



RESEARCH AT NPS

The Research and Sponsored Programs Office's mission is to support the faculty. I seem to start this section of the newsletter the same way each month. I repeat it because it has been the core operating principle over the years. It has been difficult at times for that principle to shine through as the faculty's success in attracting sponsored programs—a good thing—has outpaced the resources to support them. I am hoping the future, however, will bring the required resources to support the NPS of the present and future.

Moving into the future, the position of the Director of the Research and Sponsored Programs Office will be renamed the Assistant VP for

Research Administration. This title aligns with the current administrative structure of NPS. This is not a new position, but rather a realignment of an existing position. The second reason for the name change is to strategically align the position and responsibilities with the overall NPS Strategic Plan which calls for significant growth in research funding. Thirdly, and most important personally, is to assure there is organizational representation for the requirements of the NPS researcher.

As further changes occur in research and sponsored program support, we will continue to communicate these changes to the faculty through this venue as well as the Research Board.

BROWN-BAG SEMINAR SERIES

MAE CONFERENCE ROOM
WATKINS HALL, ROOM 302 • 1200-1300

- 11 May, Tuesday, Electronic Proposal Submission (NSF FastLane, Grants.Gov, NSPIRES....)
- 15 June, Tuesday, Contracting for Support Services
- 15 July, Thursday, Research Initiation Program

NPS FACULTY SCORE DURIP AWARDS

The FY10 Defense University Research Instrumentation Program (DURIP) awards were recently announced. NPS faculty received three of these prestigious awards.

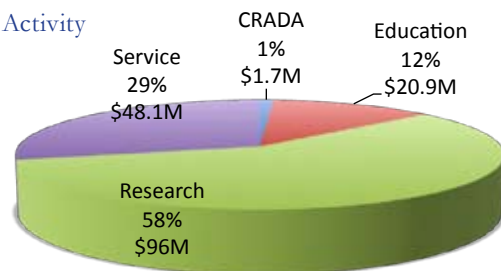
- Distinguished Professor Brig Agrawal, Department of Mechanical and Aerospace Engineering, Tactical Platform Simulator for Testing Maritime High Energy Laser Beam Control (ONR)
- Professor Ching-Sang Chiu, Department of Oceanography, Portable, High-Efficiency, Wide-Band (500-1,200Hz) Moored Sound Sources for Shallow-Water, Low Frequency Acoustic Propagation Studies (ONR)
- Research Associate Professor Hafliði Jonsson, Center for Remotely Piloted Aircraft Studies (CIRPAS), Enhanced Measurement Capabilities for Remotely-Piloted Aircraft Studies (ONR)

DURIP supports the purchase of state-of-the-art equipment costing \$50,000 or more that augments current university capabilities or develops new university capabilities to perform cutting-edge defense research. DURIP awards are the result of a merit competition for DURIP funding conducted by the Army Research Office, Office of Naval Research, and Air Force Office of Scientific Research. Collectively more than 840 proposals were received requesting \$267 million in support from university investigators conducting science and engineering research of importance to DoD. There will be 166 awards to 96 academic institutions.

