly Detection Enrichment (Arcade) In Hyperspectral Imagery*. AFIT/ENS/MS/16M-119. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: HQ USAF/A9. [COA]

MICKELSEN, RICHARD J., *Modeling the Components of an Economy as a Complex Adaptive System*. AFIT/ENS/MS/16M-120. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]

- MONTGOMERY, ROBERT T., *Using Multiple Objective Decision Analysis to Position Federal Product and Service Codes within the Kraljic Portfolio Matrix*. AFIT/ENS/MS/16M-121. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: HQ USAF. [ANT/COA]
- OLIVEIRA, LEANDRO V., *An Evaluation of Forecasting Methods that could be used in the Brazilian Air Force Uniform Distribution Process*. AFIT/ENS/MS/16M-122. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: Brazilian Air Force. [COA]
- PARK, JAMES M., *Optimizing Forecasting Methods for USTRANSCOM Railcar Demands*. AFIT/ENS/MS/16M-124. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM. [COA]
- POPOVICH, JOVAN, *A Model of Ambient Noise Caused by Wind Flow*. AFIT/ENS/MS/16M-125. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [COA]
- SALGADO, ETHAN L., *Using Approximate Dynamic Programming to Solve the Stochastic Demand Military Inventory Routing Problem with Direct Delivery*. AFIT/ENS/MS/16J-031. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: TRADOC. [COA]
- SALGADO, JESSICA A., *Factors Influencing Skill Retention in Multi-Skilled Air Force Aircraft Maintainers*. AFIT/ENS/MS/16M-130. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: AFMC/A4P. [COA]
- SEVIMLI, ABDURRAHMAN, *Sortie Generation Simulation of a Fighter Squadron*. AFIT/ENS/MS/16M-127. Faculty Advisor: Dr. John O. Miller. Sponsor: TURAF. [COA]
- SHALLCROSS, NICHOLAS, *A Logistic Regression and Markov Chain Model for the Prediction of Nation-state Violent Conflicts and Transitions*. AFIT/ENS/MS/16M-128. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]
- TETRAULT, ALYSSA S., *The Effects of High Performance Aircraft Respiratory Systems on Pilots*. AFIT/ENS/MS/16M-129. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: 711 HPW/USAFSAM. [COA]
- WALTER, RUSSELL W., *Methods to Address Extreme Class Imbalance in Machine Learning Based Network Intrusion Detection Systems*. AFIT/ENS/MS/16M-131. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: HQ USAF/A9. [COA]
- WILSON, CASSIDY L., *Increased Capacity Utilizing Aggregation and Consolidation of Contingency Cargo*. AFIT/ENS/MS/16M-132. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A3. [ANT/COA]
- WOODS, CANDIS A., *Determining the Degree of the Routinization of Additive Manufacturing in the Air Logistics Complexes*. AFIT/ENS/MS/16M-098. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFMC/A4P. [COA]
- ZENS, CHRISTINE L., *Application of Non-Rated Line Officer Attrition Levels and Career Field Stability*. AFIT/ENS/MS/16M-133. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1. [COA]

5.5.3. GRADUATE RESEARCH PAPERS

- AGNES, ALLEN Y., *Improving the Nuclear Reform Implementation for Success*. AFIT/ENS/MS/16S-023. Faculty Advisor: Lt Col Joshua K. Strakos. Sponsor: AFGSC. [COA]
- BLACKRICK, JEFFERY M., *Air Force Nuclear Enterprise Organization: A Case Study*. AFIT/ENS/MS/16S-027. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AFGSC. [COA]

BOONE, MATTHEW D., *Senior Leader Perspective on the Air Force Nuclear Enterprise: Today's Issues and the Future*. AFIT/ENS/MS/16S-028. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFGSC. [COA]

CASWELL, DAVID C., *USAF Female Pilot Turnover Influence: A Delphi Study of Work-Home Conflict*. AFIT/ENS/MS/16J-019. Faculty Advisor: Dr. Sharon G. Heilmann. Sponsor: HQ USAF/A1.

CONKLIN, NICHOLAS J., *AMLO Promotion: Perceptions and Reality*. AFIT/ENS/MS/16J-020. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 18 AF/CV. [COA]

ECHARD, BRET, *Point of Safe Return Minimums...How Low Can You Go?* AFIT/ENS/MS/16J-021. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9. [COA]

EICHNER, CHARLES L., *Extending Service Life of Aircraft through Fleet Management: A Study in C-17 Base and Aircraft Assignments*. AFIT/ENS/MS/16J-022. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AMC/A9. [COA]

EVANS, ROBERT C., *Looking to the Future of the Air Force Nuclear Enterprise*. AFIT/ENS/MS/16S-029. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AFGSC. [COA]

GUY, TIMOTHY R., *KC-46 Enterprise Fleet Management*. AFIT/ENS/MS/16J-023. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC. [COA]

HABBESTAD, JOHN M., *463L Pallet Compatibility Implications for Warfighting Capacity in the Civil Reserve Air Fleet*. AFIT/ENS/MS/16J-024. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A9. [COA]

HEIL, MARK A., *The Air Force Building Partnership Capacity Problem: Are We Engaged in the Right Partnerships?* AFIT/ENS/MS/16J-025. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: SAF/IA. [COA]

HOOD, MATTHEW L., *The Future of Tactical Airlift: The Application of CRUAS in Afghanistan*. AFIT/ENS/MS/16J-026. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9. [COA]

JOHNSTON, TAYLOR J., *Optimizing the Continental United States Air Refueling Infrastructure*. AFIT/ENS/MS/16J-027. Faculty Advisor: Dr. Jeffrey D. Weir. Sponsor: HQ USAF/A3. [COA]

KING, ADAM P., *Measuring the 'Leading People' Organizational Health of AMC Wings on a Non-interference Basis*. AFIT/ENS/MS/16J-028. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/IG. [COA]

KOSTRUBALA, KAZIMIR M., *United States Transportation Command's Role as a Lead Enabling Agency during Humanitarian and Disaster Relief Events Outside the Contiguous United States*. AFIT/ENS/MS/16J-029. Faculty Advisor: Lt Col Joshua K. Strakos. Sponsor: AMC/A4. [COA]

ORTIZ, MARC ANTHONY C., *Assessing the Effects of Organizational Changes within the Office of the Secretary of Defense on the Nuclear Mission*. AFIT/ENS/MS/16S-035. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFGSC. [COA]

PABST, DAVID, *Department of Energy: An Organizational Look at America's Nuclear Deterrent*. AFIT/ENS/MS/16S-036. Faculty Advisor: Dr. Jeffery A. Ogden. Sponsor: AFGSC. [COA]

SLAZINIK, IAN M., *Air Mobility Future: Evolving Command and Control Relationships in the Information Age*. AFIT/ENS/MS/16J-032. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: 618 AOC. [COA]

STEIN, ANDREW M., *Functional Mission Analysis: A Functional Approach to Mission Assurance*. AFIT/ENS/MS/16J-033. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AMC/A6. [COA]

STUBBENDORFF, JESPER R., *A Commander's First Challenge: Establishing a Pathway of Trust*.
AFIT/ENS/MS/16J-034. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AF PACE. [COA]

THOMPSON, MICHAEL J., *Additive Manufacturing (3D Printing) Aircraft Parts and Tooling at the Maintenance Group Level*. AFIT/ENS/MS/16J-035. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9. [COA]

THORNTON, RYAN K., *AMC Pilot Retention: A Delphi Study*. AFIT/ENS/MS/16J-036. Faculty Advisor:
Dr. Jeffrey A. Ogden. Sponsor: HQ USAF/A3. [COA]

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, missile defense, 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. AFIT research center affiliation: COA. Tel. 937-255-6565 x4708, email: Darryl.Ahner@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Algorithm Development for the Combat Sample Generator (COSAGE) Model.” Sponsor: NPS. Funding: \$55,000.

“F-35 T&E Support: Verification and Validation for the Virtual Simulation Environment.” Sponsor: F-35 Joint Program Office. Funding: \$733,834 – Ahner 80%, Weir 20%. [COA]

“PMESI Assessments and Further Data Development.” Sponsor: CAA. Funding: \$95,000. [COA]

“Scientific Test and Analysis Techniques for Automatic Test and Analysis.” Sponsor: NAVSEASYSCMD. Funding: \$500,000.

“Test and Evaluation Center of Excellence.” Sponsor: OSD DASD (DT&E). Funding: \$340,791.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“COE-S 310/410: Experimental Design and Analysis I&II Short Courses.” Sponsor: DIA. Funding: \$26,000

REFEREED JOURNAL PUBLICATIONS

Garee, M.J., Hill, R.R., Ahner, D., Czarnecki, G., “Fragment capture simulation for MANPADS test arena optimization,” *Journal of Simulation*, DOI:10.1057/jos.2016.9, 2016. [COA]

Hill, R.R., Ahner, D., Morrill, D., Talafuse, T., “Applying Statistical Engineering to the Development of a Ballistic Impact Flash Model,” *Quality Engineering*, DOI: 10.1080/08982112.2016.1155223, 2016. [COA]

Millar, J., Hodson, D., Peterson, G., and Ahner, D.K., “Data Quality Challenges in Distributed Live-Virtual-Constructive Test Environments,” *Journal of Data and Information Quality (ACM)*, Vol. 7, No. 2, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Darryl K. Ahner and Carl Parson, “Approximate Dynamic Programming Approach to Two-Stage Stochastic Weapon Assignment,” The Industrial and Systems Engineering Research Conference (ISERC), Anaheim, CA, 21-24 May 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Speaker, Darryl K. Ahner, “Conflict Evolution, Prediction, and Country Assessment using Open Source Data,” Department of Defense Science & Technology Workshop on Environmental Security,” Alexandria, VA, May 2016.

Invited Speaker, Darryl K. Ahner, Leonard Truett, Scott Wacker, “Using Sequential Testing to Address Complex Full-Scale Live Fire Test and Evaluation,” Rigorous Test and Evaluation for Defense, Aerospace, and National Security Workshop, Crystal City, VA, April 2016.

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: COA. Tel. 937-255-6565 x4328, email: Kenneth.Bauer@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Anomaly Detection and Data Visualization for Improved Cyber Security.” Sponsor: USA CYBER. Funding: \$150,000 – Bauer 80%, Chrissis 20%. [COA]

REFEREED JOURNAL PUBLICATIONS

Bihl, T. J., Bauer, K.W., and Temple, M. A., “Feature Selection for RF Fingerprinting With Multiple Discriminant Analysis and Using ZigBee Device Emissions,” *IEEE Transactions on Information Forensics and Security*, Vol. 11, No. 8, pp. 1862-1874, 2016.

Situ, J.X., Friend, M.A., Bauer, K.W., and Bihl, T.J., “Contextual Features and Bayesian Belief Networks for Improved Synthetic Aperture Radar Combat Identification,” *Military Operations Research Journal*, Vol. 21, No. 1, pp. 89-106, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bihl, T. J., Temple, M. A., Bauer, K.W., and Ramsey, B., “Dimensional Reduction Analysis for Physical Layer Device Fingerprints with Application to ZigBee and Z-Wave Devices,” IEEE Military Communications Conference (MILCOM), Tampa, FL, 26-28 Oct 2015.

Bihl, T. J., Temple, M. A., Bauer, K.W., and Ramsey, B., “Dimensional Reduction Analysis for Physical Layer Device Fingerprints with Application to ZigBee and Z-Wave Devices,” IEEE Military Communications Conference (MILCOM), Tampa, FL, 26-28 Oct 2015.

Todd J. Paciencia, Kenneth W. Bauer, “Hyperspectral anomaly detection using enhanced global factors,” SPIE 9844, Automatic Target Recognition XXVI, 984400, DOI:10.1117/12.2223865, 12 May 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bihl, T. J., Temple, M. A., Bauer, K.W., “Feature Selection Fusion (FSF) for Aggregating Relevance Ranking Information with Application to ZigBee Radio Frequency Device Identification,” 2016 IEEE National Aerospace and Electronics Conference (NAECON), Dayton, OH, 26-29 Jul 2016.

CHRISSIS, JAMES W.,

Associate Professor of Operations Research, 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’ 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: COA. Tel. 937-255-3636 x4606, email: James.Chrissis@afit.edu

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. Tel. 937-255-6565 x4283, email: William.Cunningham@afit.edu

REFEREED JOURNAL PUBLICATIONS

Joseph Skipper, William Cunningham, Christopher Boone, Raymond Hill, "Managing Hub and Spoke Networks: A Military Case Comparing Time and Cost," *Journal of Global Business and Technology*, Vol. 12, No. 1, pp. 33-47, 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Review Board, Journal of Transportation Management.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Speaker, "Basic Supply Chain Management Concepts," Logistics Officers Association Annual Conference, Washington, D.C., 4 Oct, 2016.

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, 1973 & 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. Tel. 937-255-6565 x4325, email: Richard.Deckro@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"JWAC AFIT Interaction." Sponsor: JWAC. Funding: \$75,000 – Deckro 80%, Ahner 10%, Lunday 10%.

"Transitioning the Production of Carbon Nanotubes from Development to Economic Viability." Sponsor: Undisclosed. Funding: \$14,986 – Deckro 33%, Stone 33%, Tucholski 33%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

MAJ Jared Nystrom, Lt Col Matthew JD Robbins, Richard F. Deckro, & James Morris, "Simulating Attacker and Defender Strategies within a Dynamic Game on Network Topology," 84th Military Operations Research Symposium, Quantico, VA, 21-24 Jun 2016.

Mark A. Gallagher, Richard F. Deckro, Patricia Anne Hickman & David L. Merrill, "Recent Air Force Operations Research Organization and Accomplishments," 84th Military Operations Research Symposium, Quantico, VA, 21-24 Jun 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor, Military Operations Research.

DOUGLAS, MATTHEW A., Lt Col,

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. Lt Col Douglas's research interests include logistics/operations safety, diffusion of innovation, and ethics and decision-making.
Tel. 937-255-3636 x4740, email: Matthew.Douglas@afit.edu

REFEREED JOURNAL PUBLICATIONS

Douglas, M.A. & Swartz, S.M., "Truck driver safety: An evolutionary research approach," *Transportation Journal*, Vol. 55, No. 3, pp. 258-281, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kazi, D., Johnson, A.W., & Douglas, M.A., "Information system innovation in the legacy systems era," Western Decision Sciences Institute Annual Meeting, Las Vegas, NV, 5-8 Apr 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Overstreet, R. E., Douglas, M. A., Hazen, B. T., "Supply chain leader/follower interaction: Managing change while focusing on enterprise level objectives," POMS 27th Annual Conference, Orlando, FL, 6-9 May 2016. [COA]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Douglas, M. A., Overstreet, R. E., and Hazen B.T., "Art of the possible or fool's errand: Diffusion of large scale management innovations," *Business Horizons*. Vol. 59, No. 4, pp. 379-389, 2016. [COA]

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: COA. Tel. 937-255-6565 x4521, email: Paul.Hartman@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"AFMC Senior Leader Forum Support." Sponsor: AFMC. Funding: \$50,000. [COA]

"Airworthiness Planning in Support of the 5th-to-4th Gen Gateway Program." Sponsor: AFLCMC. Funding: \$16,626 – Hartman 50%, Weir 50%. [COA]

"Operational Requirements for the Mechanical Equipment & Subsystem Integrity Program (MECSIP)." Sponsor: AFLCMC. Funding: \$450,000 – Hartman 50%, Weir 50%. [COA]

"Research, Development, Test and Evaluation (RDT&E) for the Presidential Aircraft Recapitalization (PAR) Program." Sponsor: AFLCMC. Funding: \$620,206 – Hartman 50%, Weir 50%. [COA]

"System Level Functional and Performance Requirements for the Special Mission Suite (SMS) System on the AC/MC-130J." Sponsor: USSOCOM. Funding: \$849,946 – Hartman 50%, Weir 50%. [COA]

“Technical Support for Collaboration with the Advanced Synthetic Aperture Radar System (ASARS) Program Office.” Sponsor: AFLCMC. Funding: \$364,305 – Hartman 50%, Weir 50%. [COA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Tasking, Processing, Exploitation, and Dissemination Examples Book Chapter Roadmap." Sponsor: Undisclosed. Funding: \$60,000. [COA]

REFEREED JOURNAL PUBLICATIONS

Kretser, M.P., Ogden, J., Colombi, J.M., Hartman, P., “Exploring Design Structure Matrices to Reduce Enterprise Information Systems Complexity,” *Journal of Enterprise Transformation*, Vol. 6, No.1, pp. 39-59, 2016.

Colombi, J.M., Kretser, M.P., Ogden, J., Hartman, P., “Enterprise Systems Integration using Collapsing Design Structure Matrices,” *CrossTalk, Journal of Defense Software Engineering*, Vol. 29, No. 3, pp 33-37, May/June 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kretser, M.P., Ogden, J., Colombi, J.M., Hartman, P., “Applying the Collapsing Design Structure Matrix Method to Develop Military Enterprise Systems Integration Plans”, Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 April 2016. [COA]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Lecturer on Supply Chain Management, KEDGE Business School, Bordeaux, France, Sep 2016

Guest Speaker, Sigma Iota Epsilon Induction Ceremony, Air Force Institute of Technology Chapter, Wright-Patterson AFB OH, May 2016

Keynote Speaker, Electrical Engineering Manufacturing Group Monthly Event, Dayton OH, March 2016

Invited Lecturer on Supply Chain Management, KEDGE Business School, Bordeaux, France, Oct 2015

HAZEN, BENJAMIN T., Maj,

Assistant Professor and Division Chief, 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, innovation, and supply chain management/information systems interface. AFIT research center affiliation: COA. Tel. 937-255-3636 x4337, email: Benjamin.Hazen@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Air Force Supply Chain Problem Item Early Detection.” Sponsor: AFMC/EN. Funding: \$283,750 – Hazen 80%, Weir 10%, Hartman 10%. [COA]

REFEREED JOURNAL PUBLICATIONS

Cooper, A. L., Huscroft, J. R., Overstreet, R. E., & Hazen, B. T., “Knowledge management for logistics service providers: The role of learning culture,” *Industrial Management & Data Systems*, Vol. 116, No. 3, pp. 584-602, 2016. [COA]

Khor, K. S., Udin, Z. M., Ramayah, T., & Hazen, B. T., “Reverse logistics in Malaysia: The contingent role of institutional pressure,” *International Journal of Production Economics*, Vol. 175, pp. 96-108, 2016.

Mani, V., Gunasekaran, A., Papadopoulos, T., Hazen, B., & Dubey, R., "Supply chain social sustainability for developing nations: Evidence from India," *Resources, Conservation & Recycling*, Vol. 111, pp. 42-52, 2016.

Wang, Y. & Hazen, B. T., "Consumer product knowledge and intention to purchase remanufactured products," *International Journal of Production Economics*, Vol. 181, pp. 460-469, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hazen, B. T., "Cognitive heuristics for improving information and decision quality in the supply chain," 5th World Congress on Production & Operations Management, Havana, Cuba, 6-10 Sep 2016. [COA]

Hazen, B. T., "New directions for supply chain management in support of circular economy," 5th World Congress on Production & Operations Management, Havana, Cuba, 6-10 Sep 2016. [COA]

Boone, C. A., Skipper, J. B, Hazen, B. T., & Scott, M., "Service parts management: An empirically derived agenda," Southeast Decision Sciences Institute Annual Meeting, Williamsburg, VA, 17-19 Feb 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Overstreet, R. E., Douglas, M. A., & Hazen, B. T., "Supply chain leader/follower interaction: Managing change while focusing on enterprise level objectives," Production & Operations Management 27th Annual Conference, Orlando, FL, 6-9 May 2016. [COA]

BOOKS AND CHAPTERS IN BOOKS

Ezell, J. D., Hazen, B. T., Hall, D. J., & Jones-Farmer, L. A. "Enhancing data and decision quality with statistical process control." *The Best Thinking in Business Analytics from the Decision Sciences Institute*. M. Warkentin (editor), Upper Saddle River, NJ: Pearson, 2016, pp. 17-33.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor in Chief, International Journal of Logistics Management.

Co-Editor in Chief, Journal of Defense Analytics and Logistics.

Editorial Board Member, International Journal of Physical Distribution & Logistics Management.

Editorial Board Member, International Journal of Logistics.

Editorial Board Member, Journal of Supply Chain Management.

Editorial Board Member, Sustainability Accounting, Management, and Policy Journal.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Douglas, M. A., Overstreet, R. E., & Hazen, B. T., "Art of the possible or a fool's errand? Diffusion of large scale management innovation," *Business Horizons*, Vol. 59, pp. 379-389, 2016.

Hazen, B. T., "Editorial: Overcoming basic barriers to publishing research," *International Journal of Logistics Management*, Vol. 27, No. 1, 2016. [COA]

Overstreet, R. E. & Hazen, B. T., "Editorial: Tips for conducting high-quality reviews," *International Journal of Logistics Management*, Vol. 27, No. 2, 2016. [COA]

Hazen, B. T., Fawcett, S. E., Ogden, J., Autry, C., Richey, R. G., & Ellinger, A. E., "Editorial: Addressing a broken peer review process," *International Journal of Logistics Management*, Vol. 27, No. 3, 2016. [COA]

HILL, RAYMOND R.,

Professor of Operations Research, Department of Operational Sciences; Program Chair, Graduate Test and Evaluation Certificate, 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, 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. AFIT research center affiliation: COA. Tel. 937-255-6565 x7469, email: Raymond.Hill@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Experimental Design Methods for Dynamical Systems." Sponsor: AFRL/RQ. Funding: \$25,000. [COA]

"The Science of Test: Advanced Test and Evaluation in Support of the DOD Test and Evaluation Enterprise."
Sponsor: DOT&E. Funding: \$358,635 – Hill 25%, Stone 25%, Freels 25%, Hodson 25%. [COA]

REFEREED JOURNAL PUBLICATIONS

Harman, M., Cortes, L. A., and Hill, R. R., "Quantifying Test Risk Using Design of Experiments," *The ITEA Journal of Test and Evaluation*, Vol. 37, No. 2, pp. 160-166, 2016. [COA]

Garee, M. J., Hill, R. R., Ahner, D. K., and Czarnecki, G., "Fragment capture simulation for MANPADS test arena optimization," *Journal of Simulation*, DOI: 10.1057/jos.2016.9, 2016. [COA]

Skipper, Joseph B., William A. Cunningham, Christopher A. Boone, and Raymond R. Hill, "Managing Hub and Spoke Networks: A Military Case Comparing Time and Cost," *Journal of Global Business and Technology*, Vol. XII, No. 1, pp. 33-47, 2016. [COA]

Hill, R. R., Ahner, D. K., Morrill, D. F., Talafuse, T. P. and Bestard, J. J., "Applying Statistical Engineering to the Development of a Ballistic Impact Flash Model," *Quality Engineering*, DOI: 10.1080/08982112.2016.1155223, 2016. [COA]

Bova, M. J., F. W. Ciarallo and R. R. Hill, "Development of an Agent-Based Model for the Secondary Threat Resulting from a Ballistic Impact Event," *Journal of Simulation*, Vol. 10, No. 1, pp. 24-35, 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Burns, A, Miller, J. O. and Hill, R. R., "Using SEAS to Assess GPS Constellation Resiliency in an Urban Canyon Environment," 2015 Winter Simulation Conference, IEEE, Huntington Beach, CA, 6-9 Dec 2015. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fouts, B., Serres, J. Hill, R. and Ciarallo, F., "Application Development for Optimizing Patient Placement in the Enroute Care Environment," 87th Annual Scientific Meeting of the Aerospace Medical Association, Atlantic City, NJ, 24-28 Apr 2016. [COA]

Fouts, B., Serres, J. Hill, R. and Ciarallo, F., "Application Development for Optimizing Patient Placement in the Enroute Care Environment," 2015 Airlift Tanker Association (A/TA) Conference, Orlando, FL, 29 Oct - 1 Nov 2015. [COA]

Fouts, B., Serres, J. Hill, R. and Ciarallo, F., "Application Development for Optimizing Patient Placement in the Enroute Care Environment," 87th Annual Scientific Meeting of the Aerospace Medical Association, Atlantic City, NJ, 24-28 Apr 2016. [COA]

Hill, R. R. and Russell, B., "Case Studies Comparing Traditional versus Modern Test Designs," Rigorous Test and Evaluation for Defense, Aerospace, and National Security workshop, Crystal City, VA, 11-13 Apr 2016. [COA]

Hill, R. R. and Russell, B., "Comparing Traditional versus Modern Test Designs via Meta-Models," Defense Analysis Exchange XVIII, Seoul South Korea, 1-5 May 2016. [COA]

Hill, R. R., B. Stone and W. Adorno, "Autonomous Experimentation of Carbon Nanotube Growth using Response Surface Methods," Quality and Productivity Research Conference, Phoenix, AZ, 13-17 Jun 2016. [COA]

Hill, R. R. and Russell, B., "Comparing Traditional versus Modern Test Designs via Meta-Models," Quality and Productivity Research Conference, Phoenix, AZ, 13-17 Jun 2016. [COA]

BOOKS AND CHAPTERS IN BOOKS

Tan, H. T. and Hill, R. R., "The In-Transit Vigilant Covering Tour Problem for Routing Unmanned Ground Vehicles." *Operations Research for Unmanned Systems*, J. R. Cares and J. Q. Dickmann Jr., (eds.), Wiley, New York, April 2016, pp. 7-26. [COA]

Hill, R. R. and Stone, B. B., "Experimental Design for Unmanned Aerial Systems Analysis: Bringing Statistical Rigor to UAS Testing." *Operations Research for Unmanned Systems*, J. R. Cares and J. Q. Dickmann Jr., (eds.), Wiley, New York, April 2016, pp. 187-206. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Military Operations Research.

Associate Editor, Journal of Defense Modeling and Simulation.

Associate Editor, Journal of Simulation.

Associate Editor, International Journal of Mathematics in Operations Research.

Associate Editor, Naval Research Logistics.

Associate Editor, Quality Engineering.

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: COA. Tel. 937-255-3636 x4703, email: Alan.Johnson@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: \$350,000 – Johnson 40%, Ogden 60%. [COA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Research, Analysis, and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center." Sponsor: AFMC/A4P. Funding: \$90,000 – Johnson 40%, Ogden 60%. [COA]

REFEREED JOURNAL PUBLICATIONS

Boehmke, B., Johnson, A., White, E., Weir, J. and Gallagher, M., “Tooth-to-Tail Impact Analysis: Combining Econometric Modeling and Bayesian Networks to Assess Support Cost Consequences Due to Changes in Force Structure,” *Journal of Cost Analysis and Parametrics*, Vol. 9, No. 1, pp. 2-31, 2016. [COA]

Boehmke, B., Johnson, A., White, E., Weir, J. and Gallagher, M., “Bending the Cost Curve: Moving the Focus from Macro-level to Micro-level Cost Trends with Cluster Analysis,” *Journal of Cost Analysis and Parametrics*, Vol. 8, No. 2, pp. 126-148, 2015. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kazi, D., Johnson, A. and Douglas, M., “Information System Innovation in the Legacy Systems Era,” Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 Apr 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Johnson, A., Boehmke, B., White, E., Weir, J., and Gallagher, M., “Effectiveness and Efficiency of Air Force Installation Support Activities Using Data Envelopment Analysis,” 84th MORS Symposium, Alexandria, VA, 21-24 June 2016. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board, International Journal of Operations Research and Information Systems.