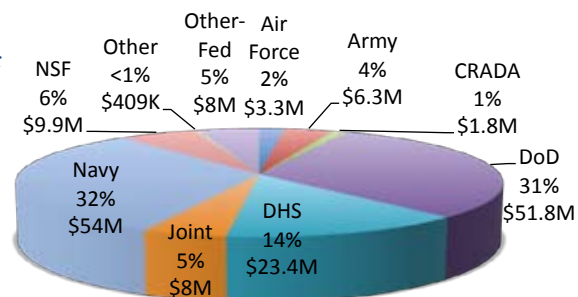
SPONSORED PROGRAMS STATUS, MARCH 2010

FUNDS AVAILABLE: \$166.7M

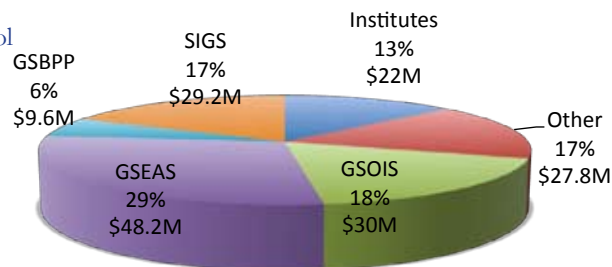
By Type of Activity



By Sponsor



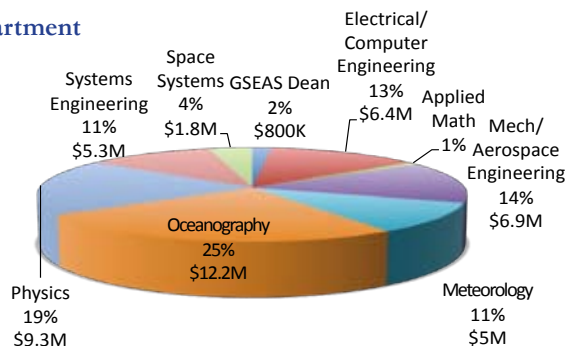
By School



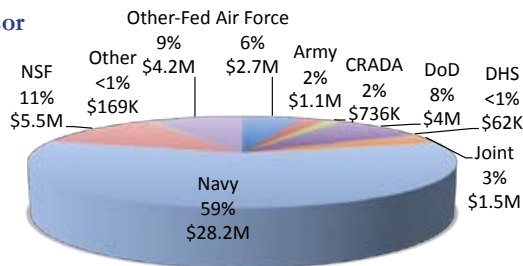
Graduate School of Engineering and Applied Sciences

Funds available to date: \$48.2M

By Department



By Sponsor



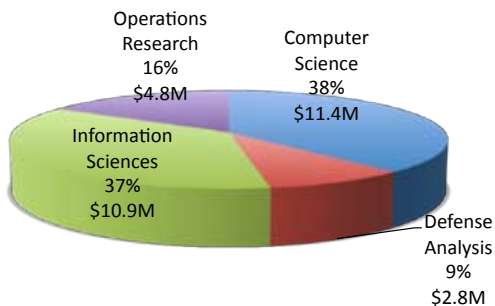
Projects funded in March:

- Electric Ship Thesis Development, Alex Julian, ECE (ONR)
- Computer Algorithms and Architecture for Space Applications, Herschel Loomis, ECE (SAF)
- Low-Power Fault Tolerance for Reliable Space-Based Computing, Herschel Loomis, ECE (Sandia National Laboratories)
- Evaluate Fault Tolerance of the Opera Multiprocessor, Herschel Loomis, ECE (SAF)
- Joint Threat Warning System (JTWS) FY10 Threat Signals Projection and Research, John McEachen, ECE (USSOCOM)
- GaNi HEMT Reliability, Todd Weatherford, ECE (AFRL)
- Investigation of Acoustic Cloaking, Clyde Scandrett, MA (NUWC – Newport Division)
- Spacecraft Systems, Brij Agrawal, MAE (NRO)
- Missile Guidance and Control Short Course, Christopher Brophy, MAE (NAWC-Aircraft Division)
- LCS Class Ship Shock Modeling and Simulation Using DYSMAS Code, Jarema Didoszak, MAE (NAVSEA)
- Collateral Damage Methodology, Morris Driels, MAE (ASC Army)
- Ahead-Look Sonar (ALS), Douglas Horner, MAE (ONR)
- Herding and Active Force Protection Using Autonomous Agents, Isaac Kaminer, MAE (ONR)
- Autonomous Control of Spacecraft Approaching Tumbling Object, Attitude Control Nanosatellites, Marcello Romano, MAE (AFRL)
- Fuel Efficient and Emergency Return Trajectories for Moon-Earth Transfers, Isaac Ross, MAE (NASA)
- ITOP 2010 Field Experiment, Patrick Harr, MR (ONR)
- Moist Pathway of Extratropical Cyclogenesis Implications for Weather Predictability, Michael Montgomery, MR (NSF)
- Investigation of Effect of Hydro-Reaction during Hypervelocity Impact Penetration, Ronald Brown, PH (ONR)
- Investigation of Asymmetric Flow Fields Induced by Localized Thermal Gradients, David Ford, PH (ONR)
- Special Capabilities Support to OSD, Richard Olsen, PH (OSD)
- Support to National System for Geospatial Intelligence for AGI/ONIR, Richard Olsen, PH (NGA)
- SEAWEB Sensor Network, Joseph Rice, PH (OUSD)
- Blast Resistant Structures for Military Vehicles, in Collaboration with UCSB and UVA, Jose Sinibaldi, PH (ONR)
- Modeling and Assessment of the C4ISR OTM Event 09 Architecture, Kristin Giammarco, SE (USARDECOM)
- SEM-PD21, Walter Owen, SE (Various)
- Advanced Power System Model-Based Architecture and Design Methods, Clifford Whitcomb, SE (ONR)
- Technology Review and Update, Rudolf Panholzer, SP (Various)
- Space Systems Engineering Experience Tour and Space Systems Engineering Support, Rudolf Panholzer, SP (NRO)