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. Tel. 937-255-3636 x4728; email: Michael.Kretzer@afit.edu

REFEREED JOURNAL PUBLICATIONS

Kretzer, M.P., Ogden, J., Colombi, J.M., Hartman, P., “Exploring Design Structure Matrices to Reduce Enterprise Information Systems Complexity,” *Journal of Enterprise Transformation*, Vol. 6, No.1, pp. 39-59, 2016. [COA]

Colombi, J.M., Kretzer, M.P., Ogden, J., Hartman, P., “Enterprise Systems Integration using Collapsing Design Structure Matrices,” *CrossTalk, Journal of Defense Software Engineering*, Vol. 29, No. 3, pp 33-37, May/June 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kretzer, M.P., Ogden, J., Colombi, J.M., Hartman, P., “Applying the Collapsing Design Structure Matrix Method to Develop Military Enterprise Systems Integration Plans,” Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 April 2016. [COA]

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. AFIT research center affiliation: COA. Tel. 937-255-3636 x4624, email: Brian.Lunday@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Transportation and Distribution Research.” Sponsor: USTRANSCOM. Funding: \$125,000. [COA]

REFEREED JOURNAL PUBLICATIONS

Han, C. Y., Lunday, B. J., & Robbins, M. J., “A Game Theoretic Model for the Optimal Disposition of Integrated Air Defense Missile Batteries,” *INFORMS Journal on Computing*, Vol. 28, No. 3, pp. 405-416, 2016. [COA]

Lunday, B. J., & Robbins, M. J., “Informing the Pediatric Vaccine Procurement Policy via the Pediatric Formulary Design, Pricing, and Production Problem,” *IIE Transactions*, Vol. 48, No. 12, pp. 1112-1126, 2016.

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*.
DOI: 10.1016/j.omega.2016.02.006, 2016. [COA]

Rettke, A. J., Robbins, M. J., & Lunday, B. J., “Approximate Dynamic Programming for the Dispatch of Military Medical Evacuation Assets,” *European Journal of Operational Research*, Vol. 254, No. 3, pp. 824-839, 2016. [COA]

Robbins, M. J. & Lunday, B.J., “A Bilevel Formulation of the Pediatric Vaccine Pricing Problem,” *European Journal of Operational Research*, Vol. 248, No. 2, pp. 634-645, 2016. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board Member, *Military Operations Research*.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Speaker, “A Maximal Conditional Covering Location Problem to Relocate Emergency Response Enterprise Units,” 2015 INFORMS Annual Meeting, Philadelphia, PA.

Invited Speaker, “A Game Theoretic Model for the Optimal Disposition of Integrated Air Defense System Assets,” 2015 INFORMS Annual Meeting, Philadelphia, PA.

Invited Speaker, “An Approximate Dynamic Programming Algorithm for the Military Inventory Routing Problem with Direct Delivery,” 2015 INFORMS Annual Meeting, Philadelphia, PA.

Briefed Mr. James McGinley, J8, USTC on thesis, “Disaggregation of USTRANSCOM Rate Setting Procedures,” 2nd Lt Warren McGriff.

Designed and taught a 3-day Game Theory technical symposium to establish disciplinary literacy and introductory modeling capacity for 20 scientists and analysts from the Joint Warfare Analysis Center (JWAC), Dahlgren, VA, 12-15 Sep 2016. [COA]

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: COA.

Tel. 937-255-6565 x4326, email: John.Miller@afit.edu

REFEREED JOURNAL PUBLICATIONS

Connors, C.D., Miller, J.O., Lunday, B., “Using Agent-Based Modeling and a Designed Experiment to Simulate and Analyze a New Air-to-Air Missile,” *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, Vol. 13, No. 3, pp. 321-330, 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Burns, A., Miller, J.O., Hill, R.R., “Using SEAS to Assess GPS Constellation Resiliency in an Urban Canyon Environment,” 2015 Winter Simulation Conference, Huntington Beach, CA, 6-9 Dec 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, International Journal of Operations Research.

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: COA. Tel. 937-255-3636 x4653, email: Jeffrey.Ogden@afit.edu

REFEREED JOURNAL PUBLICATIONS

Colombi, J.M., Kretser, M.P., Ogden, J., Hartman, P., “Enterprise Systems Integration using Collapsing Design Structure Matrices,” *Journal of Defense Software Engineering*, Vol. 29, No. 3, pp. 33-37, 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kretser, M., Ogden, J., Colombi, J. and Hartman, P., “Applying the Collapsing Design Structure Matrix Method to Develop Military Enterprise Systems Integration Plans,” Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 Apr 2016. [COA]

Miller, A., Ogden, J., Schubert-Kabban, C. and Schultz, K., “The Influence of Education and Experience Upon Contextual and Task Performance in Warehouse Operations,” Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 Apr 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor’s Board, Supply Chain Forum: An International Journal

Editorial Review Board, Journal of Business Logistics

Editorial Review Board, Journal of Supply Chain Management

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Lecturer on Supply Chain Management, KEDGE Business School, Bordeaux, France, Oct 2015

Invited Lecturer on Supply Chain Management, KEDGE Business School, Bordeaux France, Sep 2016

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: COA. Tel. 937-255-3636 x4590, email: Robert.Overstreet@afit.edu

REFEREED JOURNAL PUBLICATIONS

Douglas, M. A., Overstreet, R. E., and Hazen B.T., "Art of the Possible or Fool's Errand: Diffusion of Large Scale Management Innovations," *Business Horizons*, Vol. 59, No. 4, pp. 379–389, 2016. [COA]

Cooper, A. L., Huscroft, J. R., Overstreet, R. E., and Hazen, B. T., "Knowledge Management for Logistics Service Providers: The Role of Learning Culture," *Industrial Management & Data Systems*, Vol. 116, No. 3, pp. 1–21, 2016. [COA]

Hazen, B. T., Overstreet, R. E., and Wang, Y., "Public Bicycle Adoption: Consumer Perception of Ease of Use, Usefulness and Value Impact Adoption Intent," *Sustainability*, Vol. 7, No. 11, pp. 14558-14573, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Overstreet, R. E., Douglas, M. A., Hazen, B. T., "Supply Chain Leader/Follower Interaction: Managing Change While Focusing on Enterprise Level Objectives," POMS 27th Annual Conference, Orlando, FL, 6-9 May 2016. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Review Board, Journal of Defense Analytics and Logistics

Editorial Review Board, International Journal of Logistics Management

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Briefed Col (Dr.) Jeffrey Smith, Director, Air Force Profession of Arms Excellence Center, Joint Base San Antonio-Randolph, TX on Graduate Research Paper, "A Commander's First Challenge: Establishing a Pathway to Trust," by J.R. Stubbendorff, June 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. [COA]

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 Engineers. Tel. 937-255-3636 x4311, email: Joseph.Pignatiello@afit.edu

REFEREED JOURNAL PUBLICATIONS

Freels, Jason K., Pignatiello, Joseph J., Jr., Warr, Richard L. and Hill, Raymond R., "Bridging the Gap Between Quantitative and Qualitative Accelerated Life Tests," *Quality and Reliability Engineering International*, Vol. 31, No. 5, pp. 789-800, DOI: 10.1002/qre.1636, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Varbanov, Roumen, Chicken, Eric, Schleeter, Tiffany and Pignatiello, Joseph J., Jr., "Vertical Wavelet Thresholding for Functional Profile Monitoring," Industrial and Systems Engineering Conference, Anaheim, CA, 21-24 May 2016.

Chicken, Eric and Pignatiello, Joseph, J., Jr., “Variance Monitoring via Robust Empirical Likelihood,” Industrial and Systems Engineering Conference, Anaheim, CA, 21-24 May 2016.

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,

Dean of Students 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: COA. Tel. 937-255-3636 x4539, email: Matthew.Robbins@afit.edu

REFEREED JOURNAL PUBLICATIONS

Colombi, J.M., Robbins, M.J., Burger, J.A., and Weber, Y.S., “Interface Evaluation for Open System Architectures Using Multiobjective Decision Analysis,” *Military Operations Research*, Vol. 20, No. 2, pp. 55-69, 2015. [COA]

Robbins, M.J. and Lunday, B.J., “A Bilevel Formulation of the Pediatric Vaccine Pricing Problem,” *European Journal of Operational Research*, Vol. 248, No. 2, pp. 634-645, 2016.

Keneally, S.K., Robbins, M.J., and Lunday B.J., “A Markov Decision Process Model for the Optimal Dispatch of Military Medical Evacuation Assets,” *Health Care Management Science*, Vol. 19, No. 2, pp. 111-129, 2016. [COA]

Han, C.Y., Lunday, B.J., and Robbins, M.J., “A Game Theoretic Model for the Optimal Location of Integrated Air Defense System Missile Batteries,” *INFORMS Journal on Computing*, Vol. 28, No. 3, pp. 405-416, 2016. [COA]

Rettke, A.J., Robbins, M.J., and Lunday, B.J., “Approximate Dynamic Programming for the Dispatch of Military Medical Evacuation Assets,” *European Journal of Operational Research*, Vol. 254, No. 3, pp. 824-839, 2016. [COA]

Lunday, B.J. and Robbins, M.J., “Informing Pediatric Vaccine Procurement Policy via the Pediatric Formulary Design, Pricing, and Production Problem,” *IIE Transactions*, Vol. 48, No. 12, pp. 1112-1126, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Wolfe, R.A., Crutchfield, J.A., Thal, A.E., Robbins, M.J., and Lucas, B.M., "Contingency Base Solid Waste Disposal Planning Using Value-Focused Thinking," 2016 Air and Waste Management Association (A&WMA) Annual Conference, New Orleans, LA, 20-23 Jun 2016. [COA]

Crutchfield, J.A., Li, H., Wolfe, R.A., Thal, A.E., Robbins, M.J., Lucas, B.M., and White, E.D., "Contingency Waste Disposal and Energy Conversion Decision Support Model," 2016 Portland International Center for Management of Engineering and Technology (PICMET) Conference, Honolulu, HI, 4-8 Sep 2016. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board, Military Operations Research

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Invited Speaker, Parson, C.R., Ahner, D.K., Robbins, M.J., and Pachter, M., "Optimal Multi-stage Allocation via Approximate Dynamic Programming," 2015 INFORMS National Meeting, Philadelphia, PA, 1-4 Nov 2015.

Invited Speaker, McKenna, R.S., Robbins, M.J., Lunday, B.L., and McCormack, I.M., "Approximate Dynamic Programming for the Military Inventory Routing Problem with Direct Delivery," 2015 INFORMS National Meeting, Philadelphia, PA, 1-4 Nov, 2015.

Invited Speaker, Han, C.Y., Lunday, B.L., and Robbins, M.J., "A Game Theoretic Model for the Optimal Disposition of Integrated Air Defense System Assets," 2015 INFORMS National Meeting, Philadelphia, PA, 1-4 Nov 2015.

Invited Speaker, Sullivan, K.M., Nurre, S. G., Lunday, B.J., and Robbins, M.J., "Flow Networks with Dependent Commodities," 2015 INFORMS National Meeting, Philadelphia, PA, 1-4 Nov, 2015.

Invited Speaker, Widrick, R.S., Nurre, S.G., and Robbins, M.J., "Optimal Policies for the Management of an Electric Vehicle Battery Swap Station," IIE Annual Conference (ISERC), Anaheim, CA, 21-24 May 2016.

Invited Speaker, Nystrom, J.K., Robbins, M.J., Deckro, R.F., and Morris, J.F., "A Dynamic Game on Network Topology for Counterinsurgency Applications," 84th Military Operations Research Society Symposium, Quantico, VA, 20-23 Jun 2016.

Invited Speaker, Wolfe, R.A., Crutchfield, J.A., Thal, A.E., Robbins, M.J., and Lucas, B.M., "Contingency Base Solid Waste Disposal Planning Using Value-Focused Thinking," 2016 Air and Waste Management Association (A&WMA) Annual Conference, New Orleans, LA, 20-23 Jun 2016.

Invited Speaker, Crutchfield, J.A., Li, H., Wolfe, R.A., Thal, A.E., Robbins, M.J., Lucas, B.M., and White, E.D., "Contingency Waste Disposal and Energy Conversion Decision Support Model," 2016 Portland International Center for Management of Engineering and Technology (PICMET) Conference, Honolulu, HI, 4-8 Sep 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: COA. Tel. 937-255-3636 x4725, email: Kenneth.Schultz@afit.edu

BOOKS AND CHAPTERS IN BOOKS

Delasay, Mohammed, Armann Ingolfsson and Kenneth Schultz. "Inventory is people: How load effects service times in emergency response," In Srinagesh Gavirneni (Ed.), L. Joseph Thomas and Inventory, 27 Sep 2016.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Senior Editor, Production and Operations Management Journal.

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: COA. Tel. 937-255-3636 x4510, email: Brian.Stone@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hill, R. R., B. Stone and W. Adorno, "Autonomous Experimentation of Carbon Nanotube Growth using Response Surface Methods," Defense Analysis Exchange XVIII, Seoul, South Korea, 1-5 May 2016. [COA]

Hill, R. R., B. Stone and W. Adorno, "Autonomous Experimentation of Carbon Nanotube Growth using Response Surface Methods," Quality and Productivity Research Conference, Phoenix, AZ, 13-17 June 2016. [COA]

BOOKS AND CHAPTERS IN BOOKS

Hill, R. R. and Stone, B. B., "Experimental Design for Unmanned Aerial Systems Analysis: Bringing Statistical Rigor to UAS Testing." Operations Research for Unmanned Systems, J. R. Cares and J. Q. Dickmann Jr., (eds), Wiley, New York, April 2016, pp. 187-206. [COA]

TUCHOLSKI, HEIDI M., Maj,

Assistant Professor of Operations Research, 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: COA. Tel. 937-255-3636 x4319, email: Heidi.Tucholski@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Development of a Quantitative Framework for Intelligence Mission Data Support Analysis." Sponsor: AFLCMC. Funding: \$100,000 – Tucholski 40%, Robbins 40%, Weir 20%. [COA]

WEIR, JEFFERY D.,

Professor and Deputy Department Head, Department of Operational Sciences; Director of Research, Center for Operational Analysis; AFIT Appointment Dates: 2002 (AFIT/ENS); Bachelors Electrical Engineering, Georgia Institute of Technology, 1988; Masters Business Administration, Embry Riddle-Aeronautical University, 1992; Master of Science 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. He is a member of the Institute for Operations Research and Management Science (INFORMS), the Military Operations Research Society (MORS), the Institute of Industrial Engineers (IIE) and the Decision Sciences Institute (DSI). AFIT research center affiliation: COA. Tel. 937-255-3636 x4523, email: Jeffery.Weir@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"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: \$250,000. [COA]

“B-2 Defense Management System (DMS) RDT&E Effort for Evolving Air Force Operational Requirements.”
Sponsor: AFLCMC. Funding: \$1,500,000– Weir 80%, Hartman 20%. [COA]

“Intelligence, Surveillance, and Reconnaissance (ISR) Futures Sensitivity Analysis and Uncertainty Quantification.”
Sponsor: AFLCMC. Funding: \$250,000. [COA]

“JDPAC and AFIT Transportation and Distribution Research Proposal.” Sponsor: USTRANSCOM. Funding:
\$125,000. [COA]

“Research, Analysis and Transitional Support to the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC.
Funding: \$215,000. [COA]

“Value-Driven Tradespace Exploration and Analysis for Resilient Systems.” Sponsor: USA ERDC. Funding:
\$410,000. [COA]

REFEREED JOURNAL PUBLICATIONS

Cui, C., Wu, T., Hu, M., Weir, J., and Li, X., “Short-term building energy model recommendation system: A meta-learning approach,” *Applied Energy*, Vol. 172, pp. 251-263, 2016. [COA]

Boehmke, B C, Johnson, A W, White, E D, Weir, J D and Gallagher, M A, “Tooth-to-Tail Impact Analysis: Combining Econometric Modeling and Bayesian Networks to Assess Support Cost Consequences Due to Changes in Force Structure,” *Journal of Cost Analysis and Parametrics*, Vol. 9, No. 1, pp. 2-31, 2016. [COA]

Cui, C, Hu, M, Weir, J D, Wu, T, “A recommendation system for meta-modeling: A meta-learning based approach,” *Expert Systems with Applications*, Vol. 46, pp. 33-44, 2016. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Capt Robert Hanks, Jeffery D. Weir, “Revenue Management Using Robust Optimization to Set Transportation Rates for USTRANSCOM,” Western Decision Sciences Annual Meeting, Las Vegas, NV, 5 - 9 April 2016. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, IIE Transactions on Healthcare Systems Engineering.

Associate Editor, Military Operations Research.

5.6. DEPARTMENT OF SYSTEMS ENGINEERING AND MANAGEMENT

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5.6.1	<u>DOCTORAL DISSERTATIONS</u>	167
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5.6.3	<u>FACULTY BIOGRAPHIES & RESEARCH OUTPUT</u>	171

5.6.1. DOCTORAL DISSERTATIONS

HENDRIX, JEREMY P., *Continuous Decision Support*. AFIT/ENV/DS/15D-018. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFMC/A9.

5.6.2. MASTER'S THESES

AMEDEE, RYAN M., *An Economic Analysis of the Transition of a Contingency Military Installation to an Enduring Status using Monte Carlo Simulations*. AFIT/ENV/MS/16M-134. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCENT.

ARMWOOD, RICKY L., *The Distributed Common Ground System: Architectural Deficiencies and Corrective Actions for Effective Implementation*. AFIT/ENV/MS/15D-011. Faculty Advisor: Maj Jason K. Freels. Sponsor: NGA.

BARNES, MATTHEW T., *Emissions Characterization of a Proposed Standardized Simulated Military Waste in a 0_5-2 Ton per Day Gasification Waste-to-Energy System for "Extra -Small" and "Small" Contingency Base Camps*. AFIT/ENV/MS/16J-037. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: J81.

BROWN, CHRISTOPHER K., *Removal of Perfluorooctanoic Acid from Water using Primitive, Conventional and Novel Carbonaceous Sorbent Materials*. AFIT/ENV/MS/16M-137. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: EPA.

BUCHHOLTZ, JEFFREY D., *An Investigation in Construction Cost Estimation using a Monte Carlo Simulation*. AFIT/ENV/MS/16M-137. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCEC.

CALVO, JAY, *Reducing Energy Consumption in Existing Facilities through Retrofit Prioritization Improvements*. AFIT/ENV/MS/16M-138. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: N/A.

CANSICK, PERRY L., *Determining Air Base Installation Capacity through Multivariate Analysis*. AFIT/ENV/MS/16M-139. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: HQ USAF/A4.

CHUA, ZHONGWANG, *Application of Executable Architecture in Early Concept Evaluation using the DOD Architecture Framework*. AFIT/ENV/MS/16S-038. Faculty Advisor: Dr. David R. Jacques. Sponsor: OSD.

CRUTCHFIELD, JOHN A., *Expeditionary Waste Management and Energy Conversion Decision Analysis*. AFIT/ENV/MS/16J-040. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: J81.

DEERING, PATRICK A., *Validation and Improvement of Reliability Methods for Air Force Building Systems*. AFIT/ENV/MS/16M-143. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: USACE.

DIETRICK, ARTHUR Z., *Measuring the effectiveness of US Military Humanitarian Construction Projects through Geospatial Analysis of Public Opinion in Belize*. AFIT/ENV/MS/16M-144. Faculty Advisor: Col Paul Cotelleso. Sponsor: 12 AF.

DOANE, BENJAMIN M., *Comparison of Novel Carbonaceous Structures to Treat Nitroaromatic Impacted Water*. AFIT/ENV/MS/15D-047. Faculty Advisor: Lt Col David M. Kempisty. Sponsor: NGA.

DOMINGUEZ, THOMAS, *Characterizing Emissions from Open Burning of Military Food Waste and Packaging from Forward Operating Bases*. AFIT/ENV/MS/16M-145. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: OSD.

ELLIS, TREVOR P., *Lifecycle Cost Evaluation of Flexible Facility Designs*. AFIT/ENV/MS/16M-147. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: HQ USAF/A4.

EVERSON, STUART A., *A Service Oriented Architecture Approach for Global Positioning System Quality of Service Monitoring*. AFIT/ENV/MS/16M-149. Faculty Advisor: Lt Col Thomas C. Ford. Sponsor: SMC.

FORBES, JAMES W., *Forensic Schedule Analysis of Construction Delay in Military Projects in the Middle East*. AFIT/ENV/MS/16M-151. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCEC.

GALLUCCI, DREW D., *Material and Design Considerations for a Portable Ultra-Violet (UV) Light Emitting Diode (LED) Water Purification Device*. AFIT/ENV/MS/16M-152. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA.

GOLDSMITH, JOSEPH W., *Collecting Unsolicited User-Generated Change Requests*. AFIT/ENV/MS/15D-002. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: 49 OG.

GOODMAN, TYLER J., *Understanding Effects of Autonomous Agent Timing on Human-Agent Teams using Iterative Modeling, Simulation and Human-in-the-Loop Experimentation*. AFIT/ENV/MS/16M-154. Faculty Advisor: Dr. Michael E. Miller. Sponsor: AFOSR. [ANT]

GRAY, JEREMY, *Design and Implementation of a Unified Command and Control Architecture for Multiple Cooperative Unmanned Vehicles Utilizing Commercial off the Shelf Components*. AFIT/ENV/MS/15D-048. Faculty Advisor: Dr. David R. Jacques. Sponsor: N/A. [ANT]

GRESZLER, BRIAN S., *Civil Engineer Company Grade Officer Training Needs Analysis for Contingency Operations*. AFIT/ENV/MS/16M-155. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: N/A.

HENDRICKS, KEVIN J., *The Efficacy of Implementing a Small, Low-Cost, Real Time Kinematic GPS System into a Small Unmanned Aerial System Architecture*. AFIT/ENV/MS/16M-157. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ. [ANT]

HODSON, ELIZABETH G., *Earned Value Reporting on Agile Software Development Programs within the Department of Defense*. AFIT/ENV/MS/16M-158. Faculty Advisor: Dr. Robert D. Fass. Sponsor: AFLCMC.

HOLM, ERIC S., *Additive Manufacturing Process Parameter Effects on the Mechanical Properties of Fused Filament Fabrication Nylon*. AFIT/ENV/MS/16M-159. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: NPS.

HONIOUS, CANDICE M., *An Analysis of the Impact of Configuration Changes to the Learning Curve for Department Of Defense Aircraft Acquisition Programs Substantially Into Production*. AFIT/ENV/MS/16M-256. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFCAA.

JOHNSON, BRANDON J., *A Comparative Study of Learning Curve Models and Factors in Defense Cost Estimating Based on Program Integration, Assembly, and Checkout*. AFIT/ENV/MS/16M-162. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFLCMC. [ANT]

KIM, SUNGBIN, *Unmanned Aerial Vehicle (UAV) Operators' Workload Reduction: The Effect of 3D Audio on Operators' Workload and Performance during Multi-Aircraft Control*. AFIT/ENV/MS/16M-163. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH. [ANT]

LAMB, THOMAS W., *Cost Analysis Reform: Where do we go from here? A Delphi Study of Views of Leading Experts*. AFIT/ENV/MS/16M-165. Faculty Advisor: Dr. Robert D. Fass. Sponsor: AFLCMC.

LI, HUAN, *A Cost Analysis of Waste-to-Energy Applications for Small Modern Expeditionary Forces*. AFIT/ENV/MS/16M-257. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: J81.

MAXHEIMER, ERICH W., *Analysis of Inpatient Hospital Staff Mental Workload by Means of Discrete-event Simulation*. AFIT/ENV/MS/16M-166. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 88th MDG MSU.

MEEKS, MARIA T., *Evaluating Storm Sewer Pipe Condition using Autonomous Drone Technology*. AFIT/ENV/MS/16M-167. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

MEYER, DAVID R., *Effects of Automation on Aircrew Workload and Situation Awareness in Tactical Airlift Missions*. AFIT/ENV/MS/15D-020. Faculty Advisor: Maj Christina R. Rusnock. Sponsor: 61 AS.

MRLA, DANIELLE L., *The Impact of the Weapon Systems Acquisition Reform Act and Other Factors on the Cost of Air Force Weapon Systems*. AFIT/ENV/MS/16M-168. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: N/A.

MULLIN, REAGAN A., *Benefits and Challenges with the MC-130J Integrated Systems Architecture*. AFIT/ENV/MS/15D-021. Faculty Advisor: Lt Col Kyle Oyama. Sponsor: N/A.

OH, SAMUEL D., *Evaluation the Effect of Component Commonality on Procurement Costs of Joint Aircraft Variants*. AFIT/ENV/MS/16M-169. Faculty Advisor: Dr. Robert D. Fass. Sponsor: OSD/CAPE.

OLTMANN, JEFFREY R., *Efficient Employment of Large Format Sensor Data Transfer Architectures*. AFIT/ENV/MS/16J-042. Faculty Advisor: Dr. Brent T. Langhals. Sponsor: N/A.

PALMER, CODY G., *Optimizing Multi-Domain System-of-Systems using Model-Based Systems Engineering*. AFIT/ENV/MS/16M-174. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFRL/RQ.

PENA, ANTHONY H., *Business Software Management: Comparative Analysis of Centralized and Decentralized Acquisition*. AFIT/ENV/MS/16M-175. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: AFLCMC.

PEREZ, ERIC J., *Air Force Project Risk Management - The Impact of Inconsistent Processes*. AFIT/ENV/MS/16S-047. Faculty Advisor: Lt Col Kyle Oyama. Sponsor: AFLCMC.

POSPISAL, RYAN M., *Application of Executable Architectures in Early Concept Evaluation*. AFIT/ENV/MS/15D-027. Faculty Advisor: Dr. David R. Jacques. Sponsor: ODASD.

QUIGG, MICHAEL D., *Cyberspace and Organizational Structure: An Analysis of the Critical Infrastructure Environment*. AFIT/ENV/MS/16M-177. Faculty Advisor: LTC Mason Rice. Sponsor: DHS. [CCR]

SHARPLES, RACHEL E., *Evaluation of the Impact of an Additive Manufacturing Enhanced CubeSat Architecture on the CubeSat Development Process*. AFIT/ENV/MS/16S-049. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: HQ AFRL.

SHIELDS, BRADFORD L., *United States Air Force Additive Manufacturing Applications for Civil Engineering Tools and Jigs*. AFIT/ENV/MS/16M-182. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

SHIRELY, ERIC M., *Application of System Engineering Leading Indicators to Scrum Agile Projects*. AFIT/ENV/MS/16M-183. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFISRA.

SMITH, CLARK W., *Mission Dependency Index of Air Force Built Infrastructure: Knowledge Discovery with Machine Learning*. AFIT/ENV/MS/16M-184. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCENT.

- STEPHENS, FREDDIE L., *A Model to Enhance Distributed Team Dynamics in a Dynamic Environment*. AFIT/ENV/MS/16M-185. Faculty Advisor: Dr. John J. Elshaw. Sponsor: HQ USAF/A4.
- STEWART, BRANDON M., *The Effect of pH and Pulsed Ultraviolet Light Emitting Diode Duty Cycles on the First Order Rate Constant and Byproduct Profile of the Advanced Oxidation of Tartrazine*. AFIT/ENV/MS/16M-186. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA.
- SUH, ANTHONY D., *Waste Stream Characterization of a "Small" United States Marine Corps Expeditionary Base Camp in the Pacific Theatre*. AFIT/ENV/MS/16M-187. Faculty Advisor: Lt Col Robert M. Eninger. Sponsor: NAVFC.
- SUNDHEIM, MICKIE J., *A Simulation-Based Analysis of Chemical and Radiological Hazard Zones Adapted to Physical Boundaries*. AFIT/ENV/MS/16M-188. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: N/A.
- SUTHERLIN, KARYNN A., *Investigation of Electromagnetic Signatures of a FPGA using an APREL EM-ISIGHT System*. AFIT/ENV/MS/15D-035. Faculty Advisor: Lt Col Kyle Oyama. Sponsor: AFRL/RV.
- TAYLOR, AMANDA R., *Using Artificial Neural Networks to Predict Disease Associations for Chemicals Present in Burn Pit Emissions*. AFIT/ENV/MS/16M-189. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: 711 HPW/USAFSAM.
- WATSON, MICHAEL E., *Improving System Design through the Integration of Human Systems and Systems Engineering Models*. AFIT/ENV/MS/16M-190. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: ARL/HRED. [ANT]
- WITTMAN, CHRISTOPHER E., *Optimizing Allocation of U.S. Humanitarian Civic Assistance Projects In Support of Developing Foreign Democracy*. AFIT/ENV/MS/16M-191. Faculty Advisor: Dr. John J. Elshaw. Sponsor: 12 AF.
- WOLFE, ROBERT A., *Contingency Waste Disposal and Energy Conversion Analysis using Value-Focused Thinking*. AFIT/ENV/MS/16M-192. Faculty Advisor: Lt Col Brandon M. Lucas. Sponsor: J81.
- YILDIZ, KADIR, *Scientometric Analysis of Technology & Innovation Management Literature*. AFIT/ENV/MS/16M-193. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: N/A.
- ZINCK, CRAIG M., *Neck Injury Criteria Development for use in System Level Ejection Testing; Characterization of ATD to Human Response Correlation under -Gx Accelerative Input*. AFIT/ENV/MS/16M-194. Faculty Advisor: Lt Col Jeffrey C. Parr. Sponsor: 711 HPW/RH.