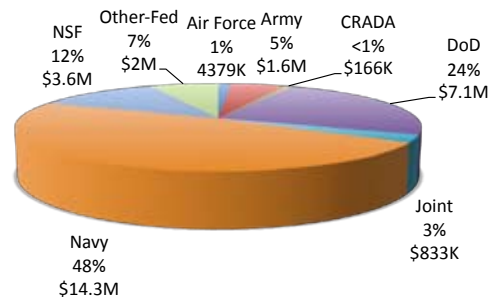
Graduate School of Operational and Information Sciences

Funds available to date: \$30M

By Department



By Sponsor



Projects funded in March:

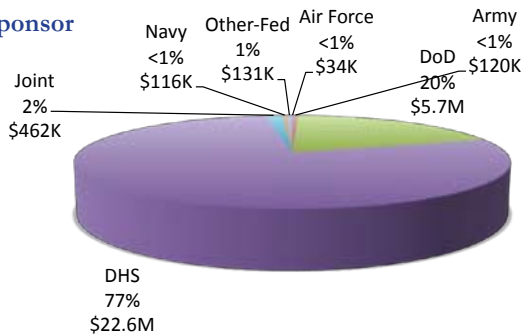
- OB-1 Evaluation Support, George Dinolt, CS (SPAWAR)
- Automated Media Exploitation 2, Simson Garfinkel, CS (DIA)
- Trustworthy System Security through 3-D Integrated Hardware, Theodore Huffmire, CS (NSF)
- Language Evidence for Social Goals: Linguistic Approach to Persuasive Moves in Discourse, Craig Martell, CS (University of Maryland)
- Investigation of Dependable, Trustworthy, and Evolvable Distributed Computing, J. Bret Michael, CS (CIO)

cont. on p. 5

School of International Graduate Studies

Funds available to date: \$29.2M

By Sponsor



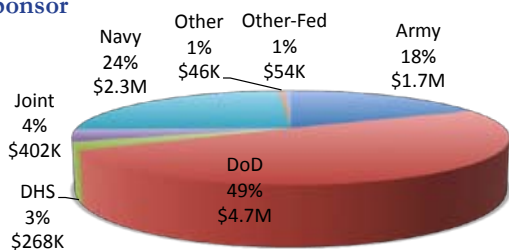
Projects funded in March:

- 4th Foreign Area Officer Conference, Mark Chakwin, NSA (SAF/IA)
- Attack the Network Innovation Effort, Thomas Johnson, NSA (AFRL)
- Homeland Security MA Degree Program, Theodore Lewis, NSA (DHS)
- Sponsored Homeland Defense and Security Leadership Development MA Degree Program for FBI (FBI), Theodore Lewis, NSA (FBI)
- U.S. China Strategic Dialogue, Phase V, Christopher Twomey, NSA (DTRA)