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

REFEREED JOURNAL PUBLICATIONS

Badiru, Adedeji B., John Elshaw, and Ibrahim Ade Badiru (2015), "Quality Insights: Systems-based product quality assessment for customer preferences," *International Journal of Quality Engineering and Technology* (IJQET), Vol. 5, No. 3/4, 2015, pp. 266-280.

BOOKS AND CHAPTERS IN BOOKS

Badiru, A. B., Christina F. Rusnock, and Vhance V. Valencia (2016), *Project Management for Research: A Guide for Graduate Students*, Taylor & Francis CRC Press, Boca Raton, FL.

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 affiliations: ANT and CSRA. Tel. 937-255-3636 x3347, email: John.Colombi@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Low Cost Attributable Aircraft Technology (LCAAT) Design Space Exploration." Sponsor: AFRL/RQ. Funding: \$25,000 – Colombi 70%, Lucas 20%, Jacques 10%.

"Open Systems Acquisition." Sponsor: SAF/AQ. Funding: \$271,000.

REFEREED JOURNAL PUBLICATIONS

Livermore, R., Lindholm, G., Neal, C., Cobb, R., and Colombi, J., "Heuristic UAS Path Planning for Convoy Overwatch," *Journal of Unmanned Aerial Systems*, Vol. 2, Issue 1, Summer 2016. [ANT]

Mailloux, Logan O., Michael R. Grimaila, John M. Colombi, Member, Douglas D. Hodson, Colin V. McLaughlin, Ryan D. Engle, Gerald Baumgartner (2015). Quantum Key Distribution: Examination of the Decoy State Protocol, *IEEE Communications* 53 (10): 24-31.

Thompson, R., Colombi, J., Black J. and B. Ayres (2015). "Disaggregated Space System Concept Optimization: Model-Based Conceptual Design Methods," *Journal of Systems Engineering* (18) 6: 549–675.

Worger, D., Jalao, E. R., Wirthlin, J. R., Colombi, J., & Wu, T. (2016). Intervention strategies for the DOD acquisition process. *Journal of Defense Modeling and Simulation*, 13(2):139-151.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Palmer, C., Colombi, J., Ford, T. “Evaluating multi-domain system-of-systems concepts using model-based system engineering,” 2016 Conference on Systems Engineering Research, Huntsville AL, March 2016.

Rodewald, J., Colombi, J., Oyama, K., Johnson, A. “Using information-theoretic principles to analyze and evaluate complex adaptive supply network architectures, Complex Adaptive Systems,” Publication 5, Cihan H. Dagli, Editor in Chief, Conference Organized by Missouri University of Science and Technology, Los Angeles, CA, 2015.

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. and Szajnarfarber, Z. “Post-Production Change to Complex Systems,” Council of Engineering Systems Universities 5th International Engineering Systems Symposium (CSER) 2016, Washington, DC, June 2016.

Cox, A. and Szajnarfarber, Z. “Case Study Research of User Design Methods,” American Society for Engineering Management (ASEM) 2015, Indianapolis, IN, October 2015.

ELSHAW, JOHN J.,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management; AFIT Civilian 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

“AFIT Human Factor Support for RT-136 Security Engineering Research.” Sponsor: OSD. Funding: \$15,000.

REFEREED JOURNAL PUBLICATIONS

Badiru, Adedeji B., Elshaw, John J., and Badiru, Ibrahim A. (2015). “Quality Insights: Systems-based Product Quality Assessment for Customer Preferences.” *International Journal of Quality Engineering and Technology*, Vol. 5, Nos. 3/4, 266-280.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Honious, Candice M., Johnson, Brandon J., Elshaw, John J., & Badiru, Adedeji B. (2016). The impact of learning curve model selection and criteria for cost estimation accuracy in the DOD. DOD Acquisition Research Conference at NPS.

Kim, Sung B., Miller, Michael E., Rusnock, Christina F., & Elshaw, John J. (2016). Aiding call sign recognition through spatial audio. IIE ISERC Conference, Anaheim CA. Paper awarded “2016 IIE ISERC Best Track Paper – Safety, Human Factors and Ergonomics.”

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

SPONSOR FUNDED RESEARCH PROJECTS

"Environmental Applications of Unmanned Aerial Systems." Sponsor: USA RDEC. Funding: \$13,035.

FASS, ROBERT D.,

Assistant Professor of Systems Integration and Cost Analysis, Department of Systems Engineering and Management, AFIT Civilian 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

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., Lt Col,

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

SPONSOR FUNDED RESEARCH PROJECTS

"JWAC AFIT Interaction (Space Research)." Sponsor: JWAC. Funding: \$100,000 – Ford 50%, Swenson 50%. [CSRA]

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

R. M. Vandawaker, D. R. Jacques, J. K. Freels (2015) "Impact of Prognostic Uncertainty in System Health Monitoring," *International Journal of Prognostics and Health Management*: Vol. 6 (Special Issue Uncertainty in PHM) 011.

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. Grmaila'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: CCR and CSRA. Tel. 937-255-3636 x4800, email: Michael.Grimaila@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Unmanned Aerial Vehicle Telemetry Data Analytics." Sponsor: AFRL/RV. Funding: \$30,000.

REFEREED JOURNAL PUBLICATIONS

Mailloux, L.O., Engle, R.D., Grmaila, M.R., Hodson, D., Colombi, J.M., and McLaughlin, C., "Modeling Decoy State Quantum Key Distribution Systems," *Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, DOI: 10.1177/1548512915588572, Oct. 2015, 12(4), pp. 489-506. [CCR]

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Mailloux, L.O., Hodson, D.D., Grmaila, M.R., Engle, R.D., McLaughlin, C.V., and Baumgartner, G., "Using Modeling and Simulation to Study Photon Number Splitting Attacks," *IEEE Access*, DOI: 10.1109/ACCESS.2016.2555759, 2016, Vol. 4, pp. 2188-2197. [CCR]

Mailloux, L.O., Hodson, D.D., Grmaila, M.R., McLaughlin, C.V., and Baumgartner, G., "Quantum Key Distribution: Boon or Bust," *Journal of Cyber Security & Information Systems (CSIAC) Journal*, June 2016, 4(2), pp. 18-25. [CCR]

Engle, R.D., Hodson, D.D., Mailloux, L.O., Grmaila, M.R., McLaughlin, C.V., and Baumgartner, G., "A module-based simulation framework to facilitate the modeling of Quantum Key Distribution system post-processing functionalities," *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, DOI: 10.1177/1548512916666740, Sept 2016, pp. 1-12. [CCR]

Mailloux, L.O., Lewis II, C. D., Riggs, C., & Grmaila, M.R., "Post-Quantum Cryptography: What Advancements in Quantum Computing Mean for IT Professionals," *IT Professional*, 18(5), Sept.-Oct. 2016, pp. 42-47. [CCR]

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Mailloux, L.O., Grmaila, M.R., Hodson, D.D., Engle, R.D., McLaughlin, C.V., & Baumgartner, G., "A Model and Simulation Framework for Studying Implementation Non-Idealities in Quantum Key Distribution Systems," 5th International Conference on Quantum Computing. Tokyo, Japan, September 28-October 2, 2015.

Mailloux, L.O., Grmaila, M.R., Hodson, D.D., Engle, R.D., McLaughlin, C.V., and Baumgartner, G.B., "Studying Decoy State Quantum Key Distribution System Configurations," In Proceedings of the 2016 International Conference Modeling, Simulation, and Visualization Methods, Las Vegas, NV, July 25-28, 2016.

Riggs, C., Lewis, C.D., Mailloux, L.O., Grimaila, M.R., “Understanding Quantum Algorithms, In Proceedings of the 2016 International Conference on Foundations of Computer Science, Las Vegas, NV, July 25-28.

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.

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 environmental biotechnology, advanced oxidation, sensing, and water quality. Tel. 937-255-3636 x4528, email: Willie.Harper@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Sequencing Batch Reactors (SBR) for Fate of Bacillus Spores in Wastewater.” Sponsor: EPA. Funding: \$21,556.

REFEREED JOURNAL PUBLICATIONS

Scott R., Mudimbi, P., Miller, M., Magnuson, M., Willison, S., Phillips, R., Harper, F., Jr., “Advanced oxidation of tartrazine and brilliant blue with pulsed ultraviolet light emitting diodes.” Water Environment Research, in press.

Rauglas, E., Martin, S., Bailey, K., Magnuson, M., Phillips, R., Harper, F., Jr., “The effect of malathion on the activity, performance, and microbial ecology of activated sludge,” Journal of Environmental Management, Vol. 183, 220-228, December 2016.

Baseley, D., Wunderlich, L., Phillips, G., Gross, K., Perram, G., Willison, S., Phillips, R., Magnuson, M., Lee, S., Harper, F., Jr., “Hyperspectral analysis for standoff detection of dimethyl methylphosphonate on building materials,” Building and Environment, Vol. 108, 135-142, November 2016.

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: ANT and CSRA. Tel. 937-255-3636 x3329, email: David.Jacques@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Cooperative Targeting Using Small UAS.” Sponsor: AFRL/RQ. Funding: \$50,000 – Jacques 50%, Colombi 25%, Cobb 25%. [ANT]

“System Qualities Ontology, Tradespace and Affordability (SQOTA) Project – Phase V.” Sponsor: OSD. Funding: \$30,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“AFIT-AFRL Partnership: Unmanned Systems Intern Program.” Sponsor: 711 HPW. Funding: \$175,000 – Jacques 75%, Colombi 25%. [ANT]

“Verification and Validation Short Course.” Sponsor: NASA. Funding: \$20,000 – Jacques 75%, Thal 25%.

REFEREED JOURNAL PUBLICATIONS

Humphreys, C., R. Cobb, D. Jacques and J. Reeger, “A Hybrid Optimization Technique Applied to the Intermediate-Target Optimal Control Problem,” *Global Journal of Technology and Optimization*, Vol. 7, Issue 2, 2016. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Humphreys, C., R. Cobb and D. Jacques, “Dynamic Re-plan of the Loyal Wingman Optimal Control Problem in a Changing Environment,” Proceedings of the AIAA Sci-Tech Conference, Jan 2016. [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 is 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.” Sponsor: EPA. Funding: \$27,178.

REFEREED JOURNAL PUBLICATIONS

G. Varshney, S.R. Kanel, D. Kempisty, V. Varshney, A. Agrawal, E. Sahle-Demessie, R.S. Varma, M.N. Nadagouda; “Nanoscale TiO₂ films and their application in remediation of organic pollutants,” *Coordination Chemistry Reviews*, 306, 43-64(2016), <http://dx.doi.org/10.1016/j.ccr.2015.06.011>.

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

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

LONG, DAVID S.

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management (through SRISY), 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. Research interests: 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: incentive structures, profit motives, coordination issues, and the economics of public choice & the law. Tel. 937-255-3636 x4441, email: Brandon.Lucas@afit.edu

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, AFIT, 2008; PhD, Systems Engineering, AFIT, 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: CCR.
Tel. 937-255-3636 x3348, email: Logan.Mailloux@afit.edu

REFEREED JOURNAL PUBLICATIONS

- Mailloux, L. O., Hodson, D. D., Grimaila, M. R., Engle, R. D., McLaughlin, C. V., and Baumgartner, G. (2016).
“Using Modeling and Simulation to Study Photon Number Splitting Attacks.” *Access, IEEE*, 4, 2188-2197. [CCR]
- Mailloux, L. O., Hodson, D. D., Grimaila, M. R., Colombi, J. M., McLaughlin, C. V., and Baumgartner, G. B. (2015).
“Test and Evaluation of Complex Cybersecurity Systems: A Case Study in Using Modeling and Simulation to
Understand, Test, and Evaluate the Security of Quantum Key Distribution Systems.” *The International Test and
Evaluation Association (ITEA) Journal*, 36(3), 199-207. [CCR]
- Mailloux, L. O., Grimaila, M. R., Colombi, J. M., Hodson, D. D., McLaughlin, C., and Baumgartner, G. (2015).
“Quantum Key Distribution: Examination of the Decoy State Protocol.” *Communications Magazine, IEEE*, 53(10),
24-31. [CCR]
- Mailloux, L. O., Engle, R. D., Grimaila, M. R., Hodson, D. D., Colombi, J. M., and McLaughlin, C. V. (2015).
“Modeling decoy state quantum key distribution systems.” *The Journal of Defense Modeling and Simulation:
Applications, Methodology, Technology*, 12(4), 489-506. [CCR]
- C. Badenhop, B. Ramsey, B. Mullins, and L. Mailloux. (2016). “Extraction and analysis of non-volatile memory off
the ZW0301 module, a Z-Wave transceiver.” *Digital Investigation, Elsevier*, 12(S1), 72-80. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER

- Holes, J.A., Mailloux, L.O., Grimaila, M.R., and Hodson, D.D., “An Efficient Testing Process for a Quantum Key
Distribution System Modeling Framework,” Proceedings of the 2015 International Conference on Scientific
Computing (CSC15), Las Vegas, NV, 2015. [CCR]
- Mailloux, L., Dove, R., Garrison, C., Biondo, R. (2015). Guidance for Working Group Maintenance of the Systems
Engineering Body of Knowledge (SEBoK) with Systems Security Engineering Example. In *Proceedings of the 2015
INCOSE International Symposium*. Seattle, WA, 2015. [CCR]

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

Mbonimpa, E. G., S. Kumar, V. Owens, R. Chintala, H. Sieverding, J. Stone. "Nitrogen rate and landscape impacts on life cycle energy use and emissions from switchgrass-derived ethanol." *GCB Bioenergy* (2016) 8, 750-763.

Lai, Li., S. Kumar, E. G. Mbonimpa, C. Hong, V. Owens, R. Neupane. "Evaluating the impacts of landscape positions and nitrogen fertilizer rates on dissolved organic carbon on switchgrass land seeded on marginally yielding cropland." *Journal of environmental management* 171, 113-120 (2016).

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 and Systems. AFIT research center affiliation: 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: \$169,275 – Miller 30%, Bindewald 30%, Peterson 30%, Langhals 10%. [ANT]

REFEREED JOURNAL PUBLICATIONS

Parr, J., Miller, M.E., Schubert-Kabban, C.M., Pellettiere, J.A., and Colombi, J.M. (2015). "Development of a side impact (Gy) neck injury criterion for use in ejection system safety evaluation." *IIE Transactions on Occupational Ergonomics and Human Factors*, 3(3-4), pp151-164. DOI: 10.1080/21577323.2015.1022283.

Miller, M.E., Gilman, J.M. and Colombi, J.M. (2016). "A model for a two-source illuminant allowing daylight color adjustment," *Lighting Research and Technology*, 48, 239-252. DOI: 10.1177/1477153514559796.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Goodman, T., Miller, M.E., Rusnock, C.F. (2015). "Incorporating Automation: Using Modeling and Simulation to Enable Task Re-Allocation. Proceedings of the 2015 Winter Simulation Conference," Huntington Beach, CA, Nov. 2015.

Goodman, T., Miller, M.E., Rusnock, C.F. (2016). "Timing within Human-Agent Interaction and its Effect on Team Performance and Human Behavior, Proceedings of the IEEE International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support," San Diego, CA, March 24, 2016.

Kim, S., Miller, M.E., Rusnock, C.F. (2016). "Use of 3D Audio to Improve Call Sign Recognition during Multi-Aircraft Control, Proceedings of the 2016 Industrial and Systems Engineering Research Conference," Anaheim, CA, May 29, 2016.

Watson, M.E., Rusnock, C.F., Miller, M.E. and Colombi, J.M. (2016). "Performing System Tradeoff Analyses Using Human Performance Modeling, Proceedings of the Human Factors and Ergonomics Society 2016 Annual Meeting," Washington, D.C., September 23, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Meyer, D.R., Rusnock, C.F. and Miller, M.E. (2016). "Seeing the Big Picture: Pilot Assessments of Cockpit System Interactions Contribution to Situation Awareness," 18th International Conference on Human-Computer Interaction, Toronto, CA.

Miller, M.E. and Shorter, P. (2016). "Revisiting Lighting Standards for Critical Viewing Tasks, in Proceedings of Display Week 2016," San Francisco, CA, June 2, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Michael E. Miller, Invited Panel Member on Human Readiness Levels, National Defense Industry Association, Alexandria, VA, October 2015.

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, 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: \$24,000 – Parr 80%, Miller 20%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Shields, B.L., Valencia, V. V., Thal, A. E., Wander, J. D., Miller, M. E., Parr, J. C. (2016). “User-Centered Design Applied to USAF Civil Engineering Explosive Ordnance Disposal Tools and Jigs.” Proceedings of the 2016 International Applied Human Factors Engineering Conference, Orlando, FL. In book: Advances in Physical Ergonomics and Human Factors, pp.895-907. January 2016. DOI: 10.1007/978-3-319-41694-686.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Zinck, C., Parr J.C., Miller, M.E., Perry, C.E. (2016). “Comparison of Human and ATD Neck Response to Frontal Impact (-Gx) Acceleration.” Proceedings of the 2016 Industrial and Systems Engineering Research Conference, H. Yang, Z. Kong, and MD Sarder, eds. Irvine, CA 2016.

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

RITSCHER, 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 Ritscher’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.Ritscher@afit.edu

REFEREED JOURNAL PUBLICATIONS

- Jimenez, C.A., White, E.D., Brown, G.E., Ritschel, J.D., Lucas, B.M., and Seibel, M.J. (2016). "Using Pre-Milestone B Data to Predict Schedule Duration for Defense Acquisition Programs," *Journal of Cost Analysis and Parametrics*, 9(2), 112-126.
- Smith, N.C., White, E.D., Ritschel, J.D., and Thal Jr., A.E. (2016). "Counteracting Harmful Incentives in DOD Acquisition Through Test and Evaluation and Oversight," *ITEA: Journal of Test and Evaluation*, 37: 218-226.
- Brown, G.E., White, E.D., Ritschel, J.D., and Seibel, M.J. (2015). "Time Phasing Aircraft R&D Using the Weibull and Beta Distribution," *Journal of Cost Analysis and Parametrics*, 8(3), 150-164.
- Moore, J.M., Elshaw, J.J., Badiru, A.B., and Ritschel, J.D. (2015). "Acquisition Challenge: The Importance of Incompressibility in Comparing Learning Curve Models," *Defense Acquisition Research Journal*, 22(4), 416-449.

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. AFIT research center affiliation: ANT. Tel. 937-255-3636 x4611, email: Christina.Rusnock@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"HIS Case Study for the Battlefield Airman Kit." Sponsor: 711 HPW. Funding: \$25,000 – Rusnock 45%, Miller 45%, Jacques 10%. [ANT]

REFEREED JOURNAL PUBLICATIONS

- Rusnock, C.F., & Borghetti, B.J. "IMPRINT Workload Profiles: A Continuous Measure of Mental Workload." *International Journal of Industrial Ergonomics*. 27 Jun 2016. [ANT]
- Rusnock, C.F. & Geiger C.D., (2016). "Impact of Adaptive Automation Revoking Strategies on Cognitive Workload and Situation Awareness." *IEEE Transactions on Human-Machine Systems*.
- Corpuz, M.Q., Rusnock, C.F., Valencia, V.V., & Oyama, K., (2016). "Medical Readiness: Evaluating the Robustness of Medical Clinic Staffing Solutions." *Journal of Defense Modeling and Simulation*.
- Miller, M.E., Thomas, S., & Rusnock, C.F., (2016). "Extending System Readiness Levels to Assess and Communicate Human Readiness." *Systems Engineering*.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Maxheimer, E.W., Rusnock, C.F., Oyama, K.F., & Valencia, V.V. (2016). "Assessing Mental Workload Demands of Healthcare Staff using Simulation." *Proceedings of the 2016 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference*, Anaheim, CA, May 21-24, 2016.
- Kim, S., Miller, M.E., Rusnock, C.F., & Elshaw, J. (2016). "Aiding Call Sign Recognition through Spatial Audio." *Proceedings of the 2016 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference*, Anaheim, CA, May 21-24, 2016. *Recognition: Safety, Human Factors, and Ergonomics Track Best Paper Award*. [ANT]

- Goodman, T.J., Miller, M.E., Rusnock, C.F., & Bindewald, J. (2016). "Timing within Human-Agent Interaction and its Effect on Team Performance and Human Behavior." *Proceedings of the 2016 IEEE Conference on Cognitive Methods in Situation Awareness and Decision Support*, San Diego, CA, Mar 21-25, 2016. [ANT]
- Goodman, T.J., Miller, M.E., & Rusnock, C.F. (2015). "Incorporating Automation: Using Modeling and Simulation to Enable Task Re-Allocation." *Proceedings of the 2015 Winter Simulation Conference*, Huntington Beach, CA, Dec 6-9, 2015. [ANT]
- Bowden, J., & Rusnock, C.F., (2015). "Evaluation of Human Machine Interface Design Factors on Situation Awareness and Task Performance." *Proceedings of the 2015 Human Factors and Ergonomics Society Annual Meeting*, Los Angeles, CA, Oct 26-30, 2015. [CCR]
- Smith, A.M., Borghetti, B. J., & Rusnock, C.F. (2015). "Improving Model Cross-Applicability for Operator Workload Estimation." *Proceedings of the 2015 Human Factors and Ergonomics Society Annual Meeting*, Los Angeles, CA, Oct 26-30, 2015. [ANT]

BOOKS AND CHAPTERS IN BOOKS

- Badiru, A.B., Rusnock, C.F., Valencia, V.V. (2016). *Project Management for Research: A Guide for Graduate Students*. Boca Raton: CRC Press.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- Rusnock, C.F. (2016). Workload Assessment Techniques. "2016 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference," Anaheim, CA, May 21-24, 2016.
- Rusnock, C.F., & Borghetti, B.J. (2016). "Assessing Mental Workload by Combining Model-based and Psychophysiological Measurement Approaches." 2016 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference, Anaheim, CA, May 21-24, 2016. [ANT]

SHELLEY, MICHAEL L.,

Professor of Environmental Science and Engineering, Department of Systems Engineering and Management, AFIT
 Appointment Date: 1996 (AFIT/ENV); BCE, Civil Engineering, Auburn University, 1974; MS, Environmental Engineering, Virginia Tech, 1975; PhD, Environmental Science and Engineering, University of North Carolina, 1985.
 Dr. Shelley focuses on system dynamics modeling in analyzing long-term management strategies. His research interests include abiotic and biochemical contaminant fate and transport, physiologically-based pharmacokinetic modeling, and ecological engineering design to optimize mission activity with environmental constraints.
 Tel. 937-255-3636 x7387, email: Michael.Shelley@afit.edu

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.
 Tel. 937-255-3636 x4632, email: Jeremy.Slagley@afit.edu

REFEREED JOURNAL PUBLICATIONS

- Stubbs, J., Slagley, J., Reboulet, J. "A noise delivery system for multi-animal multi-level whole body ototoxicity studies." *Journal of the Acoustical Society of America*, 138(5): 3181-3187.
- Ferreri, M., Slagley, J., Felker, D. "Laboratory evaluation of airborne particulate control treatments for simulated aircraft crash recovery operations involving carbon fiber composite materials." *Journal of Emergency Management*, 13(5): 468-476.

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

"Contingency Waste Disposal and Energy Conversion Cost-Benefit Analysis." Sponsor: US PACOM/J8. Funding: \$104,100 – Thal 70%, White 30%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hickman, K.M., and A.E. Thal, Jr., "Facility Budgeting Model Selection: Incorporating the Decision-Maker's Risk Behavior," Western Decision Sciences Institute Annual Meeting, Las Vegas, Nevada, 5-9 Apr, 2016.

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. Tel. 937-255-3636 x4826, email: Vhance.Valencia@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Civil Engineering Applications for Direct Digital Manufacturing." Sponsor: AFCEC. Funding: \$50,200 – Valencia 50%, Oyama 25%, Freels 25%.

REFEREED JOURNAL PUBLICATIONS

Corpuz M.Q., Rusnock, C.F., Valencia, V.V., Oyama, K. (2016). "Medical Readiness: Evaluating the Robustness of Medical Clinic Staffing Solutions." *Journal of Defense Modeling & Simulation: Applications Methodology, Technology; Special Issue: Modeling and Simulation Technologies to enhance and Optimize the DOD's Medical Readiness and Response Capabilities*, 1548512916650996.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Ellis, T., Valencia, V., White, E., Oyama, K. (2016). "Evaluating Lifecycle Cost Savings by Designing Flexible Administrative Facilities for the United States Air Force." In S. Cetinkaya & J.K. Ryan (Eds.), *Proceeding of the 2016 Industrial and Systems Engineering Research Conference*, Anaheim, CA, May 21 – 24.

Maxheimer, E., Rusnock, C., Oyama, K., Valencia, V. (2016). "Assessing Mental Workload Demands of Healthcare Staff using Simulation. In S. Cetinkaya & J.K. Ryan (Eds.)," *Proceeding of the 2016 Industrial and Systems Engineering Research Conference*, Anaheim, CA, May 21 – 24.

Holm, E.S., Valencia, V.V., Thal, A.E., Freels, J.K., Badiru, A.B. (2016). “Materials Testing and Cost Modeling for Composite Parts through Additive Manufacturing.” Paper presented at the *13th Annual Acquisition Research Symposium*, Monterrey, CA, May 2 – 4.

BOOKS AND CHAPTERS IN BOOKS

Badiru, A.B., Rusnock, C.F., Valencia, V.V. (2016). *Project Management for Research: A Guide for Graduate Students*. Boca Raton: CRC Press.

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

BETANCES, JOAN A., *Physical Layer Defenses against Primary User Emulation Attacks*. AFIT/ENG/DS/16S-005.

Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI.

CALHOUN, SEAN M., *Integrity Determination for Image Rendering Vision Navigation*. AFIT/ENG/DS/16M-251.

Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A.

CANCIANI, AARON J., *Absolute Positioning using the Earth's Magnetic Anomaly Field*. AFIT/ENG/DS/16S-074.

Faculty Advisor: Dr. John F. Raquet. Sponsor: DARPA.

HUMPHREYS, CLAY J., *Optimal Control of an Uninhabited Loyal Wingman*. AFIT/ENY/DS/16S-063. Faculty

Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

VENABLE, DONALD T., *Improving Real-world Performance of Vision Aided Navigation in a Flight Environment*.

AFIT/ENG/DS/16S-017. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/RQ.

6.1.2. MASTER'S THESES

COLSON, KEVIN W., *Toward Automated Aerial Refueling: Relative Navigation with Structure from Motion*.

AFIT/ENG/MS/16M-009. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ.

DENBY, BRADLEY D., *Towards Automated Aerial Refueling: Real-time Position Estimation with Stereo Vision*.

AFIT/ENG/MS/16M-252. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ.

DIAZ, JORGE E., *Satellite Ephemeris Correction via Remote Site Observation for Star Tracker Navigation*

Performance Improvement. AFIT/ENG/MS/16M-013. Faculty Advisor: Maj Scott J. Pierce. Sponsor: N/A.

DOSSETT, JAMES C., *Characterization of Quadcopter Positioning Systems and the Effect of Pose Uncertainties on*

Field Probe Measurements. AFIT/ENG/MS/16M-014. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG.

GOODMAN, TYLER J., *Understanding Effects of Autonomous Agent Timing on Human-Agent Teams using Iterative*

Modeling, Simulation and Human-in-the-Loop Experimentation. AFIT/ENV/MS/16M-154. Faculty Advisor:

Dr. Michael E. Miller. Sponsor: AFOSR.

GRAY, JEREMY, *Design and Implementation of a Unified Command and Control Architecture for Multiple*

Cooperative Unmanned Vehicles Utilizing Commercial off the Shelf Components. AFIT/ENV/MS/15D-048. Faculty

Advisor: Dr. David R. Jacques. Sponsor: N/A.

HENDRICKS, KEVIN J., *The Efficacy of Implementing a Small, Low-Cost, Real Time Kinematic GPS System into a*

Small Unmanned Aerial System Architecture. AFIT/ENV/MS/16M-157. Faculty Advisor: Dr. David R. Jacques.

Sponsor: AFRL/RQ.

JELINEK, DEREK R., *VHF/UHF Antenna Design for Multistatic SAR Imaging Across UAV Classes*.

AFIT/ENG/MS/16M-023. Faculty Advisor: Dr. Peter J. Collins. Sponsor: MIT/LL.

JOHNSON, BRANDON J., *A Comparative Study of Learning Curve Models and Factors in Defense Cost Estimating Based on Program Integration, Assembly, and Checkout*. AFIT/ENV/MS/16M-162. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFLCMC.

KIM, JIN K., *Classification of Replicated Signals using RF-DNA*. AFIT/ENG/MS/16M-024. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

KIM, JOSHUA P., *Evaluation of Unmanned Aircraft Flying Qualities using JSBSim*. AFIT/ENY/MS/16M-221. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFRL/RQ.

KIM, SUNGBIN, *Unmanned Aerial Vehicle (UAV) Operators' Workload Reduction: The Effect of 3D Audio on Operators' Workload and Performance during Multi-Aircraft Control*. AFIT/ENV/MS/16M-163. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH.

LEMMENES, ADAM G., *Civilian GPS Spoofing Detection and Classification using RF-DNA*. AFIT/ENG/MS/16M-030. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

LETT, NATHAN, *Utilization of a Geodesic Sphere and Quadcopter as Two-way Field Probe for Electro-Magnetic Field Measurements in an Indoor Radar Cross Section Range*. AFIT/ENG/MS/16M-031. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG.

LUKACS, MATHEW W., *Classification of Stimulated Unintended Radiated Emissions (SURE) using Radio-frequency Distinct Native Attributes (RF-DNA)*. AFIT/ENG/DS/16S-014. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A.

MACALONEY, KURT D., *Navigation from Daytime Imaging of Celestial Objects*. AFIT/ENG/MS/16M-034. Faculty Advisor: Dr. John F. Raquet. Sponsor: CSDL.

MACHIN, TIMOTHY I., *Real-time Implementation of Vision-aided Monocular Navigation for Small Fixed-wing Unmanned Aerial Systems*. AFIT/ENG/MS/16M-035. Faculty Advisor: Dr. John F. Raquet. Sponsor: N/A.

MAGERS, MICHAEL A., *Geolocation of RF Emitters using a Low-Cost UAV-Based Approach*. AFIT/ENY/MS/16M-258. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFLCMC.

MONTGOMERY, ROBERT T., *Using Multiple Objective Decision Analysis to Position Federal Product and Service Codes within the Kraljic Portfolio Matrix*. AFIT/ENS/MS/16M-121. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: HQ USAF.

MONTGOMERY, TURNER J., *Visual-INS using a Human Operator and Converted Measurements*. AFIT/ENG/MS/16M-036. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/RV.

NEW, DAVID A., *Interference Suppression using Knowledge-aided Subarray Pattern Synthesis*. AFIT/ENG/MS/16M-037. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

PAVLIK, JOHN A., *Multihop Rendezvous Algorithm for Frequency Hopping Cognitive Radio Networks*. AFIT/ENG/MS/16M-039. Faculty Advisor: Dr. Kenneth. M. Hopkinson. Sponsor: AFRL/RI.

SEANOR, COLLIN J., *Comparison of Methods for Radio Position of Non-emitting Dismounts*. AFIT/ENG/MS/16M-044. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A.

TORF, JASON, *Optimized Cooperative Control for Combat Survivability using an Unmanned Defense Wingman*. AFIT/ENY/MS/16M-243. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFLCMC.

WATSON, MICHAEL E., *Improving System Design through the Integration of Human Systems and Systems Engineering Models*. AFIT/ENV/MS/16M-190. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: ARL/HRED.

WILSON, CASSIDY L., *Increased Capacity Utilizing Aggregation and Consolidation of Contingency Cargo*. AFIT/ENS/MS/16M-132. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A3.

WORTH, DEREK B., *An OpenEagles Framework Extension for Hardware-in-the-Loop Swarm Simulation*. AFIT/ENG/MS/16M-052. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL.

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.

BINDEWALD, JASON R., Capt, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J. M., G. L. Peterson, M. E. Miller. "Clustering-Based Online Player Modeling," International Joint Conference on Artificial Intelligence (IJCAI) – Computer Games Workshop New York, NY, July 2016.

Goodman, T., Miller, M. E., Rusnock, C. F., and Bindewald, J.M., "Timing within Human-Agent Interaction and its Effects on Team Performance and Human Behavior," Proceedings of the 2016 IEEE International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA). San Diego, March 2016.

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Borghetti, B.J., Giametta, J.J., and Rusnock, C.F., "Estimating Continuous Operator Workload From Small Subject Samples," *Proceedings of the 2016 Human Factors and Ergonomics Society International Conference*, Washington DC, 19-23 Sep 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Borghetti, B.J., and Rusnock, C., "Introduction to Real-Time State Assessment," *18th International Conference on Human-Computer Interaction (HCII)*, Toronto, Canada, 17-21 July 2016.

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Evaluation of Guidance, Navigation and Control Algorithms on Jetson TX1." Sponsor: Undisclosed. Funding: \$250,000 – Carbino 40%, Swenson 40%, Pierce 10%, Nykl 10%.

CLINTON, JUSTIN A., Department of Engineering Physics

COBB, RICHARD G., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

"Automatic Ground Collision Avoidance System Trajectory Optimization - Flight Tests." Sponsor: AFRL/RQ. Funding: \$6,000.

"Trajectory Optimization Applications for Loyal Wingman and Missile Avoidance." Sponsor: AFRL/RQ. Funding: \$30,000.

REFEREED JOURNAL PUBLICATIONS

Livermore, R., Lindholm, G., Neal, C., Cobb, R., and Colombi, J., “Heuristic UAS Path Planning for Convoy Overwatch,” *Journal of Unmanned Aerial Systems*, Vol. 2, Issue 1, Summer 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carr, R., Torf, J., and Cobb, R., “Cooperative Control for Missile Evasion,” AIAA Guidance, Navigation, and Control Conference, AIAA SciTech, San Diego, California, USA. 4-8 January 2016. DOI: 10.2514/6.2016-1862.

Jodeh, N., Cobb, R. and Livermore, R., “Optimal Flight Paths in Wireless Sensor Networks: Modeling, Simulation, and Flight Test,” AIAA Guidance, Navigation, and Control Conference, AIAA SciTech, San Diego, California, USA. 4-8 January 2016. DOI:10.2514/6.2016-0383.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Torf, J., Carr, R. and Cobb, R., “Optimized Maneuvers and Countermeasures for Specialized Defensive Loyal Wingman,” AIAA Defense 2016 (Missile Sciences Conference), AIAA-Defense2016-9013, Laurel, Maryland, 8–10 March 2016.

Humphreys, C., Cobb, R., Jacques, R. and Reeger, J., “Dynamic Re-plan of the Loyal Wingman Optimal Control Problem in a Changing Mission Environment,” AIAA Infotech @ Aerospace, AIAA SciTech, San Diego, California. 4-8 January 2016. DOI: 10.2514/6.2016-0746.

Doupe, C., Swenson, E., Cobb, R. and Pierce, S., “Optimal Attitude Control of Agile Spacecraft Using Combined Reaction Wheel and Control Moment Gyroscope Arrays,” AIAA Modeling and Simulation Technologies Conference, AIAA SciTech, San Diego, California, 4-8 January 2016. DOI: 10.2514/6.2016-0675.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Humphreys, C. and Cobb, R., “Optimal Control of Uninhabited Loyal Wingman in Stochastic Environment,” ASME 11th Dayton Engineering Sciences Symposium, 2 Nov 2015.

Torf, J., Carr, R. and Cobb, R., “Missile Evasion Using Specialized Defensive Wingman,” ASME 11th Dayton Engineering Sciences Symposium, 2 Nov 2015.

Torf, J., Carr, R. and Cobb, R., “Optimized Cooperative Control for Combat Survivability Using Unmanned Defensive Wingman,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

Humphreys, C., Cobb, R., Jacques, R. and Reeger, J., “The Loyal Wingman Optimal Control Problem in a Static Threat Environment,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

COLLINS, PETER J., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mathew Lukacs, Peter Collins and Michael Temple “Device Identification Using Active Noise Interrogation and RF-DNA “Fingerprinting” for Non-Destructive Amplifier Acceptance Testing,” *2016 IEEE MTT-S Wireless and Microwave Technology Conference (WAMICON 2016)*, Clearwater Beach, Florida, 11-13 April 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lukacs, Mathew and Collins, Peter J., “Interrogation Signal Optimization for Improved Classifier Performance when using RF DNA for Non-Destructive Antenna Acceptance Testing,” *The 37th Antenna Measurement Techniques Association Symposium*, Long Beach, California, 11-16 October, 2015.

COLOMBI, JOHN M., Department of Systems Engineering and Management

REFEREED JOURNAL PUBLICATIONS

Livermore, R., Lindholm, G., Neal, C., Cobb, R., and Colombi, J., “Heuristic UAS Path Planning for Convoy Overwatch,” *Journal of Unmanned Aerial Systems*, Vol. 2, Issue 1, Summer 2016.

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Timing Testbed.” Sponsor: Undisclosed. Funding: \$100,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D. New, P. Corbell, “Interference Suppression Using Knowledge-Aided Subarray Pattern Synthesis,” 2016 IEEE Radar Conference, Philadelphia, PA, May 2-6, 2016.

D. New, P. Corbell, “Upgrading EP Through Adaptive Subarray Pattern Synthesis,” 2016 Tri-Service Radar Conference, Boulder, CO, July 11-14 2016.

J. Kim, P. Corbell, “Emitter Classification Performance using Radio Frequency Distinct Native Attributes (RF-DNA),” 2016 Tri-Service Radar Conference, Boulder, CO, July 11-14 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

D. New, P. Corbell, “Interference Suppression Using Subarray Pattern Synthesis,” 8th Annual Electronic Warfare Capability Gaps and Enabling Technologies Conference, Crane, IN, May 10-12, 2016.

A. Lemmenes, P. Corbell, “A Unified Framework for Detecting and Classifying GPS Spoofers,” Institute of Navigation Joint Navigation Conference, Dayton, OH, June 7-9, 2016.

A. Lemmenes, P. Corbell, “Detailed Analysis of the TEXBAT Datasets Using a High Fidelity SoftwareGPS Receiver,” Consortium of Ohio Universities on Navigation and Timekeeping (COUNT) Annual Workshop, Columbus, OH, April 5-6, 2016.

A. Lemmenes, P. Corbell, “Detailed Analysis of the TEXBAT Dataset using a High Fidelity GPS Receiver, Institute of Navigation (ION) GNSS+, Portland, Oregon, September 12-16, 2016.

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Testbed Development.” Sponsor: AFRL/RV. Funding: \$1,324,851 – Gunawardena 90%, Raquet 10%.

“GPS Waveform Prototyping Platform (GWPP).” Sponsor: AFRL/RV. Funding: \$250,000 – Gunawardena 90%, Raquet 10%.

REFEREED JOURNAL PUBLICATIONS

S. Gunawardena, J. Raquet, F. van Graas, "A Satellite with Personality: Chip Transition-Edge Based Signal Tracking for Ultra-Precise GNSS Monitoring Applications," *GPS World*, 2015. <http://gpsworld.com/a-satellite-with-personality/>.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

S. Gunawardena, M. Carroll, "Characterization of GNSS Spreading Code Chip Asymmetries," Proceedings of the 2016 Joint Navigation Conference (Classified Session), Dayton, OH, June 9, 2016.

R. Armstrong, J. MacDonald, S. Gunawardena, "GNSS Receiver Design Development Based on ChipShape Correlation," Proceedings of the 2016 Joint Navigation Conference, Dayton, OH, June 8, 2016.

J. Melville, M. Carroll, A. Cerruti, S. Miller, A. Shapiro, B. Armstrong, B. Zhong, M. Neumann, S. Gunawardena, E. Emile, J. Hebert, "Enabling Rapid Multi-GNSS Prototyping using the GNSS Test Architecture (GNSSTA)," Proceedings of 2015 Joint Navigation Conference, Orlando, Florida, 2015.

S. Gunawardena, T. Pany, "Follow-on Report of Activities of the GNSS SDR Metadata Standard Working Group," Proceedings of the 2015 International Technical Meeting of The Institute of Navigation, Dana Point, CA, 2015.

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Software Engineering and Human Modeling Improvements to a Simulation Framework." Sponsor: AFLCMC. Funding: \$85,000 – Hodson 70%, Peterson 30%.

"Support of AFNES/RIPR Autonomy Effort." Sponsor: AFRL/RQ. Funding: \$32,500 – Hodson 50%, Peterson 50%.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Spectrum Sensing and Sharing by Cognitive Radios in PNT Systems." Sponsor: Innoflight. Funding: \$40,000 – Hopkinson 75%, Corbell 10%, Gunawardena 10%, Raquet 5%.

JACKSON, JULIE A., Department of Electrical and Computer Engineering

JACQUES, DAVID R., Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

"Cooperative Targeting Using Small UAS." Sponsor: AFRL/RQ. Funding: \$50,000 – Jacques 50%, Colombi 25%, Cobb 25%.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"AFIT-AFRL Partnership: Unmanned Systems Intern Program." Sponsor: 711 HPW. Funding: \$175,000 – Jacques 75%, Colombi 25%.

REFEREED JOURNAL PUBLICATIONS

Humphreys, C., R. Cobb, D. Jacques and J. Reeger, "A Hybrid Optimization Technique Applied to the Intermediate-Target Optimal Control Problem," *Global Journal of Technology and Optimization*, Vol. 7, Issue 2, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Humphreys, C., R. Cobb and D. Jacques, “Dynamic Re-plan of the Loyal Wingman Optimal Control Problem in a Changing Environment,” Proceedings of the AIAA Sci-Tech Conference, Jan 2016.

LAMONT, GARY B., Department of Electrical and Computer Engineering

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Daniel Levy, Jason Roos, Jace Robinson, William Carpenter, Richard Martin, Clark Taylor, Joseph Sugrue, and Andrew Terzuoli, “Non Linear Optimization Applied To Angle-Of-Arrival Satellite Based Geo-Localization For Biased And Time-Drifting Sensors,” in *Proc. International Society for Photogrammetry and Remote Sensing (XXIII ISPRS Congress)*, Prague, Czech Republic, July 2016.

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: \$130,000 – Nykl 33%, Pecarina 33%, Woolley 33%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

L. Burchett, J. Robinson, M. Piekenbrock, S. Nykl, B. Woolley, and A. Terzuoli, “Automated aerial refueling: Parallelized 3D iterative closest point,” in IEEE NAECON, Dayton, OH, 2016.

T. Stuart, S. Calhoun, and S. Nykl, “Integrity Monitoring for Stereo Vision-Based Automated Air Refueling,” in Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC), ser. ION JNC '16. Dayton, OH, USA: Institute of Navigation, 2016.

D. Johnson and S. Nykl, “Fusion of Stereo Machine Vision with INS/GPS for Automated Aerial Refueling,” in Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC), ser. ION JNC '16. Dayton, OH, USA: Institute of Navigation, 2016.

C. Parsons and S. Nykl, “Relative Positioning for Automated Aerial Refueling Using Stereoscopic Imagery from Geometrically Accurate Real-Time Virtual Worlds,” in Proceedings of the Institute of Navigation (ION) Joint Navigation Conference (JNC), ser. ION JNC '16. Dayton, OH, USA: Institute of Navigation, 2016.

OXLEY, MARK E., Department of Mathematics and Statistics

PACHTER, MEIR, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Advanced Autonomous Navigation.” Sponsor: AFRL/RQ. Funding: \$16,786.

“Control & Estimation in the Presence of Adversarial Action and Uncertainty.” Sponsor: AFOSR. Funding: \$46,104.

“Cooperative Control.” Sponsor: AFRL/RQ. Funding: \$20,000.

“Self-Defense Missile Guidance.” Sponsor: AFRL/RW. Funding: \$50,000.

REFEREED JOURNAL PUBLICATIONS

- M. Park, K. Krishnamoorthy, S. Dharba, P. Khargonekar, M. Pachter and P. Chandler, "Performance Guarantee of an Approximate Dynamic Programming Policy for Robotic Surveillance," IEEE Trans. on Automation Science and Engineering (ASE), T-ASE, Vol. 13 No 2, April 2016, pp. 564-578.
- K. Kalyanam, M. Pachter, M. Patzek, C. Rothwell: "Optimal Human-Machine Teaming for a Sequential Inspection Operation," IEEE Trans. on Human-Machine Systems (THMS), Vol. 46, No. 4, August 2016, pp. 557-568.
- K. Kalyanam, and M. Pachter: "The Role of Prior in Optimal Team 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 Known Constant Speed on a Directed Acyclic Graph under Partial Information," SIAM J. of Control and Optimization, Vol. 54, No. 5, September 2016, pp. 2259-2273.
- M. Pachter: "LQG Dynamic Games with a Control-Sharing Information Pattern," Dynamic Games and Applications, appeared electronically in January 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- E. Garcia, D. Casbeer and M. Pachter: "Escape Regions of the Active Target Defense Differential Game," Proceedings of the ASME 2015 Dynamic Systems and Control Conference DSCC 2015, paper DSCC2015-9628, Columbus, OH, October 28-30, 2015.
- D. Casbeer, E. Garcia, Z. Fuchs and M. Pachter: "Cooperative Target Defense Differential Game with a Constrained-Maneuverable Defender," paper TuC11.3, Conference on Decision and Control, December 15-18, 2015, Osaka, Japan.
- I. Exarchos, P. Tsiotras and M. Pachter: "UAV-Collision Avoidance Based on the Solution for the Suicidal Pedestrian Differential Game," AIAA SciTech, AIAA Guidance, Navigation and Control Conference, 4-8 January 2016, San Diego, CA, AIAA paper 2016-2100.
- T. Montgomery and M. Pachter: "Visual-INS Using a Human operator and Converted Measurements," Proceedings of the 56th Israel Annual Conference on Aerospace Sciences, Tel-Aviv & Haifa, Israel, March 9-10, 2016.
- D. Casbeer, E. Garcia, and M. Pachter: "The Target Defense Differential Game with Two Defenders," Paper WeBTT1.1, 2016 International Conference on Unmanned Aircraft System ICUAS'16, Arlington, VA, June 7-10, 2016.
- K. Krishnamoorthy and M. Pachter: "The Role of Prior and Optimal Team Decision in Binary Classification," Paper ThC13.3, American Control Conference, July 6-8 2016, Boston, MA.
- T. Montgomery and M. Pachter: "Visual-INS Using Converted Measurements," Proceedings of the 20th IFAC Symposium on Automatic Control in Aerospace, Sherbrooke, Quebec, Canada, August 21-25, 2016.
- K. Krishnamoorthy, S. Rathinam, D. Casbeer and M. Pachter: "Optimal Threshold Policy for Sequential Weapon Target Assignment," Proceedings of the 20th IFAC Symposium on Automatic Control in Aerospace, Sherbrooke, Quebec, Canada, August 21-25, 2016.

BOOKS AND CHAPTERS IN BOOKS

M. Pachter: "Linear-Quadratic Gaussian Dynamic Games with a Control-Sharing Information Pattern," Advances in Dynamic and Evolutionary Games - Annals of the International Society of Dynamic Games, Vol. 15, Frank Thuijsman and Florian Wagener, Editors, Birkhauser 2016, pp. 165-186.

PECARINA, JOHN M., Maj, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

A. Leighner, B. Woolley & J. Pecarina, "Accelerated and Discrete SURF for Homography Estimation in Close Range Aerial Navigation," Presented at the *2016 Joint Navigation Conference of the Institute of Navigation (ION JNC 2016)*, Dayton, OH, June 2016.

PETERSON, GILBERT L., Maj, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J. M., Peterson, G. L., and Miller, M.E., "Clustering-Based Online Player Modeling," International Joint Conference on Artificial Intelligence – Computer Games Workshop, 2016, pp. TBD.

Bindewald, J.M., Peterson, G.L. and Miller, M.E., "Trajectory Generation with Player Modeling," Proceedings of the 28th Canadian Conference on Artificial Intelligence, 2015, pp. 42-49.

PIERCE, SCOTT J., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Star Tracker Design for Beaconless Sub-Microradian Spacecraft Pointing Estimation." Sponsor: Undisclosed. Funding: \$48,195 – Pierce 34%, Cain 33%, Ox 33%.

"Star Tracker Integration Modeling for UAV Flight Profiles." Sponsor: AFRL/RW. Funding: \$75,000 – Pierce 80%, Raquet 20%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

C. Doupe, E.D. Swenson, R.G. Cobb, and S.J. Pierce, "Optimal Attitude Control of Agile Spacecraft Using Combined Reaction Wheel and Control Moment Gyroscope Arrays," AIAA Modeling and Simulation Technologies Conference, AIAA SciTech, <http://dx.doi.org/10.2514/6.2016-0675>.

J.E. Diaz and S.J. Pierce, "Satellite Ephemeris Correction via Remote Site Observation for Star Tracker Navigation Performance Improvement," Institute of Navigation International Technical Meeting, Jan 2016.

POLANKA, MARC D., Department of Aeronautics and Astronautics

RAQUET, JOHN F., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"AFIT Support for AFRL Navigation Estimation Optimization (NEO) Program." Sponsor: AFRL/RV. Funding: \$75,000.

"ANT Center and Laboratory Support per Attachment 6 of the MOA between AFIT and AFRL." Sponsor: AFRL/RV. Funding: \$200,000 – Raquet 50%, Haker 50%.

“GPS/Inertial/Vision Integrated Navigation System (GIVINS) Development.” Sponsor: AFRL/RW. Funding: \$50,000 – Raquet 50%, Woolley 25%, Jacques 25%.

“Multi-Sensor Navigation Demonstration.” Sponsor: USA CERDEC. Funding: \$350,000.

“Multi-Sensor Navigation Demonstration.” Sponsor: USA CERDEC. Funding: \$150,000.

“PNT Collaboration.” Sponsor: Lockheed Martin. Funding: \$100,000 – Raquet 60%, Pierce 40%.

“Support for Alternative Navigation Research.” Sponsor: DARPA. Funding: \$100,000 – Raquet 80%, Pierce 20%.

“Trajectory Determination and Analysis Software (TDAS) Development Planning.” Sponsor: 812 TSS. Funding: \$123,805.

“Ultra-High Accuracy Reference System (UHARS) Support.” Sponsor: 746 TS. Funding: \$50,000.

REFEREED JOURNAL PUBLICATIONS

Grejner-Brzezinska, D., C. Toth, T. Moore, J. Raquet, M. Miller, and A. Kealy, “Multisensor Navigation Systems: A Remedy for GNSS Vulnerabilities?” *Proceedings of the IEEE*, Vol. 104, No. 6, pp. 1339-1353, Jun 2016.

Canciani, A. and J. Raquet, “Absolute Positioning Using the Earth’s Magnetic Anomaly Field,” *NAVIGATION*, Vol. 63, No. 2, pp. 111-126, Jun 2016.

Soeder, J. and J. Raquet, “Image-Aided Navigation Using Cooperative Binocular Stereopsis,” *Navigation*, Vol. 62, No. 3, pp. 239-248, Fall 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Calhoun, S. and J. Raquet, “Integrity Determination for a Vision Based Precision Relative Navigation System,” *Proceedings of IEEE/ION PLANS*, Savannah, GA, Apr 2016.

Curro, J. and J. Raquet, “Navigation Using VLF Environmental Features,” *Proceedings of IEEE/ION PLANS*, Savannah, GA, Apr 2016.

Canciani, A. and J. Raquet, “Magnetic Anomaly Navigation Accuracy with Respect to Map Quality and Altitude,” *Proceedings of 2016 ION International Meeting*, Monterey, CA, Jan 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Canciani, A. and Raquet, J., “Aerial Navigation Using the Earth's Magnetic Anomaly Field,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016.

Kauffman F, K., J. Raquet, D. Marietta S, J. Kresge S, “Scorpion - Scalable Plug-and-play Bayesian Estimation and Filtering Library for Navigation Research,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016.

Machin, T. J. Raquet, D. Jacques F, D. Venable, “Real-Time Absolute Positioning of a UAV Using Vision-Aided Navigation,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016.

Smearcheck, E, M., J. Campbell E, A. Baster E, D. Venable E, J. Rohde E, J. Raquet, “Navigation Sensor Smart Cables,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016.

Venable, D. and J. Raquet, “Improving Real World Performance of Vision Navigation in a Flight Environment,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016.

MacAloney, K., J. Raquet, B. Lane E, “Daytime Sensor Performance for Celestial Navigation,” *ION Joint Navigation Conference*, Dayton, OH, Jun 2016.

RUSNOCK, CHRISTINA, F., Maj, Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

“HIS Case Study for the Battlefield Airman Kit.” Sponsor: 711 HPW. Funding: \$25,000 – Rusnock 45%, Miller 45%, Jacques 10%.

REFEREED JOURNAL PUBLICATIONS

Rusnock, C.F., & Borghetti, B.J. “IMPRINT Workload Profiles: A Continuous Measure of Mental Workload.” *International Journal of Industrial Ergonomics*. 27 Jun 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kim, S., Miller, M.E., Rusnock, C.F., & Elshaw, J. (2016). “Aiding Call Sign Recognition through Spatial Audio.” *Proceedings of the 2016 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference*, Anaheim, CA, May 21-24, 2016. *Recognition: Safety, Human Factors, and Ergonomics Track Best Paper Award*.

Goodman, T.J., Miller, M.E., Rusnock, C.F., & Bindewald, J. (2016). “Timing within Human-Agent Interaction and its Effect on Team Performance and Human Behavior.” *Proceedings of the 2016 IEEE Conference on Cognitive Methods in Situation Awareness and Decision Support*, San Diego, CA, Mar 21-25, 2016.

Goodman, T.J., Miller, M.E., & Rusnock, C.F. (2015). “Incorporating Automation: Using Modeling and Simulation to Enable Task Re-Allocation.” *Proceedings of the 2015 Winter Simulation Conference*, Huntington Beach, CA, Dec 6-9, 2015.

Smith, A.M., Borghetti, B. J., & Rusnock, C.F. (2015). “Improving Model Cross-Applicability for Operator Workload Estimation.” *Proceedings of the 2015 Human Factors and Ergonomics Society Annual Meeting*, Los Angeles, CA, Oct 26-30, 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Rusnock, C.F., & Borghetti, B.J. (2016). “Assessing Mental Workload by Combining Model-based and Psychophysiological Measurement Approaches.” 2016 Institute of Industrial & Systems Engineers (IISE) Industrial & Systems Engineering Research Conference, Anaheim, CA, May 21-24, 2016.

SEAL, MICHAEL D., Maj, Department of Electrical and Computer Engineering

SWENSON, ERIC D., Department of Aeronautics and Astronautics

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

WOOD, AIHUA W., Department of Mathematics and Statistics

WOOLLEY, BRIAN G., Maj, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J.S. Tharp and B.G. Woolley, Enhancing Inertial Navigation with Structure from Motion Trajectory Estimates, AIAA Guidance, Navigation, and Control Conference, 4-8 January 2016, San Diego, California, USA.

J.R. Christman and B.G. Woolley, “Augmenting Interactive Evolution with Multi-Objective Optimization,” in 14th International Conference on Machine Learning and Applications (ICMLA), 9-11 Dec 2015, Miami, FL.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J.S. Tharp and B.G. Woolley, On the Integration of Medium Wave Infrared Cameras for Vision-Based Navigation, In *Proceedings of the Joint Navigation Conference 2016 (JNC'16)*, June 6 – 9, Dayton, OH, USA.