Graduate School of Business and Public Policy

Funds available to date: \$9.6M

By Sponsor



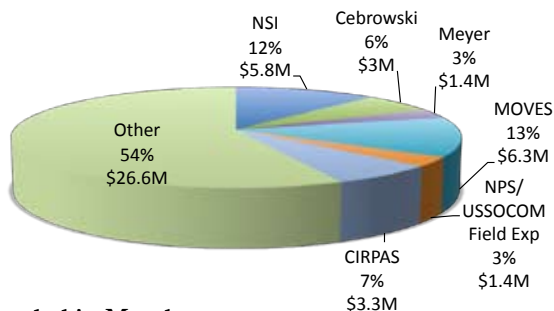
Projects funded in March:

- Advanced Acquisition Program 44-03, John Dillard, GSBPP (USMC-MARCORSYSCOM)
- Support to the Commander Naval Surface Forces, Kenneth Euske, GSBPP (Naval Surface Forces)
- Chair of Acquisition and Acquisition Research Program, Keith Snider, GSBPP (JTRS AMF)
- Chair of Acquisition and Acquisition Research Program, Keith Snider, GSBPP (OASN)
- OSD Sponsored Acquisition Research Program at NPS, Keith Snider, GSBPP (OUSD (AT&L))

Research and Education Institutes, Centers, and Other

Funds available to date: \$49.8M

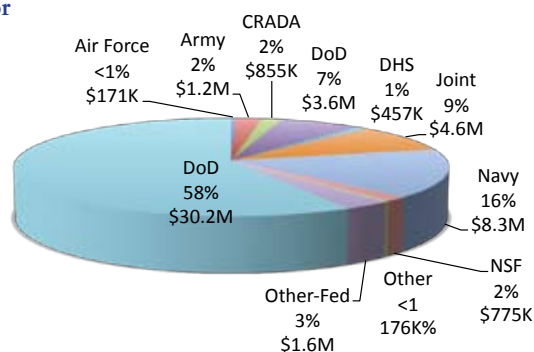
By Department



Projects funded in March:

- RFID to Support JWAC, Dan Boger, NSI (NELO)
- Golden Phoenix Training/Exercise, Dan Boger, NSI (DOE)
- NPS Support to Joint IED Defeat Test Board (JTB), Edward Lesnowicz, NSI (ATEC)
- CNIC FY10 Technical Support, Dan Boger, CAW (USFF)
- Pacific Homeland Security Center (PSC-RHSC), Dan Boger, CAW (Hawaiiya Technologies, Inc.)
- Corp. Strategic Communications, Sue Higgins, Cebrowski (ONR)
- NPS Chair of UW Program, Winford Ellis, Meyer (NAVSEA)
- Advanced Human Subjects Integration Performance Functions, Synthetic Environments, and Training and Human Systems, Paul Chatelier, MOVES (ONR)

By Sponsor



- Educational Dominance Program Support, Rudolph Darken, MOVES (DARPA)
- Developing Expert Performance on Complex Cognitive Tasks, Joseph Sullivan, MOVES (ONR)
- Field Experimentation Programs for Special Operations, NPS Field Experimentation Program (USSOCOM) Wolfgang Baer, Alex Bordetsky, Raymond Buettner, Timothy Chung, Peter Guest, Nancy Haegel, Douglas Horner, Mathias Kolsch, Oleg Yakimenko
- WTI 10-2, Robert Bluth, CIRPAS (USMC-Marine Aviation Weapons/Tactics)
- UAV Operations at Roberts Project, Robert Bluth, CIRPAS (NAVAIR)