K.P. Werner, B.D. Denby, and B.G. Woolley, Toward Automated Aerial Refueling: Relative Navigation from Stereo Vision, In *Proceedings of the Joint Navigation Conference 2016 (JNC'16)*, June 6 – 9, Dayton, OH, USA.

B.D. Denby and B.G. Woolley, Toward Automated Aerial Refueling: Relative navigation from Stereo Vision, Poster presented at *The 10th annual information meeting of the Consortium of Ohio Universities on Navigation and Timekeeping (COUNT'16)*, April 7 – 8, Columbus, OH.

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

BETANCES, JOAN A., *Physical Layer Defenses against Primary User Emulation Attacks*. AFIT/ENG/DS/16S-005.
Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI.

BIHL, TREVOR J., *Feature Selection and Classifier Development for Radio Frequency Device Identification*.
AFIT/ENG/DS/15D-003. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV.

HAMMAN, SETH T., *Improving the Cybersecurity of Cyber-physical Systems through Behavioral Game Theory and Model Checking in Practice and in Education*. AFIT/ENG/DS/16S-010. Faculty Advisor:
Dr. Kenneth M. Hopkinson. Sponsor: N/A.

KOVACH, NICHOLAS S., *A Temporal Framework for Hypergame Analysis of Cyber Physical Systems in Contested Environments*. AFIT/ENG/DS/16S-070. Faculty Advisor: Dr. Gary B. Lamont. Sponsor: N/A.

LUKACS, MATHEW W., *Classification of Stimulated Unintended Radiated Emissions (SURE) using Radio-frequency Distinct Native Attributes (RF-DNA)*. AFIT/ENG/DS/16S-014. Faculty Advisor: Dr. Peter J. Collins.
Sponsor: N/A.

VAUGHAN, SANDRA L., *A Novel Machine Learning Classifier Based on a Qualia Modeling Agent (QMA)*.
AFIT/ENG/DS/16S-016. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RV.

6.2.2. MASTER'S THESES

BYRD, CHARLES E., *Exposing Inter-virtual Machine Networking Traffic to External Applications*.
AFIT/ENG/MS/16M-006. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

CIOTTI, BARRIE J., *Defining the Security Posture of DOD Networks using The RedSeal Security Risk Manager*.
AFIT/ENG/MS/15M-007. Faculty Advisor: Dr. Michael J. Mendenhall. Sponsor: DISA.

FREEMAN, TRAVIS J., *Jamming Cognitive Radios*. AFIT/ENG/MS/16M-015. Faculty Advisor:
Dr. Richard K. Martin. Sponsor: AFRL/RV.

FULLER, JONATHAN D., *A Misuse-based Intrusion Detection System for ITU-T G.9959 Wireless Networks*.
AFIT/ENG/MS/16M-016. Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI.

GIRTZ, KYLE A., *Dynamic Honeypot Configuration for Programmable Logic Controller Emulation*.
AFIT/ENG/MS/16M-253. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

GRUNZWEIG, NATHAN E., *Statistic Whitelisting for Enterprise Network Incident Response*. AFIT/ENG/MS/
16M-019. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

HALL, JOSEPH L., *A Practical Wireless Exploitation Framework for Z-Wave Networks*. AFIT/ENG/MS/16M-020.
Faculty Advisor: Maj Benjamin W. Ramsey. Sponsor: AFRL/RI.

HARNED, SCOTT I., *POCO-MOEA: Using Evolutionary Algorithms to Solve the Controller Placement Problem*. AFIT/ENG/MS/16M-021. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

JORDAN, PAUL L., *Data Driven Device Failure Prediction*. AFIT/ENG/MS/16S-071. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: NSA.

KIM, JIN K., *Classification of Replicated Signals using RF-DNA*. AFIT/ENG/MS/16M-024. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

LAPSO, JOSHUA A., *Whitelisting System State in Windows Forensic Memory Visualizations*. AFIT/ENG/MS/16M-029. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A.

LEMMENES, ADAM G., *Civilian GPS Spoofing Detection and Classification using RF-DNA*. AFIT/ENG/MS/16M-030. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: N/A.

PAVLIK, JOHN A., *Multihop Rendezvous Algorithm for Frequency Hopping Cognitive Radio Networks*. AFIT/ENG/MS/16M-039. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI.

QUIGG, MICHAEL D., *Cyberspace and Organizational Structure: An Analysis of the Critical Infrastructure Environment*. AFIT/ENG/MS/16M-177. Faculty Advisor: LTC Mason Rice. Sponsor: DHS.

TODD, MICHAEL C., *Dynamic Network Security Control using Software Defined Networking*. AFIT/ENG/MS/16M-049. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

WYLIE, JUSTIN, *Radio Frequency-based Microcontroller Anomaly Detection*. AFIT/ENG/MS/16M-053. Faculty Advisor: Maj Samuel J. Stone. Sponsor: AFRL/RV.

YOON, JUNGSAUNG, *Framework for Evaluating the Readiness of Cyber First Responders Responsible for Critical Infrastructure Protection*. AFIT/ENG/MS/16M-054. Faculty Advisor: LTC Mason Rice. Sponsor: DHS.

YOUNG, DEREK R., *A Framework for Incorporating Insurance into Critical Infrastructure Cyber Risk Strategies*. AFIT/ENG/MS/16M-055. Faculty Advisor: LTC Mason Rice. 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 R., Capt, Department of Electrical and Computer Engineering

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Developing a Cyber Multi-Attribute Task Battery and Cognitive Model for Human Performance Evaluation in Cyber Operations.” Sponsor: AFOSR. Funding: \$44,606 – Borghetti 50%, Rusnock 50%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Funke, G., Dye, G., Borghetti, B.J., Mancuso, V., Greenlee, E., Miller, B., Menke, L., Brown, R., and Vieane, A., “Development and Validation of the Air Force Cyber Intruder Alert Testbed (CIAT),” *7th International Conference on Applied Human Factors and Ergonomics (AHFE)*, Orlando, FL, 27-31 July 2016.

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Development Support for 1553 Bus Fingerprinting.” Sponsor: AFRL/R.Y. Funding: \$25,000.

“Evaluation of Guidance, Navigation and Control Algorithms on Jetson TX1.” Sponsor: Undisclosed. Funding: \$250,000 – Carbino 40%, Swenson 40%, Pierce 10%, Nykl 10%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carbino, Timothy J., Temple, Michael A., and Lopez, Juan Jr., “Conditional Constellation Based-Distinct Native Attribute (CB-DNA) Fingerprinting for Network Device Authentication,” International Conference on Communications (ICC), 2016 IEEE, 2016. Kuala Lumpur, Malaysia 23 – 27 May 2016.

COLLINS, PETER J., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Mathew Lukacs, Peter Collins and Michael Temple “Device Identification Using Active Noise Interrogation and RF-DNA “Fingerprinting” for Non-Destructive Amplifier Acceptance Testing,” *2016 IEEE MTT-S Wireless and Microwave Technology Conference (WAMICON 2016)*, Clearwater Beach, Florida, 11-13 April 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lukacs, Mathew and Collins, Peter J., “Interrogation Signal Optimization for Improved Classifier Performance when using RF DNA for Non-Destructive Antenna Acceptance Testing,” *The 37th Antenna Measurement Techniques Association Symposium*, Long Beach, California, 11-16 October, 2015.

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“RFI Mitigation Support.” Sponsor: AFRL/R.Y. Funding: \$60,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. Kim, P. Corbell, “Emitter Classification Performance using Radio Frequency Distinct Native Attributes (RF-DNA),” 2016 Tri-Service Radar Conference, Boulder, CO, July 11-14 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

A. Lemmenes, P. Corbell, “A Unified Framework for Detecting and Classifying GPS Spoofers,” Institute of Navigation Joint Navigation Conference, Dayton, OH, June 7-9, 2016.

DEVER, MATTHEW C., Department of Electrical and Computer Engineering

SPONSOR FUNDED EDUCATIONAL PROJECTS

"ACVAM Course." Sponsor: AFLCMC. Funding: \$2,500.

GRAHAM, SCOTT R., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Avionics Cyber Vulnerability.” Sponsor: AFRL/R.Y. Funding: \$30,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Simon, P.E., Graham, S.R., “Comparison of Real-Time, Mobile Data Bus Architectures,” *Third International Workshop on Information Integration in Cyber Physical Systems (IICPS 2016)*, Jul 2016.

GRIMAILA, MICHAEL R., Department of Systems Engineering and Management

REFEREED JOURNAL PUBLICATIONS

Mailloux, L.O., Engle, R.D., Grimaila, M.R., Hodson, D., Colombi, J.M., and McLaughlin, C., “Modeling Decoy State Quantum Key Distribution Systems,” *Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, DOI: 10.1177/1548512915588572, Oct. 2015, 12(4), pp. 489-506.

Mailloux, L.O., Grimaila, M.R., Colombi, J.M., Hodson, D., McLaughlin, C., Engle, R., and Baumgartner, G., “Quantum Key Distribution: Examination of Decoy State Performance,” *IEEE Communications*, 53(10), Oct. 2015, pp. 24-31.

Mailloux, L.O., Hodson, D.D., Grimaila, M.R., Colombi, J.M., McLaughlin, C.V., and Baumgartner, G., “Test and Evaluation of Complex Cybersecurity Systems: A Case Study in Using Modeling and Simulation to Understand, Test, and Evaluate the Security of Quantum Key Distribution Systems,” *The International Test and Evaluation Association (ITEA) Journal*, Dec. 2015, 36(3), pp. 199-207.

Mailloux, L.O., Hodson, D.D., Grimaila, M.R., Engle, R.D., McLaughlin, C.V., and Baumgartner, G., “Using Modeling and Simulation to Study Photon Number Splitting Attacks,” *IEEE Access*, DOI: 10.1109/ACCESS.2016.2555759, 2016, Vol. 4, pp. 2188-2197.

Mailloux, L.O., Hodson, D.D., Grimaila, M.R., McLaughlin, C.V., and Baumgartner, G., “Quantum Key Distribution: Boon or Bust,” *Journal of Cyber Security & Information Systems (CSIA) Journal*, June 2016, 4(2), pp. 18-25.

Engle, R.D., Hodson, D.D., Mailloux, L.O., Grimaila, M.R., McLaughlin, C.V., and Baumgartner, G., “A module-based simulation framework to facilitate the modeling of Quantum Key Distribution system post-processing functionalities,” *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, DOI: 10.1177/1548512916666740, Sept 2016, pp. 1-12.

Mailloux, L.O., Lewis II, C. D., Riggs, C., & Grimaila, M.R., “Post-Quantum Cryptography: What Advancements in Quantum Computing Mean for IT Professionals,” *IT Professional*, 18(5), Sept.-Oct. 2016, pp. 42-47.

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Software Engineering and Human Modeling Improvements to a Simulation Framework.” Sponsor: AFLCMC. Funding: \$85,000 – Hodson 70%, Peterson 30%.

REFEREED JOURNAL PUBLICATIONS

L.O. Mailloux, D.D. Hodson, M.R. Grimaila, R.D. Engle, C.V. McLaughlin and G.B. Baumgartner, “Using Modeling and Simulation to Study Photon Number Splitting Attacks,” *IEEE Access*, 4, pp. 2188-2197, April 2016.

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L.O. Mailloux, D.D. Hodson, M.R. Grimaila, J.M. Colombi, C.V. McLaughlin, and G.B. Baumgartner, “Test and Evaluation of Complex Cybersecurity Systems: A Case Study in Using Modeling and Simulation to Understand, Test and Evaluate the Security of Quantum Key Distribution Systems,” *The International Test and Evaluation Association (ITEA) Journal*, 36(3), pp. 199-207, 2015.

L.O. Mailloux, M.R. Grimaila, J.M. Colombi, D.D. Hodson, C.V. McLaughlin, and G.B. Baumgartner, "Quantum Key Distribution: Examination of the Decoy State Protocol," *IEEE Communications Magazine*, 53(10), pp. 24-31, Oct 2015.

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L.O. Mailloux, M.R. Grimaila, D.D. Hodson, R.D. Engle, C.V. McLaughlin and G.B. Baumgartner, "Studying Decoy State Quantum Key Distribution System Configurations," 2016 International Conference on Scientific Computing (CSC16), Las Vegas, NV, July 25-28, 2016.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Cognitive and Mobile Networks." Sponsor: AFRL/RI. Funding: \$110,000.

"Using Cognitive Radios to Enhance Communication Capabilities (Continuation)." Sponsor: Undisclosed. Funding: \$45,000.

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Thompson, J.J., Hopkinson, K.M., Silvius, M.D., A Test Methodology for Evaluating Cognitive Radio Systems, *IEEE Transactions on Wireless Communications*, Vol. 14, Issue 11, November 2015, pp. 6311-6324.

Raulerson, E.L., Hopkinson, K.M., Laviers, K.R., A Framework to Facilitate Cyber Defense Situational Awareness Modeled in an Emulated Virtual Machine Testbed, *Journal of Defense Modeling and Simulation*, Vol. 12, Issue 3, 2015, pp. 229-239.

Hamman, S.T., Hopkinson, K.M., Teaching Adversarial Thinking for Cybersecurity, *CRC Colloquium for Information Systems Security Education*, 13-15 June 2016, Philadelphia, PA, USA, pp. 1-10.

LIN, ALAN C. Maj, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Lin, A. C. & Peterson, G. L. (2016), Activity Pattern Discovery from Network Captures. In *IEEE Symposium on Security and Privacy Workshops* (pp. 334–342). San Jose, CA. <http://doi.org/10.1109/SPW.2016.22>.

MAILLOUX, LOGAN O., Maj, Department of Systems Engineering and Management

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Mailloux, L. O., Hodson, D. D., Grimaila, M. R., Engle, R. D., McLaughlin, C. V., and Baumgartner, G. (2016). "Using Modeling and Simulation to Study Photon Number Splitting Attacks." *Access, IEEE*. 4, 2188-2197.

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Mailloux, L. O., Engle, R. D., Grimaila, M. R., Hodson, D. D., Colombi, J. M., and McLaughlin, C. V. (2015). "Modeling decoy state quantum key distribution systems." *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, 12(4), 489-506.

C. Badenhop, B. Ramsey, B. Mullins, and L. Mailloux. (2016). "Extraction and analysis of non-volatile memory off the ZW0301 module, a Z-Wave transceiver." *Digital Investigation, Elsevier*, 12(S1), 72-80.

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Holes, J.A., Mailloux, L.O., Grimaila, M.R., and Hodson, D.D., "An Efficient Testing Process for a Quantum Key Distribution System Modeling Framework," Proceedings of the 2015 International Conference on Scientific Computing (CSC15), Las Vegas, NV, 2015.

Mailloux, L., Dove, R., Garrison, C., Biondo, R. (2015). Guidance for Working Group Maintenance of the Systems Engineering Body of Knowledge (SEBoK) with Systems Security Engineering Example. In *Proceedings of the 2015 INCOSE International Symposium*. Seattle, WA, 2015.

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Analytical Support for Hardware Assurance." Sponsor: AFRL/R.Y. Funding: \$72,150.

"Cognitive RF Sensing and Interference Management." Sponsor: AFRL/R.Y. Funding: \$15,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Learning about Signals through Tinkering and Game-Playing." Sponsor: ONR. Funding: \$66,700.

PATENTS

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MENDENHALL, MICHAEL J., Department of Electrical and Computer Engineering

MERKLE, LAURENCE D., Department of Electrical and Computer Engineering

MILLS, ROBERT F., 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 (BICA) Journal*, 2016, pp 71-85.

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Rice, J., Mills, R.F., Temple, M.A., and Peterson, J.D., "Increased Ambiguity Resolution in Digital Radio Frequency Receivers," IEEE International Conference on Microwaves, Communications, Antennas and Electronic Systems, Tel Aviv, 2-4 Nov 2015, pp 1-4.

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Barcomb, K.W., Krill, D.J., Mills, R.F., Saville, M., “Establishing Cyberspace Sovereignty,” in *Leading Issues in Information Warfare and Security Research*, Vol. 2, ed: J. Ryan, Academic Conferences and Publishing International Limited, Oct 2015, pp 203-218.

MULLINS, BARRY E., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Control Systems Security Program Support.” Sponsor: DHS. Funding: \$275,000 – Mullins 33%, Rice 33%, Ramsey 33%.

“Directed Energy Cyber Effects.” Sponsor: AFRL/RD. Funding: \$50,000.

“Software Defined Networking Research Support.” Sponsor: NSA. Funding: \$80,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“IASP Tuition and Resource Support for the AFIT Center for Cyberspace Research (CCR).” Sponsor: NIETP. Funding: \$126,603.

REFEREED JOURNAL PUBLICATIONS

C. W. Badenhop, B. W. Ramsey, B. E. Mullins, L. O. Mailloux, “Extraction and Analysis of Non-volatile Memory of the ZW0301 Module, a Z-wave Transceiver,” *Digital Investigation*, Publisher: Elsevier, Vol. 17, No. 14, June 2016, pp. 14-27.

C. W. Badenhop, B. W. Ramsey, and B. E. Mullins, “An Analytical Black Hole Attack Model Using a Stochastic Topology Approximation Technique for Reactive Ad-Hoc Routing Protocols,” *International Journal of Network Security (IJNS)*, Publisher: National Chung Hsing University, Vol. 18, No. 4, January 2016, pp. 667-677.

B. W. Ramsey, B. E. Mullins, M. A. Temple, and M. R. Grimaila, “Wireless Intrusion Detection and Device Fingerprinting through Preamble Manipulation,” *IEEE Transactions on Dependable and Secure Computing*, Vol. 12, No. 5, September/October 2015, pp. 585-596.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

D. J. Casey, and B. E. Mullins, “SDN Shim: Controlling Legacy Devices,” 40th Annual IEEE Conference On Local Computer Networks, Clearwater Beach FL, 26-29 October 2015, pp. 169-172.

BOOKS AND CHAPTERS IN BOOKS

J. Lopez, M. A. Temple, and B. E. Mullins, “Exploitation of HART Wired Signal Distinct Native Attribute (WSDNA) Features to Verify Field Device Identity and Infer Operating State,” *Critical Information Infrastructures Security*, Panayiotou et al, eds., Springer LNCS 8985, February 2016, pp. 24-30.

NYKL, SCOTT L., Department of Electrical and Computer Engineering

PACHTER, MEIR, Department of Electrical and Computer Engineering

PECARINA, JOHN M., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“CAMAS: Context Aware Mission Auditing System.” Sponsor: AFRL/RI. Funding: \$50,000 – Pecarina 50%, Lin 50%.

“Cross Device Usage Analysis for Cyber ISR Research.” Sponsor: AFRL/RI. Funding: \$35,000 – Pecarina 67%, Li 33%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Fuller, J., Ramsey, B., Pecarina, J. and Rice, M., “Wireless Intrusion Detection of Covert Channel Attacks in ITU-T G.9959-Based Networks.” *11th International Conference on Cyber Warfare and Security: ICCWS2016*. Academic Conferences and publishing limited, 2016.

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Lin, A.C. and Peterson, G.L., “Activity Pattern Discovery from Network Captures,” IEEE Symposium on Security and Privacy Workshop, 2016, pp. 334-342.

Wardell, D.C., Mills, R.F., Peterson, G.L. and Oxley, M.E., “Identifying Security Vulnerabilities in CPS by Modeling Malicious Interaction and Model Checking,” *Complex Adaptive Systems*, 2016, pp. TBD.

RAMSEY, BENJAMIN W. P., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Cyber Intelligence, Surveillance, and Reconnaissance (ISR) Research.” Sponsor: AFRL/RI. Funding: \$35,000.

REFEREED JOURNAL PUBLICATIONS

B. Ramsey, J. Fuller, and C. Badenhop, “Efficacy of Physical Layer Preamble Manipulation for IEEE 802.11a/ac,” *Electronics Letters*, Vol. 52, No. 8, pp. 669-671.

B. Ramsey, B. Mullins, M. Temple, and M. Grimaila, “Wireless Intrusion Detection and Device Fingerprinting through Preamble Manipulation,” *IEEE Transactions on Dependable and Secure Computing*, Vol. 12, No. 5, pp. 585-596.

C. Badenhop, B. Ramsey, and B. Mullins, “An Analytical Black Hole Attack Model using a Stochastic Topology Approximation Technique for Reactive Ad-Hoc Routing Protocols,” *International Journal of Network Security*, Vol. 18, No. 4, pp. 667-677.

C. Badenhop, B. Ramsey, B. Mullins, and L. Mailloux, “Extraction and Analysis of non-Volatile Memory of the ZW0301 Module, a Z-Wave Transceiver,” *Digital Investigation*, Vol. 17, pp. 14-27.

J. Yoon, S. Dunlap, J. Butts, M. Rice, and B. Ramsey, “Evaluating the Readiness of Cyber First Responders Responsible for Critical Infrastructure Protection,” *International Journal of Critical Infrastructure Protection*, Vol. 13, pp. 19-27.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

A. Seitz and B. Ramsey, “Z-Ranger: An Improved Tool Set for ZigBee Warwalking,” *International Conference on Cyber Warfare and Security (ICWS '16)*, pp. 456-465. (Best MS Student Paper).

J. Fuller, B. Ramsey, J. Pecarina, and M. Rice, "Wireless Intrusion Detection of Covert Channel Attacks in ITU-T G.9959-based Networks," *International Conference on Cyber Warfare and Security (ICCWS '16)*, pp. 139-145.

J. Hall, B. Ramsey, M. Rice, and T. Lacey, "Z-Wave Network Reconnaissance and Transceiver Fingerprinting Using Software-Defined Radios," *International Conference on Cyber Warfare and Security (ICCWS '16)*, pp. 163-171.

J. Fuller and B. Ramsey, "Rogue Z-Wave Controllers: A Persistent Attack Channel," *IEEE International Workshop on Practical Issues in Building Sensor Network Applications (SenseApp '16)*, pp. 734-741.

H. Patel and B. Ramsey, "Comparison of Parametric and Non-Parametric Statistical Features for Z-Wave Fingerprinting," *IEEE Military Communications Conference (MILCOM '15)*, pp. 378-382.

REITH, MARK G., Lt Col, Department of Electrical and Computer Engineering

RICE, MASON J., LTC, Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

J. Yoon, S. Dunlap, J. Butts, M. Rice and B. Ramsey, Evaluating the readiness of cyber first responders for critical infrastructure protection, *International Journal of Critical Infrastructure Protection*, Vol. 13, pp 19-27, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

J. Hall, B. Ramsey, M. Rice and T. Lacey, Z-Wave network reconnaissance and transceiver fingerprinting using software-defined radios, *International Conference on Cyber Warfare and Security (ICCWS)*, March 2016.

A. Seitz, B. Ramsey, B. Mullins and M. Rice, Z-Ranger: An improved tool set for ZigBee warwalking, *International Conference on Cyber Warfare and Security (ICCWS)*, March 2016.

J. Fuller, B. Ramsey, J. Pecarina and M. Rice, Wireless intrusion detection of covert channel attacks in ITU-TG.9959-based networks, *International Conference on Cyber Warfare and Security (ICCWS)*, March 2016.

BOOKS AND CHAPTERS IN BOOKS

M. Rice and S. Sheno (Eds.), *Critical Infrastructure Protection IX*, Springer, Germany, 2015.

K. Girtz, B. Mullins, M. Rice and J. Lopez, Practical application layer emulation in industrial control system honeypots, in *Critical Infrastructure Protection X*, February 2016.

S. Dunlap, J. Butts, J. Lopez, M. Rice and B. Mullins, Timing-based side-channel analysis for anomaly detection in the industrial control system environment, in *Critical Infrastructure Protection X*, February 2016.

M. Quigg, J. Lopez, M. Rice, M. Grimaila and B. Ramsey, Cyberspace and organizational structure: An analysis of the critical infrastructure Environment, in *Critical Infrastructure Protection X*, February 2016.

RUSNOCK, CHRISTINA, F., Maj, Department of Systems Engineering and Management

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bowden, J., & Rusnock, C.F., (2015). "Evaluation of Human Machine Interface Design Factors on Situation Awareness and Task Performance." *Proceedings of the 2015 Human Factors and Ergonomics Society Annual Meeting*, Los Angeles, CA, Oct 26-30, 2015.

STONE, SAMUEL J., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Phase I Support RF-Based Characterization of Systems.” Sponsor: AFRL/R.Y. Funding: \$25,000.

“Side-Channel Based Integrity Assessment and Intrusion Detection of Industrial Controllers.” Sponsor: Power Fingerprinting. Funding: \$20,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

B. Stone, S. Stone, “Comparison of Radio Frequency Based Techniques for Device Discrimination and Operation Identification,” 11th International Conference on Cyber Warfare and Security, Boston University, Boston, MA, Accepted for presentation, Mar 2016.

J. Wylie, S. Stone, B. Mullins “Detecting a Weakened Encryption Algorithm in Microcontrollers Using Correlation-Based Anomaly Detection,” 11th International Conference on Cyber Warfare and Security, Boston University, Boston, MA, Accepted for presentation, Mar 2016.

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“RF-EW Systems Support.” Sponsor: AFRL/R.Y. Funding: \$50,000.

“RFINT for Commercial Communications.” Sponsor: Undisclosed. Funding: \$55,186.

“RFINT for Commercial Communications (FY16 Continuation).” Sponsor: Undisclosed. Funding: \$57,599 – Temple 60%, Corbell 40%.

REFEREED JOURNAL PUBLICATIONS

Bihl, Bauer, Temple, “Feature Selection for RF Fingerprinting with MDA and Using ZigBee Device Emissions,” IEEE Trans on Info Forensics & Security, Vol. 11, Issue 8, pp. 1862-1874, Aug 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carbino, Temple, Lopez, “Conditional Constellation Based-Distinct Native Attribute (CB-DNA) Fingerprinting for Network Device Authentication,” 2016 IEEE Int’l Communications Conf (ICC 2016), Kuala Lumpur, Malaysia, May 2016.

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

BURCHETT, LEE R., *Methods for Passive Remote Turbulence Characterization in the Planetary Boundary Layer*. AFIT/ENP/DS/16M-058. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO.

MEIER, DAVID C., *Operational Exploitation of Satellite-Based Sounding Data and Numerical Weather Prediction Models for Directed Energy Applications*. AFIT/ENP/DS/15D-009. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: MZA.

6.3.2. MASTER'S THESES

COOK, RICHARD D., *Capturing Atmospheric Effects on 3-D Millimeter Wave Radar Propagation Patterns*. AFIT/ENP/MS/16M-063. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: AFRL/R.Y.

SHIREY, STEPHEN M., *A Relative Humidity Based Comparison of Numerically Modeled Aerosol Extinction to LIDAR and Adiabatic Parameterizations*. AFIT/ENP/MS/16M-082. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO.

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

BUTLER, SAMUEL D., Maj, Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Comparison of micro-facet BRDF model to modified Beckmann-Kirchhoff BRDF model for rough and smooth surfaces," *Optics Express* Vol. 23, No. 22, pp. 29100-29112, Nov 2015.

Freda, S.E., Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Analysis of wave optics BRDF model elements for a moderately rough surface," *Proc. SPIE* Vol. 9961, p. 15, Aug 2016.

COBB, RICHARD G., Department of Aeronautics and Astronautics

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 through Hall effect thruster plume and atmospheric modeling. *Proc. SPIE* 9974, *Infrared Sensors, Devices, and Applications VI*, 99740T (September 19, 2016); DOI:10.1117/12.2238021.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Specht, J. and Cobb, R., "Pointing Analysis and Design Drivers for Low Earth Orbit Satellite Quantum Key Distribution," *AIAA 41st Dayton-Cincinnati Aerospace Science Symposium*, 2 Mar 2016.

FERDINANDUS, MANUEL R., Maj, Department of Engineering Physics

FIORINO, STEVEN T., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“2016 AFIT Center for Directed Energy Summer Intern (DESI) Program.” Sponsor: HELJTO. Funding: \$60,000.

“Additions to AFIT Atmospheric Effects Software Code for AFRL/R.Y.” Sponsor: AFRL/R.Y. Funding: \$127,513.

“AFIT Research in Support of ONR’s US-India OSD-DRDO Collaborations.” Sponsor: ONR. Funding: \$120,000 – Fiorino 25%, Sritharan 25%, Akers 25%, Reeger 25%.

“AFIT’s Support to Oak Ridge National Laboratory MIDAS 16 DOE 2276-A066-15 Research (DTRA).” Sponsor: DTRA. Funding: \$100,000.

“Airborne Aero-optics Lab Beam Control Collection and Evaluation.” Sponsor: HELJTO. Funding: \$120,000.

“Atmospheric Characterization for Directed Energy Applications (Phase II SBIR).” Sponsor: MZA. Funding: \$65,496.

“CY2016 HELJTO AP TAWG Research and Analysis.” Sponsor: HELJTO. Funding: \$375,000.

“CY2016 HELJTO M&S TAWG Product Development.” Sponsor: HELJTO. Funding: \$400,000.

“Directed Energy and Remote Sensing Research, Development and Prototype Demonstration.” Sponsor: Raytheon. Funding: \$50,000.

“HIP-4D Weather Effects Visualization for Future Fires Decision Aids.” Sponsor: USACE. Funding: \$48,000.

“LEEDR Weather Datacube Development for SIMAF.” Sponsor: AFLCMC. Funding: \$150,000.

“Modeling Development for Forward Laser Acoustic Inhibitor (FLAIR).” Sponsor: SPAWAR. Funding: \$125,000.

“Modification of AFIT Atmospheric Effects Software Code for AFRL/R.Y.” Sponsor: AFRL/R.Y. Funding: \$79,532.

“Wave Optics of Deep Atmospheric Turbulence: From Underlying Physics towards Predictive Modeling, Mitigation and Exploitation.” Sponsor: AFOSR. Funding: \$270,000 – Fiorino 55%, Cusumano 45%.

“Wavefront Measurement through Scintillation with Speckle.” Sponsor: AFRL/RD. Funding: \$100,000.

“Weather Effects for Integrated HEL / KE Weapons Capabilities Analyses.” Sponsor: AFRL/RD. Funding: \$100,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Directed Energy Short Courses Continued Development and Delivery.” Sponsor: DEPS. Funding: \$9,050.

REFEREED JOURNAL PUBLICATIONS

Meier, D.M. and S.T. Fiorino, 2016: “Application of Satellite and NWP Derived Wind Profiles to Military Airdrop Operations,” *J. Appl. Meteor. Climatol.*, 55, 2197–2209, DOI: 10.1175/JAMC-D-15-0296.1.

Basu S, J.E. McCrae, S.T. Fiorino, and J. Przelomski, 2016: “Estimation of temporal variations in path-averaged atmospheric refractive index gradient from time-lapse imagery,” *Opt. Eng.* 0001; 55(9):090503. DOI:10.1117/1.OE.55.9.090503.

Van Zandt, N.R., J.E. McCrae, and S.T. Fiorino, 2016: "Modeled and measured image-plane polychromatic speckle contrast," *Opt. Eng.* Vol. 55 No. 2, 024106 DOI: 10.1117/1.OE.55.2.024106.

REFEREED CONFERENCE PAPERS ON THE BASIS OF FULL PAPER REVIEW

Fiorino S.T. and D.C. Meier, "Improving the fidelity of the Tatarskii Cn2 Calculation with inclusion of pressure perturbations," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, Washington DC, (OSA, 27 June 2016).

Burchett, L. and S.T. Fiorino, "Improved Parametrization for Estimating Cn2 from Numerical Weather Prediction," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, Washington DC, (OSA, 27 June 2016).

Basu, S., J. McCrae, and S.T. Fiorino, "Estimation of atmospheric refractive index gradient variations and Cn2 from time-lapse imagery," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, Washington DC invited, (OSA, 28 June 2016).

Fiorino, S.T., B. Elmore, J. Schmidt, E. Matchefts, And J. Burley, "A fast calculating two-stream-like multiple scattering algorithm that captures azimuthal and elevation variations," *Proceedings of SPIE*, Vol. 9833, 983305, Baltimore, MD, 21 April 2016.

McCrae, J. S. Basu, and S.T. Fiorino, "Estimation of atmospheric parameters from time-lapse imagery," *Proceedings of SPIE*, Vol. 9833, 983303, Baltimore, MD, 21 April 2016.

McCrae, J.E. and S.T. Fiorino, "Simulation of array tilt effects in laser phased arrays," 2016 IEEE Aerospace Conference, Big Sky, MT, March 2016.

Basu, S, L.R. Burchett, S.T. Fiorino, and J.E. McCrae, "Comparison of the path-weighted Cn2 derived from time-lapse imagery and weather radar," 2016 IEEE Aerospace Conference, Big Sky, MT, March 2016.

Basu, S., J. McCrae, S.T. Fiorino, L.R. Burchett, and C.A. Rice, "Comparison of atmospheric Cn2 and refractive index gradient variations derived from time-lapse photography to mesoscale modeling and radar measurements," *American Meteorological Society Annual Meeting*, New Orleans, LA, Jan 2016.

Fiorino, S.T., D.C. Meier, L.R. Burchett, M.F. Via, C.A. Rice, B.J. Elmore, and K.J. Keefer, "High Performance Computing for 4D Weather Cubes and Real-Time, World-Wide Visualization of Radiative Effects," 18th Symposium on Meteorological Observation and Instrumentation, 96th Annual American Meteorological Society Meeting, New Orleans, LA, Jan 2016.

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., L. Lamberson, K.J. Keefer, D. Rigdon, J. Schmidt, E. Matchefts, and B. Elmore, "Using Climatology and Numerical Weather Models for Ground-Based HEL Air Defense," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

Van Zandt, N.R., S.T. Fiorino, J. McCrae, and D. Kunkel, "UImaging and Tracking Modeling including Earth Reflection and Multiple Scattering," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

Schmidt, J., S.T. Fiorino, J. Burley, and B. Elmore, "Weather Cubes and 4D Visualizations of Atmospheric and Radiative Effects," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

O'Connor, K.J., S.T. Fiorino, J. Bowers, and K.J. Keefer, "HEL Field Test Forensic Analysis Using High Fidelity Laser Propagation Scaling Law Model and V&V'd Atmospheric Characterization Code," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, "Investigation of Turbulence Anisotropy using a Hartmann Turbulence Sensor," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

Burley, J., S.T. Fiorino, B.J. Elmore, J. Schmidt, and M.F. Via, "A Fast Calculating Two-Stream-Like Multiple Scattering Algorithm that Captures Azimuthal and Elevation Variations," 37th Review of Atmospheric Transmission Models Meeting, Woburn, MA, 26 July 2016.

Fiorino, S.T., K.J. Keefer, J.E. Schmidt, B.J. Elmore, and E.J. Matchefts "Weather Effects Tools for HEL Mission Planning and Fire Control," Directed Energy Professional Society 18th Annual DE Symposium, Albuquerque, NM (March 2016).

Fiorino, S.T., J.E. Schmidt, and K.L. Kremer "A Path-Independent, World-Wide CFLOS Calculator," Directed Energy Professional Society 18th Annual DE Symposium, Albuquerque, NM (March 2016).

GREENDYKE, ROBERT B., Department of Aeronautics and Astronautics

GROSS, KEVIN C., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

"Adapting and Improving Atmospheric Correction Algorithms for Wide-Band Hyperspectral Imaging Sensors." Sponsor: NASIC. Funding: \$73,815 – Gross 75%, Fiorino 25%.

REFEREED JOURNAL PUBLICATIONS

Fitch, K., K. Hutchinson, K. Bartlett, R. Wacker, K. Gross, "Assessing VIIRS cloud base height products with data collected from the Department of Energy Atmospheric Radiation Measurement sites," *International Journal of Remote Sensing*, vol. 37, pp. 2604-2620, 2016.

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: the Optical Sciences Corporation. Funding: \$112,500.

REFEREED JOURNAL PUBLICATIONS

Milo W. Hyde IV and Santasri Basu, "Two spatial light modulator system for laboratory simulation of random beam propagation in random media: comment," *Applied Optics*, Vol. 55, No. 21, pp. 5596-5597, Jul 2016, DOI: 10.1364/AO.55.005596. JIF: 1.598.

Milo W. Hyde IV, Santasri Basu, David G. Voelz, and Xifeng Xiao, "Generating partially-coherent Schell- model sources using a modified phase screen approach," *Optical Engineering*, Vol. 54, No. 12, 120501 (5 pp.), Dec 2015, DOI: 10.1117/1.OE.54.12.120501. JIF: 0.954.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Noah R. Van Zandt, Mark F. Spencer, Michael J. Steinbock, Brian M. Anderson, Milo W. Hyde IV, and Steven T. Fiorino, "Comparison of polychromatic wave-optics models," *Proceedings of SPIE (SPIE Optics and Photonics)*, Vol. 9982, 17 pp., San Diego, CA, Aug 2016.

Milo W. Hyde IV, "Phase-only implementation of the complex screen technique for generating Schell-model sources," *IEEE Aerospace Conference (AeroConf)*, 6 pp, Big Sky, MT, Mar 2016.

Milo W. Hyde IV, "The scattering of a partially-coherent electromagnetic field from a bianisotropic object," IEEE Aerospace Conference (AeroConf), 10 pp., Big Sky, MT, Mar 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Milo W. Hyde IV, Alex Strom, and Glenn A. Tyler, "Enhanced LOCSET/IPALS array tilt correction using a local phasing loop," Directed Energy Professional Society (DEPS) Directed Energy Systems Symposium (Limited Distribution), p. 24, Portsmouth, VA, Sep 2016.

MARCINIAK, MICHAEL A., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

"Discontinuous Phase Surfaces for Low-Profile Infrared Optics." Sponsor: AFOSR. Funding: \$19,700.

"Dynamic Data-Driven Focusing of Light Scattered from Diffuse Reflectors using Phase Modulation." Sponsor: AFOSR. Funding: \$91,240 – Marciniak 84%, Oxley 16%.

REFEREED JOURNAL PUBLICATIONS

Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Comparison of micro-facet BRDF model to modified Beckmann-Kirchhoff BRDF model for rough and smooth surfaces," Optics Express Vol. 23, No. 22, pp. 29100-29112, Nov 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Burgi, K.W., Marciniak, M.A., Nauyoks, S.E., and Oxley, M.E., "Matrix methods for reflective inverse diffusion," Proc. SPIE Vol. 9961, p. 23, Aug 2016.

Freda, S.E., Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Analysis of wave optics BRDF model elements for a moderately rough surface," Proc. SPIE Vol. 9961, p. 15, Aug 2016.

MCCRAE, JACK E., Jr., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Noah R. Van Zandt, Jack E. McCrae, and Steven T. Fiorino, "Modeled and measured image-plane polychromatic speckle contrast," Opt. Eng. 55(2):024106 (1-7), (Feb 2016).

Basu S, J.E. McCrae, S.T. Fiorino, and J. Przelomski, 2016: "Estimation of temporal variations in path-averaged atmospheric refractive index gradient from time-lapse imagery," *Opt. Eng.* 0001; 55(9):090503. DOI:10.1117/1.OE.55.9.090503.

Van Zandt, N.R., J.E. McCrae, and S.T. Fiorino, 2016: "Modeled and measured image-plane polychromatic speckle contrast," *Opt. Eng.* Vol. 55 No. 2, 024106 DOI: 10.1117/1.OE.55.2.024106.

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Basu, S., J. McCrae, and S.T. Fiorino, "Estimation of atmospheric refractive index gradient variations and Cn2 from time-lapse imagery," in Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP), Washington DC invited, (OSA, 28 June 2016).

McCrae, J, S. Basu, and S.T. Fiorino, "Estimation of atmospheric parameters from time-lapse imagery," Proceedings of SPIE, Vol. 9833, 983303, Baltimore, MD, 21 April 2016.

McCrae, J.E. and S.T. Fiorino, "Simulation of array tilt effects in laser phased arrays," 2016 IEEE Aerospace Conference, Big Sky, MT, March 2016.

Basu, S, L.R. Burchett, S.T. Fiorino, and J.E. McCrae, "Comparison of the path-weighted Cn2 derived from time-lapse imagery and weather radar," 2016 IEEE Aerospace Conference, Big Sky, MT, March 2016.

Basu, S., J. McCrae, S.T. Fiorino, L.R. Burchett, and C.A. Rice, "Comparison of atmospheric Cn2 and refractive index gradient variations derived from time-lapse photography to mesoscale modeling and radar measurements," American Meteorological Society Annual Meeting, New Orleans, LA, Jan 2016.

REFEREED CONFERENCE PAPERS ABSTRACT REVIEW

Van Zandt, N.R., S.T. Fiorino, J. McCrae, and D. Kunkel, "UImaging and Tracking Modeling including Earth Reflection and Multiple Scattering," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, "Investigation of Turbulence Anisotropy using a Hartmann Turbulence Sensor," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

Jack E. McCrae, Santasri Basu, and Steven T. Fiorino, "Estimation of atmospheric parameters from time-lapse imagery," Proc. SPIE 9833, Atmospheric Propagation XIII, 983303 (May 13, 2016); DOI:10.1117/12.2223986.

NAUYOKS, STEPHEN E., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Comparison of micro-facet BRDF model to modified Beckmann-Kirchhoff BRDF model for rough and smooth surfaces," Optics Express Vol. 23, No. 22, pp. 29100-29112, Nov 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Burgi, K.W., Marciniak, M.A., Nauyoks, S.E., and Oxley, M.E., "Matrix methods for reflective inverse diffusion," Proc. SPIE Vol. 9961, p. 23, Aug 2016.

Freda, S.E., Butler, S.D., Nauyoks, S.E., and Marciniak, M.A., "Analysis of wave optics BRDF model elements for a moderately rough surface," Proc. SPIE Vol. 9961, p. 15, Aug 2016.

PERRAM, GLEN P., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

"Design and Analysis of Unstable Resonators for Diode Pumped Alkali Lasers." Sponsor: HELJTO. Funding: \$130,487.

"Diode Pumped Rare Gas Lasers." Sponsor: HELJTO. Funding: \$255,211.

"In-Process Monitoring of Additive Manufacturing. Phase II. Selective Laser Melting and E-Beam Manufacture." Sponsor: NASA (WSU and MLPC). Funding: \$130,221.

"Rubidium Vapor Circulation System: Optical Diagnostic (Phase II)." Sponsor: Creare. Funding: \$197,790.

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 D1 and D2 lines for 4He and 3He collisions," Journal of Quantitative Spectroscopy and Radiative Transfer, 184, 118-134, Nov 2016.

Paul J. Moran, Ryan M. Richards, Christopher A. Rice, and Glen P. Perram, “Mid-infrared Rubidium $6\ 2P\ 3/2, 1/2 \rightarrow 6\ 2S_{1/2}$ Laser,” Optics Communications, 374, 51-57, Aug 2016.

Ben Eshel, Christopher A. Rice, and Glen P. Perram, “Pressure broadening and shift rates for Ar (s-p) transitions observed in an Ar-He discharge,” Journal of Quantitative Spectroscopy and Radiative Transfer 179, 40-50 Aug 2016.

Ricardo C. Davila and Glen P. Perram, “Spin-orbit relaxation of Cesium $7\ 2D$ in mixtures of helium and argon,” Physical Review A, 93, 033418, Mar 2016.

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “Combustion kinetics of laser irradiated porous graphite from imaging Fourier transform spectroscopy,” Combustion and Flame, 163, 90-99, Jan 2016.

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “Thermal degradation of poly(methyl methacrylate) with a $1.064\ \mu\text{m}$ Nd:YAG laser in buoyant flow,” Polymer Degradation and Stability, 121, 78-89, Nov 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Jiande Han, Michael C. Heaven, Daniel Emmons, Glen P. Perram, David E. Weeks, and William F. Bailey “Pulsed Discharge Production of Ar Metastables,” Proc. SPIE 9729, 97290D, SPIE Photonics West, April 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Nicholas C. Herr, Ashley E. Gonzales, Grady T. Phillips and Glen P. Perram, “Fiber laser irradiated graphite and carbon fiber reinforced polymers using imaging Fourier Transform Spectroscopy,” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM.

Steven A. Owen, Ben Eshel, Christopher A. Rice and Glen P. Perram, “Optically Pumped Rare Gas Laser Kinetics,” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM.

A.J. Wallerstein, Ricardo Davila, Christopher A. Rice and Glen P. Perram, “Diode Pumped Alkali Laser Kinetics: Higher Lying Excited States” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM.

PHILLIPS, GRADY T., Department of Engineering Physics

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Nicholas C. Herr, Ashley E. Gonzales, Grady T. Phillips and Glen P. Perram, “Fiber laser irradiated graphite and carbon fiber reinforced polymers using imaging Fourier Transform Spectroscopy,” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM.

REEGER, JONAH A., Capt, 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.

Paul J. Moran, Ryan M. Richards, Christopher A. Rice, and Glen P. Perram, “Mid-infrared Rubidium $6\ 2P\ 3/2, 1/2 \rightarrow 6\ 2S_{1/2}$ Laser,” Optics Communications, **374**, 51-57, Aug 2016.

Ben Eshel, Christopher A. Rice, and Glen P. Perram, “*Pressure broadening and shift rates for Ar (s-p) transitions observed in an Ar-He discharge*,” Journal of Quantitative Spectroscopy and Radiative Transfer **179**, 40-50 Aug 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Steven A. Owen, Ben Eshel, Christopher A. Rice and Glen P. Perram, “*Optically Pumped Rare Gas Laser Kinetics*,” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM.

A.J. Wallerstein, Ricardo Davila, Christopher A. Rice and Glen P. Perram, “*Diode Pumped Alkali Laser Kinetics: Higher Lying Excited States*,” Directed Energy Professional Society Annual Symposium, March 2016, Albuquerque, NM.

SRITHARAN, SIVAGURU S., Department of Mathematics and Statistics

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: \$30,000.

REFEREED CONFERENCE PAPERS 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 Ar Metastables,” Proc. SPIE 9729 (2016) 97290D.

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

ANDERSON, JASON R., *An Examination of Commercial Motor Vehicle Hours of Service Safety Regulation*. AFIT/ENS/DS/16S-025. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: N/A.

BELLUCCI, JOSEPH P., *Non-Linear Metamodeling Extensions to the Robust Parameter Design of Computer Simulations*. AFIT/ENS/DS/16S-026. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: HQ USAF/A9.

GIBB, MICHAEL P., *On Improved Least Squares Regression & Artificial Neural Network Meta-models for Simulation via Control Variates*. AFIT/ENS/DS/16S-030. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: AFNWC.

MILLER, ALLEN R., *The Influence of Education and Experience upon Contextual and Task Performance*. AFIT/ENS/DS/16S-073. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: SCOW.

6.4.2. MASTER'S THESES

AYKIRI, BAHADIR, *Simulation Modeling of the Sortie Generation Process in Turaf*. AFIT/ENS/MS/16M-090. Faculty Advisor: Dr. John O. Miller. Sponsor: TURAF.

BOARDMAN, NICHOLAS T., *Heterogeneous Air Defense Battery Location: A Game Theoretic Approach*. AFIT/ENS/MS/16M-091. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: N/A.

BRADSHAW, AMELIA E., *United States Air Force Officer Manpower Planning Problem via Approximate Dynamic Programming*. AFIT/ENS/MS/16M-092. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: HQ USAF/A1.

BRADSHAW, CALVIN J., *Contingency Workload Demand Forecast Techniques for Cargo and Flying Hours*. AFIT/ENS/MS/16M-093. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: USTRANSCOM.

CARDENAS, KEVIN R., *Logistics Simulation for Long Duration Logistics Wargames*. AFIT/ENS/MS/16M-095. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4F.

CLAWSON, CHRISTOPHER L., *Consolidating Supply Chain Management Education through Professional Certification*. AFIT/ENS/MS/16M-096. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: HQ USAF/A4.

COTTON, JAMES A., *Antecedents of Fuel Efficiency*. AFIT/ENS/MS/16M-099. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: SAF/IEN.

DAVIS, MICHAEL T., *Determination of Fire Control Policies via Approximate Dynamic Programming*. AFIT/ENS/MS/16M-100. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: N/A.

DICKEY, THOMAS M., *Modeling and Economy's Dynamics and External Influences through a System of Differential Equations*. AFIT/ENS/MS/16M-102. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA.

DWYER, JUSTIN J., *Analysis of Military Entry Control Point Queueing*. AFIT/ENS/MS/16M-103. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM.

EHRlich, JACOB M., *A Response Surface Validation of a Quantum Key Distribution Model*. AFIT/ENS/MS/16M-104. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

GRIFFITH, DANIEL A., *Epidemiology, Cost, and Aircraft Choice for Aeromedical Evacuation in AFRICOM*. AFIT/ENS/MS/16M-105. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

HEFTY, KILEY E., *Application of Reliability Allocation Principles on Statistical Power*. AFIT/ENS/MS/16M-106. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

JANTSCHER, HELEN L., *An Examination of Economic Metrics as Indicators of Air Force Retention*. AFIT/ENS/MS/16M-107. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

JAVID, CLAY C., *Assessing the Military Worth of Advanced Capabilities of the Small Advanced Capabilities Missile through Agent-Based Modeling*. AFIT/ENS/MS/16M-108. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin.

KIM, CHANGSUNG, *Simulation Modeling and Analysis of Air Force Depot Engine Repair during Normal and Increased Operational Tempos*. AFIT/ENS/MS/16M-109. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4F.

LAFIGUERA, GEORGE B., *A “Big Bang” versus a “Small Bang” Approach: A Case Study of the Expeditionary Combat Support System (ECSS) and the Maintenance, Repair, and Overhaul Initiative (MROi)*. AFIT/ENS/MS/16M-110. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFMC/A4P.

LEASE, LUCAS J., *The Impact of Reducing Full Time Support Positions in the U.S. Army National Guard and Reserves*. AFIT/ENS/MS/16M-111. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: CAA.

LIRA, JOHN R., *Agent-Based Modeling for Air-to-Air Missile Combat*. AFIT/ENS/MS/16M-112. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin.

MARTIN, SANTIAGO L., *Overhaul Facility Planning and Control Tool Selection and Implementation Analysis*. AFIT/ENS/MS/16M-114. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: Argentine Air Force Material General Directorate.

MARTYN, ANTON H., *Long-Term Impacts of Military Drawdown on the Industrial Base*. AFIT/ENS/MS/16M-115. Faculty Advisor: Dr. William Cunningham. Sponsor: N/A.

MCGRIFF, WARREN B., *Rate Setting Analysis: A Statistical Approach to Outliers in the Rate Setting Process within the United States Transportation Command*. AFIT/ENS/MS/16M-118. Faculty Advisor: Dr. Brian J. Lunday. Sponsor: USTRANSCOM.

MCLEAN, BRENDEN A., *Autoencoded Reduced Clusters for Anomaly Detection Enrichment (Arcade) In Hyperspectral Imagery*. AFIT/ENS/MS/16M-119. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: HQ USAF/A9.

MICKELSEN, RICHARD J., *Modeling the Components of an Economy as a Complex Adaptive System*. AFIT/ENS/MS/16M-120. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA.

MONTGOMERY, ROBERT T., *Using Multiple Objective Decision Analysis to Position Federal Product and Service Codes within the Kraljic Portfolio Matrix*. AFIT/ENS/MS/16M-121. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: HQ USAF.

OLIVEIRA, LEANDRO V., *An Evaluation of Forecasting Methods that could be used in the Brazilian Air Force Uniform Distribution Process*. AFIT/ENS/MS/16M-122. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: Brazilian Air Force.

PARK, JAMES M., *Optimizing Forecasting Methods for USTRANSCOM Railcar Demands*. AFIT/ENS/MS/16M-124. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: USTRANSCOM.

POPOVICH, JOVAN, *A Model of Ambient Noise Caused by Wind Flow*. AFIT/ENS/MS/16M-125. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

SALGADO, ETHAN L., *Using Approximate Dynamic Programming to Solve the Stochastic Demand Military Inventory Routing Problem with Direct Delivery*. AFIT/ENS/MS/16J-031. Faculty Advisor: Lt Col Matthew J. Robbins. Sponsor: TRADOC.

SALGADO, JESSICA A., *Factors Influencing Skill Retention in Multi-Skilled Air Force Aircraft Maintainers*. AFIT/ENS/MS/16M-130. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: AFMC/A4P.

SEVIMLI, ABDURRAHMAN, *Sortie Generation Simulation of a Fighter Squadron*. AFIT/ENS/MS/16M-127. Faculty Advisor: Dr. John O. Miller. Sponsor: TURAF.

SHALLCROSS, NICHOLAS, *A Logistic Regression and Markov Chain Model for the Prediction of Nation-state Violent Conflicts and Transitions*. AFIT/ENS/MS/16M-128. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA.

TETRAULT, ALYSSA S., *The Effects of High Performance Aircraft Respiratory Systems on Pilots*. AFIT/ENS/MS/16M-129. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: 711 HPW/USAFSAM.

WALTER, RUSSELL W., *Methods to Address Extreme Class Imbalance in Machine Learning Based Network Intrusion Detection Systems*. AFIT/ENS/MS/16M-131. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: HQ USAF/A9.

WILSON, CASSIDY L., *Increased Capacity Utilizing Aggregation and Consolidation of Contingency Cargo*. AFIT/ENS/MS/16M-132. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A3.

WOODS, CANDIS A., *Determining the Degree of the Routinization of Additive Manufacturing in the Air Logistics Complexes*. AFIT/ENS/MS/16M-098. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFMC/A4P.

ZENS, CHRISTINE L., *Application of Non-Rated Line Officer Attrition Levels and Career Field Stability*. AFIT/ENS/MS/16M-133. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

6.4.3. GRADUATE RESEARCH PAPERS

AGNES, ALLEN Y., *Improving the Nuclear Reform Implementation for Success*. AFIT/ENS/MS/16S-023. Faculty Advisor: Lt Col Joshua K. Strakos. Sponsor: AFGSC.

BLACKRICK, JEFFERY M., *Air Force Nuclear Enterprise Organization: A Case Study*. AFIT/ENS/MS/16S-027. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: AFGSC.

BOONE, MATTHEW D., *Senior Leader Perspective on the Air Force Nuclear Enterprise: Today's Issues and the Future*. AFIT/ENS/MS/16S-028. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AFGSC.

CONKLIN, NICHOLAS J., *AMLO Promotion: Perceptions and Reality*. AFIT/ENS/MS/16J-020. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: 18 AF/CV.

ECHARD, BRET, *Point of Safe Return Minimums...How Low Can You Go?* AFIT/ENS/MS/16J-021. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9.

EICHNER, CHARLES L., *Extending Service Life of Aircraft through Fleet Management: A Study in C-17 Base and Aircraft Assignments.* AFIT/ENS/MS/16J-022. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: AMC/A9.

EVANS, ROBERT C., *Looking to the Future of the Air Force Nuclear Enterprise.* AFIT/ENS/MS/16S-029. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AFGSC.

GUY, TIMOTHY R., *KC-46 Enterprise Fleet Management.* AFIT/ENS/MS/16J-023. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC.

HABBESTAD, JOHN M., *463L Pallet Compatibility Implications for Warfighting Capacity in the Civil Reserve Air Fleet.* AFIT/ENS/MS/16J-024. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A9.

HEIL, MARK A., *The Air Force Building Partnership Capacity Problem: Are We Engaged in the Right Partnerships?* AFIT/ENS/MS/16J-025. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: SAF/IA.

HOOD, MATTHEW L., *The Future of Tactical Airlift: The Application of CRUAS in Afghanistan.* AFIT/ENS/MS/16J-026. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9.

JOHNSTON, TAYLOR J., *Optimizing the Continental United States Air Refueling Infrastructure.* AFIT/ENS/MS/16J-027. Faculty Advisor: Dr. Jeffrey D. Weir. Sponsor: HQ USAF/A3.

KING, ADAM P., *Measuring the 'Leading People' Organizational Health of AMC Wings on a Non-interference Basis.* AFIT/ENS/MS/16J-028. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/IG.

KOSTRUBALA, KAZIMIR M., *United States Transportation Command's Role as a Lead Enabling Agency during Humanitarian and Disaster Relief Events Outside the Contiguous United States.* AFIT/ENS/MS/16J-029. Faculty Advisor: Lt Col Joshua K. Strakos. Sponsor: AMC/A4.