SITUATIONAL AWARENESS FOR SURVEILLANCE AND INTERDICTION OPERATIONS (SASIO): TACTICAL INSTALLATION PROTECTION

Kenneth L. Byers Jr.—Lieutenant, United States Navy
Master of Science in Operations Research—March 2010
Advisor: Tim Chung, Operations Research
Second Reader: Rachel Johnson, Operations Research

Security of a forward operating base (FOB) is of high interest and operational importance to the U.S. military and allied forces. The Situational Awareness for Surveillance and Interdiction Operations (SASIO) model simulates the operational tasking of a single unmanned, aerial vehicle (UAV) and a ground-based interceptor that are designed to search, identify, and intercept potential hostile targets prior to reaching the FOB. This thesis explains the SASIO model and its implementation in JAVA. This theoretical model leverages Design of Experiments (DOE), which varies multiple characteristics of the system to explore insights for the tactical employment of UAV and interceptor to combat potential hostile actions against a predefined area of interest. Designed screening simulation experiments identifies influential factors to provide guidance for tactical employment of Blue Force assets, as well as provide alternative means to influence Red force behavior in a beneficial manner. This thesis analyzed the effects of the influential factors with respect to the percentage of threats interdicted, time to acquire threats, and mean distance away from the FOB that the threats were interdicted. Through analytical techniques, a quantifiable measure of the employment strategy for the UAV and ground-based interceptor was achieved.

LT Byers received the Chief of Naval Operations Award for Excellence in Operations Research and the Stephen A. Tisdale Graduate Research Award

ACCELERATING ACCULTURATION IN MILITARY COALITION TASK FORCES: ENHANCING COMMAND AND CONTROL AGILITY

June G. C. Y. Lee, Major, Republic of Singapore Navy
Master of Science in Information Technology Management—June 2010
Advisor: Mark Nissen, Information Sciences
Second Reader: Karl Pfeiffer, Information Sciences

Knowledge is key to sustainable competitive advantage, but different kinds of knowledge affect competitive advantage differently. This applies especially to the environment of increasing globalization. Because cultural knowledge is deeply rooted and highly tacit, its flows are critical to global enterprise performance, but tacit knowledge clumps noticeably and is known well to flow both slowly and narrowly. Such clumping and flowing are exacerbated when knowledge is required to flow across cultures. Unfortunately, knowledge management theory on intercultural knowledge flows remains limited. Alternatively, research to integrate Institutional Theory with Knowledge Flow Theory provides a powerful theoretical framework for understanding how tacit knowledge flows across cultures but is inadequate to describe how acculturation can be accelerated. This thesis addresses the current gap in understanding accelerated acculturation with the development of an acculturation process model with accelerators and decelerators. The model was applied to a major, international, coalition operation to validate its utility. Result serves to inform theory and practice alike. It has implication in enhancing the performance of coalition command

and control approaches in complex endeavors.

MAJ Lee garnered the NPS Outstanding Academic Achievement Award for International Students and the Rear Admiral Grace Murray Hopper Information Technology Management Award

ATMOSPHERIC EFFECTS ON RADIO FREQUENCY (RF) WAVE PROPOGATION IN A HUMID, NEAR-SURFACE ENVIRONMENT NSWC-PC

Samuel P. Mason—Lieutenant, United States Navy
Master of Science in Meteorology—March 2010
Co-advisor: Peter S. Guest, Meteorology
Co-advisor: Andreas K. Goroch, Naval Research Laboratory

Currently, the meteorological and physical phenomena associated with the various dynamic processes in the very near surface environment (for example, within the surface layer), are poorly understood. By properly characterizing what is happening in the real world, there is potential for obtaining an empirical formula which correlates well with real world data, and thus can be used as a means of quantifying these physical processes. This in turn can be used to more accurately model the effects of the atmosphere on RF waves. This thesis is an analysis of the propagation loss measurements taken from the Near Earth Propagation-6 (NEP-6), Panama City FL experiment in Aug 2009, where propagation loss was measured at 1768 MHz within a few wavelengths (≈ 0.5 meters) of the surface. The results support and extend the near-surface, short range RF propagation conclusions drawn by Merrill, et al. (2004). In particular, we focus on a novel technique that takes advantage of tidal sea level variation to continuously vary antenna height above the surface. Results confirm a strong dependence of propagation loss on antenna height similar to Merrill, et al. (2004) observations.