ORTIZ, MARC ANTHONY C., *Assessing the Effects of Organizational Changes within the Office of the Secretary of Defense on the Nuclear Mission.* AFIT/ENS/MS/16S-035. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFGSC.

PABST, DAVID, *Department of Energy: An Organizational Look at America's Nuclear Deterrent.* AFIT/ENS/MS/16S-036. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AFGSC.

SLAZINIK, IAN M., *Air Mobility Future: Evolving Command and Control Relationships in the Information Age.* AFIT/ENS/MS/16J-032. Faculty Advisor: Maj Benjamin T. Hazen. Sponsor: 618 AOC.

STEIN, ANDREW M., *Functional Mission Analysis: A Functional Approach to Mission Assurance.* AFIT/ENS/MS/16J-033. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AMC/A6.

STUBBENDORFF, JESPER R., *A Commander's First Challenge: Establishing a Pathway of Trust.* AFIT/ENS/MS/16J-034. Faculty Advisor: Lt Col Robert E. Overstreet. Sponsor: AF PACE.

THOMPSON, MICHAEL J., *Additive Manufacturing (3D Printing) Aircraft Parts and Tooling at the Maintenance Group Level.* AFIT/ENS/MS/16J-035. Faculty Advisor: Lt Col Joseph R. Huscroft, Jr. Sponsor: AMC/A9.

THORNTON, RYAN K., *AMC Pilot Retention: A Delphi Study.* AFIT/ENS/MS/16J-036. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: HQ USAF/A3.

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.

AHNER, DARRYL K., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“F-35 T&E Support: Verification and Validation for the Virtual Simulation Environment.” Sponsor: F-35 Joint Program Office. Funding: \$733,834 – Ahner 80%, Weir 20%.

“PMESI Assessments and Further Data Development.” Sponsor: CAA. Funding: \$95,000.

REFEREED JOURNAL PUBLICATIONS

Garee, M.J., Hill, R.R., Ahner, D., Czarnecki, G., “Fragment capture simulation for MANPADS test arena optimization,” *Journal of Simulation*, DOI:10.1057/jos.2016.9, 2016.

Hill, R.R., Ahner, D., Morrill, D., Talafuse, T., “Applying Statistical Engineering to the Development of a Ballistic Impact Flash Model,” *Quality Engineering*, DOI: 10.1080/08982112.2016.1155223, 2016.

BAUER, KENNETH W., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Anomaly Detection and Data Visualization for Improved Cyber Security.” Sponsor: USA CYBER. Funding: \$150,000 – Bauer 80%, Chrissis 20%.

CHRISSIS, JAMES W., Department of Operational Sciences

CUNNINGHAM, WILLIAM A., Department of Operational Sciences

DOUGLAS, MATTHEW A., Lt Col, Department of Operational Sciences,

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kazi, D., Johnson, A.W., & Douglas, M.A., “Information system innovation in the legacy systems era,” Western Decision Sciences Institute Annual Meeting, Las Vegas, NV, 5-8 Apr 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Overstreet, R. E., Douglas, M. A., Hazen, B. T., “Supply chain leader/follower interaction: Managing change while focusing on enterprise level objectives,” POMS 27th Annual Conference, Orlando, FL, 6-9 May 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Douglas, M. A., Overstreet, R. E., and Hazen B.T., “Art of the possible or fool’s errand: Diffusion of large scale management innovations,” *Business Horizons*. Vol. 59, No. 4, pp. 379–389, 2016.

HARTMAN, PAUL L., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

"AFMC Senior Leader Forum Support." Sponsor: AFMC. Funding: \$50,000.

“Airworthiness Planning in Support of the 5th-to-4th Gen Gateway Program.” Sponsor: AFLCMC. Funding: \$16,626 – Hartman 50%, Weir 50%.

“Operational Requirements for the Mechanical Equipment & Subsystem Integrity Program (MECSIP).” Sponsor: AFLCMC. Funding: \$450,000 – Hartman 50%, Weir 50%.

“Research, Development, Test and Evaluation (RDT&E) for the Presidential Aircraft Recapitalization (PAR) Program.” Sponsor: AFLCMC. Funding: \$620,206 – Hartman 50%, Weir 50%.

“System Level Functional and Performance Requirements for the Special Mission Suite (SMS) System on the AC/MC-130J.” Sponsor: USSOCOM. Funding: \$849,946 – Hartman 50%, Weir 50%.

“Technical Support for Collaboration with the Advanced Synthetic Aperture Radar System (ASARS) Program Office.” Sponsor: AFLCMC. Funding: \$364,305 – Hartman 50%, Weir 50%.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Tasking, Processing, Exploitation, and Dissemination Examples Book Chapter Roadmap." Sponsor: Undisclosed. Funding: \$60,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kretser, M.P., Ogden, J., Colombi, J.M., Hartman, P., “Applying the Collapsing Design Structure Matrix Method to Develop Military Enterprise Systems Integration Plans”, Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 April 2016.

HAZEN, BENJAMIN T., Maj, Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Air Force Supply Chain Problem Item Early Detection.” Sponsor: AFMC/EN. Funding: \$283,750 – Hazen 80%, Weir 10%, Hartman 10%.

REFEREED JOURNAL PUBLICATIONS

Cooper, A. L., Huscroft, J. R., Overstreet, R. E., & Hazen, B. T., “Knowledge management for logistics service providers: The role of learning culture,” *Industrial Management & Data Systems*, Vol. 116, No. 3, pp. 584-602, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hazen, B. T., “Cognitive heuristics for improving information and decision quality in the supply chain,” 5th World Congress on Production & Operations Management, Havana, Cuba, 6-10 Sep 2016.

Hazen, B. T., “New directions for supply chain management in support of circular economy,” 5th World Congress on Production & Operations Management, Havana, Cuba, 6-10 Sep 2016.

Boone, C. A., Skipper, J. B, Hazen, B. T., & Scott, M., “Service parts management: An empirically derived agenda,” Southeast Decision Sciences Institute Annual Meeting, Williamsburg, VA, 17-19 Feb 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Overstreet, R. E., Douglas, M. A., & Hazen, B. T., “Supply chain leader/follower interaction: Managing change while focusing on enterprise level objectives,” Production & Operations Management 27th Annual Conference, Orlando, FL, 6-9 May 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Hazen, B. T., "Editorial: Overcoming basic barriers to publishing research," *International Journal of Logistics Management*, Vol. 27, No. 1, 2016.

Overstreet, R. E. & Hazen, B. T., "Editorial: Tips for conducting high-quality reviews," *International Journal of Logistics Management*, Vol. 27, No. 2, 2016.

Hazen, B. T., Fawcett, S. E., Ogden, J., Autry, C., Richey, R. G., & Ellinger, A. E., "Editorial: Addressing a broken peer review process," *International Journal of Logistics Management*, Vol. 27, No. 3, 2016.

HILL, RAYMOND R., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

"Experimental Design Methods for Dynamical Systems." Sponsor: AFRL/RQ. Funding: \$25,000.

"The Science of Test: Advanced Test and Evaluation in Support of the DOD Test and Evaluation Enterprise." Sponsor: DOT&E. Funding: \$358,635 – Hill 25%, Stone 25%, Freels 25%, Hodson 25%.

REFEREED JOURNAL PUBLICATIONS

Harman, M., Cortes, L. A., and Hill, R. R., "Quantifying Test Risk Using Design of Experiments," *The ITEA Journal of Test and Evaluation*, Vol. 37, No. 2, pp. 160-166, 2016.

Garee, M. J., Hill, R. R., Ahner, D. K., and Czarnecki, G., "Fragment capture simulation for MANPADS test arena optimization," *Journal of Simulation*, DOI: 10.1057/jos.2016.9, 2016.

Skipper, Joseph B., William A. Cunningham, Christopher A. Boone, and Raymond R. Hill, "Managing Hub and Spoke Networks: A Military Case Comparing Time and Cost," *Journal of Global Business and Technology*, Vol. XII, No. 1, pp. 33-47, 2016.

Hill, R. R., Ahner, D. K., Morrill, D. F., Talafuse, T. P. and Bestard, J. J., "Applying Statistical Engineering to the Development of a Ballistic Impact Flash Model," *Quality Engineering*, DOI: 10.1080/08982112.2016.1155223, 2016.

Bova, M. J., F. W. Ciarallo and R. R. Hill, "Development of an Agent-Based Model for the Secondary Threat Resulting from a Ballistic Impact Event," *Journal of Simulation*, Vol. 10, No. 1, pp. 24-35, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Burns, A, Miller, J. O. and Hill, R. R., "Using SEAS to Assess GPS Constellation Resiliency in an Urban Canyon Environment," 2015 Winter Simulation Conference, IEEE, Huntington Beach, CA, 6-9 Dec 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fouts, B., Serres, J. Hill, R. and Ciarallo, F., "Application Development for Optimizing Patient Placement in the Enroute Care Environment," 87th Annual Scientific Meeting of the Aerospace Medical Association, Atlantic City, NJ, 24-28 Apr 2016.

Fouts, B., Serres, J. Hill, R. and Ciarallo, F., "Application Development for Optimizing Patient Placement in the Enroute Care Environment," 2015 Airlift Tanker Association (A/TA) Conference, Orlando, FL, 29 Oct - 1 Nov 2015.

Fouts, B., Serres, J. Hill, R. and Ciarallo, F., "Application Development for Optimizing Patient Placement in the Enroute Care Environment," 87th Annual Scientific Meeting of the Aerospace Medical Association, Atlantic City, NJ, 24-28 Apr 2016.

Hill, R. R. and Russell, B., "Case Studies Comparing Traditional versus Modern Test Designs," Rigorous Test and Evaluation for Defense, Aerospace, and National Security workshop, Crystal City, VA, 11-13 Apr 2016.

Hill, R. R. and Russell, B., "Comparing Traditional versus Modern Test Designs via Meta-Models," Defense Analysis Exchange XVIII, Seoul South Korea, 1-5 May 2016.

Hill, R. R., B. Stone and W. Adorno, "Autonomous Experimentation of Carbon Nanotube Growth using Response Surface Methods," Quality and Productivity Research Conference, Phoenix, AZ, 13-17 Jun 2016.

Hill, R. R. and Russell, B., "Comparing Traditional versus Modern Test Designs via Meta-Models," Quality and Productivity Research Conference, Phoenix, AZ, 13-17 Jun 2016.

BOOKS AND CHAPTERS IN BOOKS

Tan, H. T. and Hill, R. R., "The In-Transit Vigilant Covering Tour Problem for Routing Unmanned Ground Vehicles." *Operations Research for Unmanned Systems*, J. R. Cares and J. Q. Dickmann Jr., (eds.), Wiley, New York, April 2016, pp. 7-26.

Hill, R. R. and Stone, B. B., "Experimental Design for Unmanned Aerial Systems Analysis: Bringing Statistical Rigor to UAS Testing." *Operations Research for Unmanned Systems*, J. R. Cares and J. Q. Dickmann Jr., (eds.), Wiley, New York, April 2016, pp. 187-206.

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

JOHNSON, ALAN W., 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: \$350,000 – Johnson 40%, Ogden 60%.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Research, Analysis, and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center." Sponsor: AFMC/A4P. Funding: \$90,000 – Johnson 40%, Ogden 60%.

REFEREED JOURNAL PUBLICATIONS

Boehmke, B., Johnson, A., White, E., Weir, J. and Gallagher, M., "Tooth-to-Tail Impact Analysis: Combining Econometric Modeling and Bayesian Networks to Assess Support Cost Consequences Due to Changes in Force Structure," *Journal of Cost Analysis and Parametrics*, Vol. 9, No. 1, pp. 2-31, 2016.

Boehmke, B., Johnson, A., White, E., Weir, J. and Gallagher, M., "Bending the Cost Curve: Moving the Focus from Macro-level to Micro-level Cost Trends with Cluster Analysis," *Journal of Cost Analysis and Parametrics*, Vol. 8, No. 2, pp. 126-148, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kazi, D., Johnson, A. and Douglas, M., "Information System Innovation in the Legacy Systems Era," Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 Apr 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Johnson, A., Boehmke, B., White, E., Weir, J., and Gallagher, M., "Effectiveness and Efficiency of Air Force Installation Support Activities Using Data Envelopment Analysis," 84th MORS Symposium, Alexandria, VA, 21-24 June 2016.

KRETSER, MICHAEL P., Capt, Department of Operational Sciences

REFEREED JOURNAL PUBLICATIONS

Kretser, M.P., Ogden, J., Colombi, J.M., Hartman, P., "Exploring Design Structure Matrices to Reduce Enterprise Information Systems Complexity," *Journal of Enterprise Transformation*, Vol. 6, No.1, pp. 39-59, 2016.

Colombi, J.M., Kretser, M.P., Ogden, J., Hartman, P., "Enterprise Systems Integration using Collapsing Design Structure Matrices," *CrossTalk, Journal of Defense Software Engineering*, Vol. 29, No. 3, pp 33-37, May/June 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kretser, M.P., Ogden, J., Colombi, J.M., Hartman, P., "Applying the Collapsing Design Structure Matrix Method to Develop Military Enterprise Systems Integration Plans," Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 April 2016.

LUNDAY, BRIAN J., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

"Transportation and Distribution Research." Sponsor: USTRANSCOM. Funding: \$125,000.

REFEREED JOURNAL PUBLICATIONS

Han, C. Y., Lunday, B. J., & Robbins, M. J., "A Game Theoretic Model for the Optimal Disposition of Integrated Air Defense Missile Batteries," *INFORMS Journal on Computing*, Vol. 28, No. 3, pp. 405-416, 2016.

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*. DOI: 10.1016/j.omega.2016.02.006, 2016.

Rettker, A. J., Robbins, M. J., & Lunday, B. J., "Approximate Dynamic Programming for the Dispatch of Military Medical Evacuation Assets," *European Journal of Operational Research*, Vol. 254, No. 3, pp. 824-839, 2016.

Robbins, M. J. & Lunday, B.J., "A Bilevel Formulation of the Pediatric Vaccine Pricing Problem," *European Journal of Operational Research*, Vol. 248, No. 2, pp. 634-645, 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Designed and taught a 3-day Game Theory technical symposium to establish disciplinary literacy and introductory modeling capacity for 20 scientists and analysts from the Joint Warfare Analysis Center (JWAC), Dahlgren, VA, 12-15 Sep 2016.

MILLER, JOHN O., Department of Operational Sciences

REFEREED JOURNAL PUBLICATIONS

Connors, C.D., Miller, J.O., Lunday, B., "Using Agent-Based Modeling and a Designed Experiment to Simulate and Analyze a New Air-to-Air Missile," *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, Vol. 13, No. 3, pp. 321-330, 2016.

OGDEN, JEFFREY A., Department of Operational Sciences

REFEREED JOURNAL PUBLICATIONS

Colombi, J.M., Kretser, M.P., Ogden, J., Hartman, P., “Enterprise Systems Integration using Collapsing Design Structure Matrices,” *Journal of Defense Software Engineering*, Vol. 29, No. 3, pp. 33-37, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kretser, M., Ogden, J., Colombi, J. and Hartman, P., “Applying the Collapsing Design Structure Matrix Method to Develop Military Enterprise Systems Integration Plans,” Western Decision Sciences Institute Conference, Las Vegas, NV, 5-8 Apr 2016.

OVERSTREET, ROBERT E., Lt Col, Department of Operational Sciences

REFEREED JOURNAL PUBLICATIONS

Douglas, M. A., Overstreet, R. E., and Hazen B.T., “Art of the Possible or Fool’s Errand: Diffusion of Large Scale Management Innovations,” *Business Horizons*, Vol. 59, No. 4, pp. 379–389, 2016.

Cooper, A. L., Huscroft, J. R., Overstreet, R. E., and Hazen, B. T., “Knowledge Management for Logistics Service Providers: The Role of Learning Culture,” *Industrial Management & Data Systems*, Vol. 116, No. 3, pp. 1–21, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Overstreet, R. E., Douglas, M. A., Hazen, B. T., “Supply Chain Leader/Follower Interaction: Managing Change While Focusing on Enterprise Level Objectives,” POMS 27th Annual Conference, Orlando, FL, 6-9 May 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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.

PIGNATIELLO, JOSEPH J., Department of Operational Sciences

ROBBINS, MATTHEW J., Lt Col, Department of Operational Sciences

REFEREED JOURNAL PUBLICATIONS

Colombi, J.M., Robbins, M.J., Burger, J.A., and Weber, Y.S., “Interface Evaluation for Open System Architectures Using Multiobjective Decision Analysis,” *Military Operations Research*, Vol. 20, No. 2, pp. 55-69, 2015.

Keneally, S.K., Robbins, M.J., and Lunday B.J., “A Markov Decision Process Model for the Optimal Dispatch of Military Medical Evacuation Assets,” *Health Care Management Science*, Vol. 19, No. 2, pp. 111-129, 2016.

Han, C.Y., Lunday, B.J., and Robbins, M.J., “A Game Theoretic Model for the Optimal Location of Integrated Air Defense System Missile Batteries,” *INFORMS Journal on Computing*, Vol. 28, No. 3, pp. 405-416, 2016.

Rettke, A.J., Robbins, M.J., and Lunday, B.J., “Approximate Dynamic Programming for the Dispatch of Military Medical Evacuation Assets,” *European Journal of Operational Research*, Vol. 254, No. 3, pp. 824-839, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Wolfe, R.A., Crutchfield, J.A., Thal, A.E., Robbins, M.J., and Lucas, B.M., “Contingency Base Solid Waste Disposal Planning Using Value-Focused Thinking,” 2016 Air and Waste Management Association (A&WMA) Annual Conference, New Orleans, LA, 20-23 Jun 2016.

Crutchfield, J.A., Li, H., Wolfe, R.A., Thal, A.E., Robbins, M.J., Lucas, B.M., and White, E.D., “Contingency Waste Disposal and Energy Conversion Decision Support Model,” 2016 Portland International Center for Management of Engineering and Technology (PICMET) Conference, Honolulu, HI, 4-8 Sep 2016.

SCHULTZ, KENNETH L., Department of Operational Sciences

STONE, BRIAN B., Maj, Department of Operational Sciences

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hill, R. R., B. Stone and W. Adorno, “Autonomous Experimentation of Carbon Nanotube Growth using Response Surface Methods,” Defense Analysis Exchange XVIII, Seoul, South Korea, 1-5 May 2016.

Hill, R. R., B. Stone and W. Adorno, “Autonomous Experimentation of Carbon Nanotube Growth using Response Surface Methods,” Quality and Productivity Research Conference, Phoenix, AZ, 13-17 June 2016.

BOOKS AND CHAPTERS IN BOOKS

Hill, R. R. and Stone, B. B., “Experimental Design for Unmanned Aerial Systems Analysis: Bringing Statistical Rigor to UAS Testing.” Operations Research for Unmanned Systems, J. R. Cares and J. Q. Dickmann Jr., (eds), Wiley, New York, April 2016, pp. 187-206.

TUCHOLSKI, HEIDI M., Maj, Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Development of a Quantitative Framework for Intelligence Mission Data Support Analysis.” Sponsor: AFLCMC. Funding: \$100,000 – Tucholski 40%, Robbins 40%, Weir 20%.

WEIR, JEFFERY D., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“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: \$250,000.

“B-2 Defense Management System (DMS) RDT&E Effort for Evolving Air Force Operational Requirements.” Sponsor: AFLCMC. Funding: \$1,500,000– Weir 80%, Hartman 20%.

“Intelligence, Surveillance, and Reconnaissance (ISR) Futures Sensitivity Analysis and Uncertainty Quantification.” Sponsor: AFLCMC. Funding: \$250,000.

“JDPAC and AFIT Transportation and Distribution Research Proposal.” Sponsor: USTRANSCOM. Funding: \$125,000.

“Research, Analysis and Transitional Support to the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$215,000.

“Value-Driven Tradespace Exploration and Analysis for Resilient Systems.” Sponsor: USA ERDC. Funding: \$410,000.

REFEREED JOURNAL PUBLICATIONS

Cui, C., Wu, T., Hu, M., Weir, J., and Li, X., "Short-term building energy model recommendation system: A meta-learning approach," *Applied Energy*, Vol. 172, pp. 251-263, 2016.

Boehmke, B C, Johnson, A W, White, E D, Weir, J D and Gallagher, M A, "Tooth-to-Tail Impact Analysis: Combining Econometric Modeling and Bayesian Networks to Assess Support Cost Consequences Due to Changes in Force Structure," *Journal of Cost Analysis and Parametrics*, Vol. 9, No. 1, pp. 2-31, 2016.

Cui, C, Hu, M, Weir, J D, Wu, T, "A recommendation system for meta-modeling: A meta-learning based approach," *Expert Systems with Applications*, Vol. 46, pp. 33-44, 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Capt Robert Hanks, Jeffery D. Weir, "Revenue Management Using Robust Optimization to Set Transportation Rates for USTRANSCOM," Western Decision Sciences Annual Meeting, Las Vegas, NV, 5 - 9 April 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. DOCTORAL DISSERTATIONS

DOUPE, COLE C., *Optimal Attitude Control of Agile Spacecraft using Combined Reaction Wheel and Control Moment Gyroscopes Arrays*. AFIT/ENY/DS/15D-042. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

HESS, JOSHUA A., *Adaptive Estimation and Heuristic Optimization of Nonlinear Spacecraft Attitude Dynamics*. AFIT/ENY/DS/16S-061. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

6.5.2. MASTER THESES

BASSETT, ERIC A., *Test and Verification of a CubeSat Attitude Determination and Control System in Variable Magnetic Fields*. AFIT/ENY/MS/16J-050. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

BIEHL, SCOTT A., *Multi-CubeSat Deployment Strategies: How Different Satellite Deployment Schemes Affect Satellite Separation and Detection for Various Types of Constellations and Missions*. AFIT/ENY/MS/16M-198. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV.

CUNNINGHAM, DAVID A., *Localized Plasma Measurement during Instability Modes in a Hall Thruster*. AFIT/ENY/MS/16M-203. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFOSR.

DENTON, JONATHAN C., *Key Detection Rate Modeling and Analysis for Satellite-Based Quantum Key Distribution*. AFIT/ENY/MS/16M-206. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: LTS.

DICKINSON, THOMAS W.N., *Simulation, Design, and Test of Square, Apodized Photon Sieves for High-Contrast, Exoplanet Imaging*. AFIT/ENP/MS/16M-065. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: USAFA.

FERGUSON, AARON J., *Analysis of Neutron Effects for Asteroid Disruption*. AFIT/ENP/MS/16M-068. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

FLAMOS, STACIE M., *Space Object Self-Tracker On-Board Orbit Determination Analysis*. AFIT/ENY/MS/16M-209. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

FULLENKAMP, JONATHAN, *Analysis of Software Defined Radios for Collecting GPS Tracking Data from Terrestrial Transmitters*. AFIT/ENY/MS/16M-210. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

GROSS, KERIANNE H., *Evaluation of Verification Approaches Applied to a Nonlinear Control System*. AFIT/ENY/MS/16M-214. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RQ.

HOLT, JASON, *Persistent Surveillance of Geosynchronous Satellites Utilizing CubeSats in Low Earth Orbit*. AFIT/ENY/MS/16M-218. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

KOBZA, CARL L., *Space Qualification Testing of a Deployable Shape Memory Alloy CubeSat Antenna*. AFIT/ENY/MS/16S-064. Faculty Advisor: Dr. Richard Cobb. Sponsor: N/A.

LIU, JAMES J., *Analysis of a Modified Equivalent Circuit Model for Lithium-Ion Battery Modules in CubeSats*. AFIT/ENY/MS/16M-224. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

LIU, YUEN, *Performance Testing of Various Nozzle Design for Water Electrolysis Thruster*. AFIT/ENY/MS/16M-225. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RV.

LOUDERMILK, JOSHUA, *A Logic-based Mission Modeling Tool for Designing CubeSats*. AFIT/ENY/MS/16M-226. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

MCCAFFERTY, JULIAN P., *Development of a Modularized Software Architecture to Enhance SSA with COTS Telescopes*. AFIT/ENY/MS/16M-227. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

MCKENNEY, SHAYNA K., *Meeting the DOD's Tactical Weather Needs using CubeSats*. AFIT/ENY/MS/16J-055. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

MILLER, DANIEL G., *Vibrational Analysis of a 12U Chassis*. AFIT/ENY/MS/16M-229. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

MORGAN, BLAKE, *Performance Comparison of Multiple Ionic Liquid Propellants using the Busek BGT-XS Monopropellant Thruster*. AFIT/ENY/MS/16M-230. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ.

MUILENBURG, CONNOR L., *Empirical Determination of Performance Characteristics for Busek 1cm Micro Radio-Frequency Ion Propulsion System*. AFIT/ENY/MS/16M-023. Faculty Advisor: Dr. Carl R. Hartsfield. Sponsor: AFRL/RQ.

PAKISH, CRAIG W., *Low Latency Weather Data from a CubeSat Constellation*. AFIT/ENY/MS/16M-173. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

PATRICK, RYAN M., *Analysis of a Near Real-Time Optimal Attitude Control for Satellite Simulators*. AFIT/ENY/MS/16M-232. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: N/A.

SPECHT, JEREMIAH A., *Pointing Analysis and Design Drivers for Low Earth Orbit Satellite Quantum Key Distribution*. AFIT/ENY/MS/16M-024. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: LTS.

WILMER, MEREDITH M., *Military Applications of High-Altitude Satellite Orbits in a Multi-Body Dynamical Environment using Numerical Methods and Dynamical Systems Theory*. AFIT/ENY/MS/16M-247. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV.

ZURITA, ALFREDO G., *Minimum-Fuel Trajectory Design in Multiple Dynamical Environments Utilizing Direct Transcription Methods and Particle Swarm Optimization*. AFIT/ENY/MS/16M-250. Faculty Advisor: Maj Christopher D. Geisel. Sponsor: AFRL/RV.

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

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kaslow, D., Ayres, B., Cahill, P. T., Chonoles, M.J., Hart, L., Iwata, C.K., Levi, A.G., and Yntema, R., "CubeSat Model-Based Systems Engineering (MBSE) Reference Model - Development and Distribution - Interim Status," AIAA SPACE 2016, SPACE Conferences and Exposition, (AIAA 2016-5551).

CARBINO, TIMOTHY J., Maj, Department of Electrical and Computer Engineering

COBB, RICHARD G., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Modeling & Simulation of Space via High Performance Computing.” Sponsor: AFRL/RV. Funding: \$150,000 – Cobb 50%, Swenson 50%.

“Plenoptic Cameras for 3-D Video (PC3V).” Sponsor: Undisclosed. Funding: \$7,670.

“Small Sat Constellation for Weather Applications.” Sponsor: Undisclosed. Funding: \$9,000 – Cobb 50%, Simmons 50%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Gross, K., Hoffman, J., Clark, M., Swenson, E., Cobb, R., Whalen, M. and Wagner, L., “Evaluation of Formal Methods Tools Applied to a 6U CubeSat Attitude Control System,” AIAA SPACE 2015 Conference and Exposition, Space Conferences and Exposition, Pasadena, California. 2015. DOI: 10.2514/6.2015-4529.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Doupe, C., Swenson, E., Cobb, R. and Pierce, S., “Optimal Attitude Control of Agile Spacecraft Using Combined Reaction Wheel and Control Moment Gyroscope Arrays,” AIAA Modeling and Simulation Technologies Conference, AIAA SciTech, San Diego, California, 4-8 January 2016. DOI: 10.2514/6.2016-0675.

Wheeler, P., Cobb, R., Hartsfield, C., and Prince, B., Satellite propulsion spectral signature detection and analysis through Hall effect thruster plume and atmospheric modeling. Proc. SPIE 9974, Infrared Sensors, Devices, and Applications VI, 99740T (September 19, 2016); DOI:10.1117/12.2238021.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Loudermilk, J., Cobb, R. and Ayres, B., “A Logic-based Mission Modeling Tool for Designing CubeSats,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

Pakish, C. and Cobb, R., “Low Latency Weather Data from a CubeSat Constellation,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

McCafferty, J. and Cobb, R., “Development of a Modularized Software Architecture to Enhance SSA with COTS Telescopes,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

Denton, J. and Cobb, R., “Satellite Quantum Key Distribution Modeling Toolkit Development and the Impact of Channel Effects on Satellite-based Raw Key Generation Rates,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

Specht, J. and Cobb, R., “Pointing Analysis and Design Drivers for Low Earth Orbit Satellite Quantum Key Distribution,” AIAA 41st Dayton-Cincinnati Aerospace Science Symposium, 2 Mar 2016.