LT Mason was awarded the NPS Outstanding Academic Achievement Award for Department of Defense Student and the Chief of Naval Operations Undersea Warfare Award

EFFECTS OF ACTIVATION ON SELECTED MARINE CORPS RESERVE PRIOR SERVICE ENLISTED CONTINUATION RATES IN THE POST 9/11 ERA

Jonathan D. Price—Major, United States Marine Corps
Master of Science in Management—March 2010
Advisor: Stephen L. Mehay, Graduate School of Business and Public Policy

Second Reader: LtCol Margery A. Westerbeck, USMC, Reserve Affairs Personnel Plans and Policy, Quantico, Virginia

This thesis analyzes the continuation behavior of prior service Selected Marine Corps Reserve (SMCR) unit members in the grades of E3 to E5 and examines the effect of activation post 9/11 on 12-month continuation rates. The effect of monetary incentives was estimated and other significant predictors of continuation identified. Data were collected from the Total Force Data Warehouse (TFDW) for all Selected Reserve (SelRes) from August 31, 2001 to October 31, 2009. Limited data to determine service history were collected from December 31, 1994 to July 31, 2001. Two probit regression models were estimated for the three tour lengths of 4-, 12- and 24-months. The models included explanatory variables for activation in support of a contingency operation, monetary incentives, economic conditions, ability, person-job fit, military experience, and demographics. Two additional models were estimated to isolate the effects of prior reserve experience in the active and Reserve

Components (RC). Factors having positive effects on continuation were activation frequency, monetary incentives, unemployment, prior RC experience, tour length, and multiple tours.

Negative influencers on continuation included activation length, deploying outside the continental U.S., unexcused absence from drill, being female, being married, and age.

Maj Price received the Monterey Council Navy League Award for Highest Academic Achievement, the Louis D. Liskin Award for Excellence in Business and Public Policy, and the Chief of Naval Personnel Award for Academic Excellence in Manpower Systems Analysis.

COLLAPSING INSURGENT ORGANIZATIONS THROUGH LEADERSHIP DECAPITATION: A COMPARISON OF TARGETED KILLING AND TARGETED INCARCERATION IN INSURGENT ORGANIZATIONS

Paul W. Staeheli—Major, United States Army

Master of Science in Defense Analysis—March 2010

Advisor: Michael Freeman, Defense Analysis

Second Reader: David Tucker, Defense Analysis

Killing or capturing an insurgent leader provides a means of eliminating the knowledge, charismatic power, and direction that the leader instills within the organization. Technological breakthroughs in signal intelligence (SIGINT), an increase in the collection of human intelligence (HUMINT), and the beginning of the global war on terror have brought the employment of leadership decapitation as a means of collapsing insurgent organizations back into the consciousness of western society. While the goal of government forces is to separate the insurgent leader from the organization, the techniques of killing or capturing insurgent leadership provide distinct advantages and drawbacks. This thesis asks the research question: under what conditions is the targeted killing of an enemy leader preferable to the targeted incarceration of an enemy leader during counterinsurgency operations? The analysis of four case studies provides the insight required to determine whether an insurgent organization is susceptible to collapse as a result of leadership decapitation. This thesis finds that killing versus incarcerating a terrorist leader seems to make little difference. Instead, insurgent organizations are most likely to collapse when they fail to name a successor, regardless of whether the leader is killed or captured. Through careful study of an insurgent organization's structure, military leaders can operationalize this thesis and develop a strategy to collapse an insurgent organization through leadership decapitation. *MAJ Staeheli is winner of the Association of the United State Army, General Joseph W. Stilwell Chapter, Award for Outstanding Army Student.*

TOWARD QUANTIFYING THE IMPACT OF ATMOSPHERIC FORCING ON ARCTIC SEA ICE VARIABILITY USING THE NPS 1/12 DEGREE PAN-ARCTIC COUPLED ICE-OCEAN MODEL

Hsien-Liang R. Tseng—Captain, United States Air Force

Master of Science in Meteorology—March 2010

Master of Science in Physical Oceanography—March 2010

Co-advisor: Wieslaw Maslowski, Oceanography

Co-advisor: Commander Rebecca Stone, USN, Meteorology

The rapid Arctic sea-ice decline since the 1970s has propelled the United States into a state of urgency for updating its defense plan as Arctic and non-Arctic nations alike take an interest in the newfound natural resources of an ice-declining Arctic. In line with

the National Security Presidential Directive-66, we quantify the amount of anomalous sea ice variability (aSIV) that anomalous atmospheric forcing parameters explain using partial covariance analysis. A one-system approach where the NPS-model sea-ice parameters are the direct output of the atmospheric forcing parameters input is employed. Atmospheric forcing fields of 2 m temperature, downward shortwave and long-wave fluxes, 10 m zonal and meridional winds and stresses, are from the European Centre for Medium Range Weather Forecasts Reanalysis-15 and Operational Products. Locations of interest are the Central Arctic seas and along the Northwest Passage (NWP) and Northern Sea Route (NSR). Results show that the atmospheric parameter with greatest influence on aSIV is anomalous surface-air temperature. This occurs during cooling months and averages 4-39% of aSAT contribution to aSIV in the central Arctic, 9-16% along the NWP, and 11-25% along the NSR. Results suggest that atmospheric forcing alone does not explain all of aSIV.

Capt. Tseng was awarded the Air Force Association Award for Outstanding U.S. Air Force Student.

CONGRATULATIONS TO FACULTY ON PROMOTION AND TENURE ACTIONS

- Deborah Gibbons, GSBPP, award of tenure
- Craig Martell, CS, award of tenure
- Javier Salmeron, OR, award of tenure
- Anne Marie Baylouny and Jessica Piombo, NSA, promotion to associate professor
- Nicholas Dew, GSBPP, promotion to associate professor
- Frank Kragh and Weilan Su, ECE, promotion to associate professor
- Marcello Romano, MAE, promotion to associate professor
- Roberto Szechtman, OR, promotion to associate professor
- Frank Giraldo and Pantelimon Stanica, MA, promotion to professor
- Clifford Whitcomb, SE, promotion to professor

GSOIS sponsored programs, cont. from p. 2

- Soviet Union Experience in Afghanistan in 1980s, Nancy Roberts, DA (ONR)
- Field Information Support Tool, James Ehlert, IS (NAVSEA)
- Transnational Information Sharing Cooperation JCTD, Shelley Gallup, IS (U.S. Southern Command)
- NPS Support for CY2010-2012 Rapid Pro VIRT (RPV), Frederick, Hayes-Roth, IS (USMC – MARCORSSYSCOM)
- Center for Edge Power and C2 Chair, Mark Nissen, IS (OSD)
- Support to DTRA Innovation Office, Ronald Fricker, OR (DTRA)
- Counter-NARCO-Terrorism, Edward Lesnowicz, OR (ONR)
- ONR Workshops on Human Performance and Environmental Stressors, Michael McCauley, OR (ONR)
- Development of Program of Instruction for Cost Benefit Analysis, Daniel Nussbaum, OR (OASA)
- Battlespace on Demand Command Decision Making: Enhanced Decision Using METOC Data, Eva Regnier, OR (NRL)

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS (CRADAS)

Nonlinear Model of a Twelve-Phase Transformer Feeding a 24 Pulse Diode Rectifier

Partner: DRS Power & Control Technologies, Inc.
NPS POC: Giovanna Oriti, Electrical and Computer Engineering

Summary: The goal of this collaboration is to channel valuable design enhancements into products being manufactured by DRS for the Navy fleet and other defense applications and evaluate new concepts for viability. Collaborators will develop a new Simulink model of non linear twelve phase transformer that will be used to study system behavior. NPS will model the transformer including core saturation and hysteresis in order to help select/size system level components and predict the behavior before lab validation, reducing the cost of the design cycle.