COLLINS, PETER J., Department of Electrical and Computer Engineering

COLOMBI, JOHN M., Department of Systems Engineering and Management

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

DECKRO, RICHARD F., Department of Operational Sciences

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

“Imaging Chromatographic Spectrometer Experiment (CTEx).” Sponsor: Undisclosed. Funding: \$11,800.

“Plenoptic Cameras for 3D Video.” Sponsor: Undisclosed. Funding: \$115,350.

GEISEL, CHRISTOPHER D., Lt Col, Department of Aeronautics and Astronautics

GRMAILA, MICHAEL R., Department of Systems Engineering and Management

HARTSFIELD, CARL R., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Additive Manufacturing of Optimized Spacecraft Structure.” Sponsor: Undisclosed. Funding: \$72,225.

“Additive Manufacturing Structures with Integral Heat Pipes for Thermal Control.” Sponsor: Undisclosed. Funding: \$68,600 – Hartsfield 50%, Swenson 50%.

“Ultra-High Speed Plasma Diagnostics in an ExB Device for the Determination of Anomalous Transport Diffusion.” Sponsor: AFOSR. Funding: \$30,090.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Cunningham, D., Liu, D., Hartsfield, C., Mullins, C., Farnell, C., Williams, J.D., Hargus, W.A., “Synchronized Measurement of Plasma Characteristics in a Hall Effect Thruster,” 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-1943.

Liu, D., Hartsfield, C., “Empirical Determination of Performance Characteristics for a 1 cm Micro Radio Frequency Ion Propulsion System,” 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-1944.

Liu, J.L., Liu, D., Hartsfield, C., “Performance Testing of Various Nozzle Designs for Water Electrolysis Thruster,” 54th AIAA Aerospace Sciences Meeting, AIAA SciTech, San Diego, CA, Jan 2016, AIAA Paper 2016-0954.

Wheeler, P., Cobb, R., Hartsfield, C., and Prince, B., Satellite propulsion spectral signature detection and analysis through Hall effect thruster plume and atmospheric modeling. Proc. SPIE 9974, Infrared Sensors, Devices, and Applications VI, 99740T (September 19, 2016); DOI:10.1117/12.2238021.

HAWKS, MICHAEL R., Department of Engineering Physics

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

JACQUES, DAVID R., Department of Systems Engineering and Management

LAKE, ROBERT A. Capt, Department of Electrical and Computer Engineering

LOPER, ROBERT D., Department of Engineering Physics

MCCLORY, JOHN W., Department of Engineering Physics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Daniel T. Schmitt, John W. McClory, Gilbert L. Peterson, “Estimating Atmospheric Nuclear Detonation Volume,” presented at the *2016 Hardened Electronics and Radiation Technology Conference* in Monterey, CA on 7 April 2016.

B. G. Frandsen and J. W. McClory, “Gamma Radiation Shielding of Multi-Functional Composites,” presented at the *2016 Hardened Electronics and Radiation Technology Conference* in Monterey, CA on 7 April 2016.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

A.J. Ferguson, J.W. McClory, “Effects of Neutron Energy Deposition for Asteroid Disruption,” *ANS Technical Meeting on Nuclear Energy and Cyber Security* in Annapolis, MD on 19 April 2016.

MAGNUS, AMY L., Department of Engineering Physics

O’HARA, RYAN P., Maj, Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Unit Cell Optimization of Lattice Structures.” Sponsor: AFRL/RW. Funding: \$27,000.

PETROSKY, JAMES C., Department of Engineering Physics

RUTLEDGE, JAMES L., Maj, Department of Aeronautics and Astronautics

REFEREED JOURNAL PUBLICATIONS

Misak, H.E., Rutledge, J.L., Swenson, E.D., Mall, S., 2016, “Thermal Transport Properties of Dry Spun Carbon Nanotube Sheets,” *Journal of Nanomaterials*, Vol. 2016, pp. 1-8.

STEWART, BRYAN J., Department of Engineering Physics

SWENSON, ERIC D., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“AFRL/RV-AFIT 2012 MOA Research.” Sponsor: AFRL/RV. Funding: \$250,000 – Swenson 25%, Cobb 25%, Black 25%, Wiesel 25%.

“Blue Force Tracking and Imaging.” Sponsor: Undisclosed. Funding: \$74,250.

“Design and Analysis of LEO Constellation for Detecting Optical Signatures.” Sponsor: Undisclosed. Funding: \$40,000 – Swenson 50%, Cobb 50%.

“GeoDiscover.” Sponsor: Undisclosed. Funding: \$73,500.

“Program Analyst for Integrated Air and Missile Defense.” Sponsor: MDA. Funding: \$166,000.

“REBEL Satellite Simulator Control Moment Gyroscope Rotor Shaft Hardening.” Sponsor: AFRL/RV. Funding: \$91,000.

“Variable-Speed Control Moment Gyroscope (CMG) Research and Development.” Sponsor: Undisclosed. Funding: \$100,000.

REFEREED JOURNAL PUBLICATIONS

Misak, H.E., Rutledge, J.L., Swenson, E.D., Mall, S., “Thermal transport properties of dry spun carbon nanotube sheets,” *Journal of Nanomaterials*, Vol. 2016, 2016. DOI:10.1155/2016/9174085.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Gross, K.H., Patrick, R., Swenson, E.D., Agte, J.S., “Optimal Attitude Control of a 6U CubeSat with a Four-Wheel Pyramid Reaction Wheel Array and Magnetic Torque Coils,” *SciTech – Modeling and Simulation Conference*, San Diego, California, Jan 2016.

Gross, K.H., Clark, M.A., Hoffman, J.A., Fifarek, A.W., Rattan, K.S., Swenson, E.D., Whalen, M.W., Wagner, L., “Formally Verified Run Time Assurance of a 6U CubeSat Attitude Control System,” *SciTech – Modeling and Simulation Conference*, San Diego, California, Jan 2016.

Hess, J., Swenson, E.D., Leve, F., Black, J., and Goff, G.M., “Adaptive Estimation of Nonlinear Spacecraft Attitude Dynamics with Time-Varying Moments of Inertia Using On-Board Sensors,” *AIAA Guidance, Navigation, and Control Conference*, AIAA SciTech, (AIAA 2016-1855).

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

TERZUOLI, ANDREW J., Jr., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Structural Design Considerations for Very-Large Space Antenna.” Sponsor: AFOSR. Funding: \$50,436.

WIESEL, WILLIAM E., Jr., Department of Aeronautics and Astronautics

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

RHOBY, MICHAEL R., *Laminar Flame Combustion Diagnostics using Imaging Fourier Transform Spectroscopy*. AFIT/ENP/DS/16J-018. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: AFRL/RQ.

6.6.2. MASTER'S THESES

BINTZ, JEFFREY R., *Image-based Bidirectional Reflectance Distribution Function of Human Skin in the Visible and Near Infrared*. AFIT/ENG/MS/16M-004. Faculty Advisor: Dr. Michael J. Mendenhall. Sponsor: 711 HPW/RH.

RAMOS, IKAIKA R., *Extracting Preference using Recommender Systems*. AFIT/ENG/MS/16M-040. Faculty Advisor: Dr. Kenneth. M. Hopkinson. Sponsor: N/A.

YOUNG, SHANNON R., *Improving Detection of Dim Targets: Optimization of Moment-based Detection using Statistical Confidence*. AFIT/ENP/MS/16M-088. Faculty Advisor: Dr. Kevin C. Gross. Sponsor: NGA.

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

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

“Imaging Chromatographic Spectrometer Experiment (CTEx).” Sponsor: Undisclosed. Funding: \$11,800.

“Plenoptic Cameras for 3D Video.” Sponsor: Undisclosed. Funding: \$115,350.

GROSS, KEVIN C., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Adapting and Improving Atmospheric Correction Algorithms for Wide-Band Hyperspectral Imaging Sensors.” Sponsor: NASIC. Funding: \$73,815 – Gross 75%, Fiorino 25%.

“Fieldable Fireball In-situ and Remote Emission Spectroscopy Sensor Suite (F2IRES3).” Sponsor: Spectral Sciences. Funding: \$24,469.

“Multi-INT Fusion for Anomaly Detection.” Sponsor: Undisclosed. Funding: \$34,965.

“Multi-INT Fusion for Anomaly Detection.” Sponsor: Undisclosed. Funding: \$80,869 – Gross 25%, McBee 25%, Oxley 25%, Hopkinson 25%.

“Pulmonary Health Biomarker Discovery: MicroRNA Biomarker Discovery Using in Vivo Airborne Hazard Exposures.” Sponsor: 711 HPW. Funding: \$5,000.

“Remote Sensing Research Support (RS)².” Sponsor: Undisclosed. Funding: \$19,846.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Open Skies Education Briefing.” Sponsor: NASIC. Funding: \$10,000 – Gross 50%, Terzuoli 50%.

REFEREED JOURNAL PUBLICATIONS

Martin, Jacob A.; Gross, Kevin C. “Estimating index of refraction from Polarimetric hyperspectral imaging measurements.” Optics Express 24, 17928-17940, Aug 2016.

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

Jacob A. Martin, Kevin C. Gross, “Estimating Index Of Refraction, Surface Temperature, and Downwelling Radiance Using Polarimetric-Hyperspectral Imagery (P-HSI),” Proceedings of the 8th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS). Los Angeles, CA, 21-24 August 2016.

Tim Ombrello, R. Milligan, Z. West, C. Klingshirn, M. Dewitt, T. Hendershott, M. Rhoby, M. Garrett, K. Gross, “Diagnostics of Fueling Strategy for Scramjets,” Proceedings of the JANNAF 35th Airbreathing Propulsion Subcommittee Meeting. Hampton, VA, 16–19 May 2016.

Shannon R. Young, Bryan J. Steward, Michael R. Hawks, Kevin C. Gross, “Improving Detection of Low SNR Targets Using Moment-based Detection,” Proc. SPIE 9828, Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications XIII, 98280K (2016); <http://dx.doi.org/10.1117/12.2224544>. SPIE Defense and Commercial Sensing, Baltimore, MD, 17-21 April 2016.

Jacob A. Martin, Kevin C. Gross, “Estimating index of refraction for material identification in comparison to existing temperature emissivity separation algorithms,” Proc. SPIE 9853, Polarization: Measurement, Analysis, and Remote Sensing XII, 98530N (2016); <http://dx.doi.org/10.1117/12.2222971>. SPIE Defense and Commercial Sensing, Baltimore, MD 17-21 April 2016.

HAWKS, MICHAEL R., Department of Engineering Physics

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

Shannon R. Young, Bryan J. Steward, Michael R. Hawks, Kevin C. Gross, “Improving Detection of Low SNR Targets Using Moment-based Detection,” Proc. SPIE 9828, Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications XIII, 98280K (2016); <http://dx.doi.org/10.1117/12.2224544>. SPIE Defense and Commercial Sensing, Baltimore, MD, 17-21 April 2016.

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: \$97,548 – Hopkinson 20%, McBee 20%, Oxley 20%, Schubert Kabban 20%, Magnus 20%.

“Technical Support: Space Vehicles Decision Support Group.” Sponsor: AFRL/RV. Funding: \$68,329.

HYDE, MILO W. IV, Maj, 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: \$30,000.

“Summer Study in IR Plasmonics/Metasurface Design/Fabrication.” Sponsor: Undisclosed. Funding: \$14,535.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bintz, J.R., Mendenhall, M.J., Marciniak, M.A., Butler S.D., and Lloyd, J.T., “A novel image-based BRDF measurement system for human skin,” Proc. SPIE Vol. 9961, p. 7, Aug 2016.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bintz, J.R., Mendenhall, M.J., and Marciniak, M.A., “Human skin's bidirectional reflectance distribution function and its impact on human skin detection,” presented at the 711 Human Performance Wing Technology Day held on July 2016 at Wright-Patterson AFB OH.

Bintz, J.R., Mendenhall, M.J., Marciniak, M.A., and Lloyd, J.T., “A multispectral bidirectional reflectance distribution model for improved human skin detection,” presented at the Air Force Research Laboratory Automatic Target Recognizers Center Review held on August 2015 at Wright State University, Dayton, OH.

MCBEE, BRIAN K., Lt Col, Department of Mathematics and Statistics

MCCLORY, JOHN W., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Rapid Location of Radiation Sources Using Polarimetric HSI and Radiation Sensors (Two-Year Extension).” Sponsor: DTRA. Funding: \$342,912 – McClory 40%, Gross 40%, Clinton 10%, Jacques 10%.

MENDENHALL, MICHAEL J., Department of Electrical and Computer Engineering

OXLEY, MARK E., Department of Mathematics and Statistics

PERRAM, GLEN P., Department of Engineering Physics

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

POLANKA, MARC D., Department of Aeronautics and Astronautics

STEWART, BRYAN J., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Persistent Infrared Scientific and Analytical Support.” Sponsor: NASIC. Funding: \$200,000 – Stewart 90%, Gross 10%.

“Remote Sensor Data Simulation & Algorithm Development.” Sponsor: SMC/RSXE. Funding: \$150,000 – Stewart 90%, Gross 10%.

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

Shannon R. Young, Bryan J. Steward, Michael R. Hawks, Kevin C. Gross, "Improving Detection of Low SNR Targets Using Moment-based Detection," Proc. SPIE 9828, Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications XIII, 98280K (2016); <http://dx.doi.org/10.1117/12.2224544>. SPIE Defense and Commercial Sensing, Baltimore, MD, 17-21 April 2016.

SWENSON, ERIC D., Department of Aeronautics and Astronautics

7. TECHNOLOGY TRANSFER

7.1. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS

Directed Energy and Remote Sensing Applications,” USAF CRADA 15-AFIT-11, Collaborator: Raytheon Space and Airborne Systems, Faculty Investigator: Dr Steven Fiorino, Effective Date: 6 October 2015, Term: 24 months.

“Learning About Signals through Tinkering and Game-Playing,” USAF CRADA 16-AFIT-01, Collaborator: Western Washington University, Faculty Investigator: Dr Richard Martin, Effective Date: 16 October 2015, Term: 39 months.

“Collaboration on Positioning, Navigation, and Timing (PNT) Technology,” USAF CRADA 16-AFIT-02, Collaborator: Lockheed Martin Corporation, Faculty Investigator: Dr John Raquet, Effective Date: 2 May 2016, Term: 60 months.

“NDA - ICS Operational Technology & Security,” USAF CRADA 16-AFIT-03, Collaborator: Tenet 3, LLC, Faculty Investigator: LTC Mason Rice, Effective Date: 3 November 2015, Term: 12 months.

“NDA - AF SBIR Topic Number AF153-001,” USAF CRADA 16-AFIT-04, Collaborator: The Design Knowledge Company, Faculty Investigator: Dr Eric Swenson, Effective Date: 28 October 2015, Term: 12 months.

“Side-Channel-Based Integrity Assessment and Intrusion Detection of Industrial Controllers,” USAF CRADA 16-AFIT-05, Collaborator: Power Fingerprinting, Inc. , Faculty Investigator: Maj Samuel Stone, Effective Date: 5 January 2016, Term: 24 months.

“NDA - Aircraft Propulsion Systems,” USAF CRADA 16-AFIT-06, Collaborator: Boeing Research & Technology, Faculty Investigator: Maj Darrell Crowe, Effective Date: 5 January 2016, Term: 12 months.

“NDA - Solar Road Panel,” USAF CRADA 16-AFIT-07, Collaborator: Solar Roadways Inc., Faculty Investigator: Dr Ron Coutu, Effective Date: 5 January 2016, Term: 12 months.

“NDA - Operational Technology For Sewage and Water Treatment Facilities,” USAF CRADA 16-AFIT-08, Collaborator: Trinity River Authority of Texas, Faculty Investigator: LTC Mason Rice, Effective Date: 7 January 2016, Term: 12 months.

“NDA - Operational Technology for Cyber Security,” USAF CRADA 16-AFIT-09, Collaborator: ASM Research , Faculty Investigator: LTC Mason Rice, Effective Date: 5 January 2016, Term: 12 months.

“NDA - Satellite Attitude Determination and Control,” USAF CRADA 16-AFIT-11, Collaborator: Space-X (Space Exploration Technologies Corp.), Faculty Investigator: Dr Eric Swenson, Effective Date: 20 January 2016, Term: 12 months.

“Fieldable Fireball In-situ and Remote Emission Spectroscopy Sensor Suite (F2IRES3),” USAF CRADA 16-AFIT-12, Collaborator: Spectral Sciences, Inc., Faculty Investigator: Dr Kevin Gross, Effective Date: 6 April 2016, Term: 15 months.

“SUPERNOVA (Six U Performance-Enhanced Radiation-Tolerant Nanosat Open Vehicle Architecture,” USAF CRADA 16-AFIT-13, Collaborator: Pumpkin, Inc., Faculty Investigator: Dr Eric Swenson, Effective Date:

27 April 2016, Term: 12 months. “NDA - Operational Technology,” USAF CRADA 16-AFIT-15, Collaborator: ThreatQuotient Inc, Faculty Investigator: LTC Mason Rice, Effective Date: 17 May 2016, Term: 12 months.

“NDA - Review of Operational Technology,” USAF CRADA 16-AFIT-16, Collaborator: TDi Technologies Inc, Faculty Investigator: LTC Mason Rice, Effective Date: 18 July 2016, Term: 12 months.

“NDA - Ultra-Violet Water Treatment,” USAF CRADA 16-AFIT-17, Collaborator: BasTech Inc, Faculty Investigator: Dr Michael Miller, Effective Date: 4 August 2016, Term: 12 months.

“NDA - Review of Interactive Visualization of Computer Security Data,” USAF CRADA 16-AFIT-18, Collaborator: Vambrace Inc, Faculty Investigator: Dr Gilbert Peterson, Effective Date: 4 August 2016, Term: 12 months.

“NDA - Cyber-Security and Operational Technology,” USAF CRADA 16-AFIT-19, Collaborator: Sypris Electronics LLC, Faculty Investigator: LTC Mason Rice, Effective Date: 4 August 2016, Term: 12 months.

“NDA - Review ESCAPE Technology,” USAF CRADA 16-AFIT-20, Collaborator: Vambrace Inc, Faculty Investigator: Mr Matt Dever, Effective Date: 27 August 2016, Term: 12 months.

7.2. EDUCATIONAL PARTNERSHIP AGREEMENTS

“EPA - ATIC Technical Intelligence Training Program,” USAF CRADA AFIT EPA 2016-01, Collaborator: Advance Technical Intelligence Center, Faculty Investigator: Dr Kevin Gross, Effective Date: 29 December 2015, Term: 60 months.

“EPA - Educational Partnership Student Research Tuition,” USAF CRADA AFIT EPA 2016-02, Collaborator: Southwestern Ohio Council on Higher Education, Faculty Investigator: Dr Paul Wolf, Effective Date: 15 August 2016, Term: 60 months.

7.3. PATENTS

PATENT APPLICATIONS

R. K. Martin, “Method for Radio Tomographic Image Formation,” filed with the U.S. Patent and Trademark Office on 10 Feb 2016, U.S. Serial No. 15/040,585. [CCR]

PATENTS AWARDED

Lanzerotti, Mary Y., 5 January 2016, “System and Method for Identification of Electrical Properties of Integrated Circuits,” U.S. Patent No. 9,230,050

Rutledge, J.L. and McCall, J.F., 19 April 2016, “A Method to Determine Time-Resolved Waveforms of Periodic Unsteady Heat Transfer Coefficient and Adiabatic Wall Temperature,” U.S. Patent No. 9,316,547.

Burggraf, Larry W., Kowash, Benjamin R., FitzGerald, Jack G. M., 30 August 2016. “Reconfigurable Liquid Attenuated Collimator,” US Patent No: 9,431,141 B1.

INVENTION DISCLOSURES

Hexakis Icosahedron With and Internal Vacuum, Brain Cranston and Anthony Palazotto, May, 2016

APPENDICES

APPENDIX A: POST-DOCTORAL AND OTHER RESEARCH ASSOCIATES' CREDENTIALS

BOSE-PILLAI, SANTASRI,

Post-Doctoral Research Associate (through ORISE), Department of Engineering Physics, AFIT Appointment date: 2011 (AFIT/ ENP); BS, Electrical Engineering, Jadavpur University, India, 2000; MS, Electrical Engineering, New Mexico State University, 2005; PhD, Electrical Engineering, New Mexico State University, 2008. Dr. Bose is working on generation and propagation of partially coherent sources and laser beam propagation and imaging problems through atmospheric turbulence. Tel. 937-255-3636 X4903, email: Santasri.BosePillai.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Bose S, J.E. McCrae, S.T. Fiorino, and J. Przelomski, 2016: "Estimation of temporal variations in path-averaged atmospheric refractive index gradient from time-lapse imagery" *Opt. Eng.* 0001; 55(9):090503.
DOI:10.1117/1.OE.55.9.090503.

Milo W. Hyde IV, and Santasri Bose, "Two spatial light modulator system for laboratory simulation of random beam propagation in random media: comment," *Applied Optics*, Vol. 55, No. 21, pp. 5596-5597, Jul 2016, doi: 10.1364/AO.55.005596.

Milo W. Hyde IV, Santasri Bose, David G. Voelz, and Xifeng Xiao, "Generating partially coherent Schell-model sources using a modified phase screen approach," *Optical Engineering*, Vol. 54, No. 12, 120501 (5 pp.), Dec. 2015, DOI: 10.1117/1.OE.54.12.120501.

REFEREED CONFERENCE PAPERS ON THE BASIS OF FULL PAPER REVIEW

Basu, S., J. McCrae, and S.T. Fiorino, "Estimation of atmospheric refractive index gradient variations and Cn2 from time-lapse imagery," in *Propagation Through and Characterization of Atmospheric and Oceanic Phenomena (pcAOP)*, Washington DC invited, (OSA, 28 June 2016).

McCrae, J, S. Basu, and S.T. Fiorino, "Estimation of atmospheric parameters from time-lapse imagery," *Proceedings of SPIE*, Vol. 9833, 983303, Baltimore, MD, 21 April 2016.

Basu, S, L.R. Burchett, S.T. Fiorino, and J.E. McCrae, "Comparison of the path-weighted Cn2 derived from time-lapse imagery and weather radar," 2016 IEEE Aerospace Conference, Big Sky, MT, March 2016.

Basu, S., J. McCrae, S.T. Fiorino, L.R. Burchett, and C.A. Rice, "Comparison of atmospheric Cn2 and refractive index gradient variations derived from time-lapse photography to mesoscale modeling and radar measurements," American Meteorological Society Annual Meeting, New Orleans, LA, Jan 2016.

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

McCrae, J.E., S. Bose-Pillai, M. Current, K. Lee, and S.T. Fiorino, "Investigation of Turbulence Anisotropy using a Hartmann Turbulence Sensor," 11th DEPS Systems Symposium, Norfolk, VA, 12-16 Sep 2016.

CAHILL, ADAM D.,

AFNWC Postdoctoral 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

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.

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. Tel. 937-255-3636 x4489, email: Nathaniel.Hammen.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Eldar, Y., Hammen, N., and Mixon, D., "Recent advances in phase retrieval," *IEEE Signal Processing Magazine*, Vol. 33, pp. 158-162, 2016.

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 Research Grants Engineer 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 water remediation). Tel. 937-255-3636 x4545, email: Sushil.Kanel@afit.edu.

REFEREED JOURNAL PUBLICATIONS

Kanel, S. R., Misak H., Nepal, D., Mall, S., Brittle, S. W., Sizemore, I., Kempisty, D., Goltz, M. Application of Carbon Nanotube Yarns as a Filter Media to Treat Nitroaromatic-contaminated Water, *New Carbon Materials*, 31:4, 415-423, 2016

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KEEFER, KEVIN J.,

Research Physicist, 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.

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KEENAN, CAMERON B.,

Post-Doctoral Research Associate, (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2013 (AFIT/ENP); BS. Physics, Case Western Reserve University, 2002; PhD, Physics, West Virginia University, 2011. Dr. Keenan's work is focused on computer simulation and analysis of gas species during combustion events using imaging and non-imaging Fourier Transform Spectroscopy.

RHOBY, MICHAEL R.,

Post-Doctoral Research Associate, (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2016 (AFIT/ENP); BS. Physics, Michigan State University, 2010; MS, Optical Engineering, Air Force Institute of Technology, PhD, Optical Engineering, Air Force Institute of Technology, 2016. Dr. Rhoby's work is focused on the developing mid-infrared (1-5 μm) hyperspectral imaging for combustion diagnostics and flow field analysis.

REFEREED CONFERENCE PAPERS ON THE BASIS OF ABSTRACT REVIEW

Tim Ombrello, R. Milligan, Z. West, C. Klingshirn, M. Dewitt, T. Hendershott, M. Rhoby, M. Garrett, K. Gross, "Diagnostics of Fueling Strategy for Scramjets," Proceedings of the JANNAF 35th Airbreathing Propulsion Subcommittee Meeting. Hampton, VA, 16–19 May 2016.

THANKAMANI MOHAN, MANIL,

National Research Council Post-Doctoral Fellow, Department of Mathematics and Statistics, AFIT, Appointment Date: 2015 (AFIT/ENC); BSc, University of Kerala, 2006; MSc, University of Kerala, 2008; PhD, Indian Institute of Science Education and Research, 2014. Dr. Mohan's research interests include partial differential equations, functional analysis, control theory, mathematical fluid dynamics (compressible and incompressible flow), stochastic analysis, and stochastic differential equations. His current research includes control and stochastic analysis of compressible fluid flow, and quasilinear evolutions of hyperbolic type. Tel. 937-255-3636 x4722, email: Manil.Thankamanimohan@afit.edu

REFEREED JOURNAL PUBLICATIONS

Mohan, M. and Sritharan, S., "New methods for local solvability of quasilinear symmetric hyperbolic systems," *Evolution Equation and Control Theory*, Vol. 5, No. 2, pp. 273-302, June 2016.

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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Mohan, M., "Stochastic Non-Resistive Magnetohydrodynamic System with Levy Noise," Workshop on Stochastic PDEs, Department of Mathematics, University of Pittsburgh, PA, 5 Dec 2015.

Mohan, M., " L^p solutions of the Stochastic Navier-Stokes Equations Subject to Levy Noise with $L^m(R^m)$ Initial Data," International Conference on Nonlinear Dynamical Systems (ICNDS-2016), Department of Mathematics, Bharatiar University, Coimbatore, Tamil Nadu, India, 26 Mar 2016.

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Mohan, M., "New Methods for Local Solvability of Quasilinear Symmetric Hyperbolic System," Department of Mathematics, Indian Institute of Space and Technology (IIST) Trivandrum, Thiruvananthapuram, Kerala, India, 1 Apr 2016.

TURNER, DAVID B.,

DNDO/NTNFC Post-Doctoral Fellowship (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2013 (AFIT/ENP); BS, Biochemistry, Millersville University (United States), 2003; PhD, Chemistry, The Ohio State University (United States), 2009. Dr. Turner's work is focused on the surface chemistry, band gap, work function and electrical properties of thorium and uranium oxides for their use as novel neutron detectors.

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
AFCEC	Air Force Civil Engineering Center
AFCAA	Air Force Cost Analysis Agency
AFGSC	Air Force Global Strike Command
AFIT	Air Force Institute of Technology
AFIA	Air Force Inspection Agency
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
AF PACE	Air Force Profession of Arms Center of Excellence
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
AFSC	Air Force Sustainment Center
AFSPC	Air Force Space Command
AFTPS	Air Force Test Pilot School
AFTAC	Air Force Technical Applications Center
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
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
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

FORSCOM	United States Army Forces Command
HELJTO	High Energy Laser Joint Technology Office
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
CSDL	The Charles Stark Draper Laboratory, Inc
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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