TECHNICAL SERVICES AGREEMENTS

Toyon Unicorn UAV Flight Testing

Partner: Toyon Research Corporation
NPS POC: Robert Bluth, CIRPAS

Summary: Toyon is designing complex algorithms to support autonomous navigation, image processing, geo-registration, and tracking by small UAVs. Toyon will use CIRPAS facility to test the performance of these algorithms in hardware. NPS's CIRPAS will provide facility and personnel support.

MEMORANDA OF UNDERSTANDING/ AGREEMENT (MOUS/MOAS)

Partner: Department of State (DOS), Bureau of Resource Management, Global Financial Centers Bangkok and Charleston
NPS POCs: Kevin Little and Tom Hazard

Summary: The purpose of this MOU is to establish the terms and conditions for agencies to become a Fully Serviced Agency, requiring allotment accounting services from the Department of State Financial Services Centers. Dept. of State, Post Financial Management Officer will be providing overall funds control and accounting services to the Fully Services Agency at overseas posts.

TECHNICAL REPORTS PUBLISHED

NPS-MAE-10-003	Damage Detection in Composite Interfaces through Carbon Nanotube Reinforcement	M. A. Billy, Y. W. Kwon, R. D. Pollak
NPS-SE-10-001	Augmenting Naval Capabilities in Remote Locations	S. Bostowick, B. Beunviaje, A. Fotouhi, <i>et al.</i>
NPS-SE-10-002	Proposed Functional Architecture and Associated Benefits Analysis of a Common Ground Control Station for Unmanned Aircraft Systems	M. Chanda, J. DiPlacido, J. Dougherty, <i>et al.</i>
NPS-OR-10-002	A Review of the Safety Climate Literature as it Relates to Naval Aviation	A. O'Dea, P. O'Connor, Q. Kennedy, S. Buttrey
NPS-MV-10-001	Social and Cultural Modeling for Naval Analyses: Project Summary 2008-2009	C. Blais

In addition to the unrestricted technical reports above, NPS also produced 3 restricted reports in March 2010. Reports are found at www.nps.edu/Research/TechReports.html

Partner: Defense Business Transformation Agency, Defense Business Systems Acquisition Executive

NPS POC: Keith Snider, GSBPP
 Summary: MOA establishes a relationship between the Business Transformation Agency, Defense Business Systems Acquisition Executive and NPS, supporting the Acquisition Research program at NPS.

Partner: The University of Pennsylvania Law School
NPS POC: CDR Mary Sims, USN

Summary: The agreement will allow Navy JAG master-of-law student to be enrolled in the 2010–2011 academic year at University of Pennsylvania Law School. Law scholarship of \$18,500 for the Navy student will be awarded for the Academic Year.

Partner: San Diego State University and Chief of Information, DoN

NPS POC: CDR Mary Sims, USN
 Summary: The purpose of this agreement is to provide guidelines and procedures for delivering a master of arts degree in communication, with specialization in mass communication and media studies, to Department of the Navy Public Affairs.

Partner: Harvard Law School
NPS POC: CDR Mary Sims, USN

Summary: The Harvard Law School will award one tuition waiver per academic year to a Navy JAGC officer. The Navy JAGC applicant must meet all application and enrollment requirements of the Harvard Law School.

PATENT APPLICATIONS AND AWARDS

Agile Attitude Control System for Small Spacecraft, Navy Case No. 20090004

Inventors: M. Romano and P. Oppenheimer (Mechanical and Aerospace Engineering)

Inductive, Pulse-Forming Network for High-Current, High-Power Applications, Patent No. US 7,675.198 B1,

Inventor: W. Maier (Physics)