



## RESEARCH AT NPS



Maj Don Herod, USMC, 1st Lt Ozkan Ozcan, Turkish Air Force, and CDR Dan McKaughan, USN

NPS students from the modeling, virtual environments, and simulation (MOVES) curriculum presented papers at the 2011 Spring Simulation Multi-Conference Military Modeling and Simulation Symposium April 4-7 in Boston, Massachusetts. The students prepared the papers as part of their final projects in the Modeling and Simulation for Stability Operations course (MV4657) held during the fall quarter of

academic year 2011. **Research Associate Curt Blais** worked with symposium organizers to set up a paper session on Human Social Culture Behavior (HSCB) Modeling containing three of the four papers. The fourth paper was presented during a separate session during the symposium.

The students attended paper presentation sessions in the Spring Simulation Multiconference, as well as sessions in ...continued on page 5

### BROWN-BAG SEMINAR SERIES

WA-302, 1200-1300

- Wednesday, 17 August, Legal Issues of Interest to Faculty (Outside Employment)
- Wednesday, 7 September, Research Initiation Program

### NPS DEEP LAB HONORED



### DEEP LAB • NPS

The NPS Digital Evaluation and Exploitation Laboratory (DEEP Lab) was recognized for its contributions to the “bulk\_extractor” program in a 2011 Value Engineering Award awarded by the DoD Value Engineering Program at a ceremony at the Pentagon on June 22, 2011.

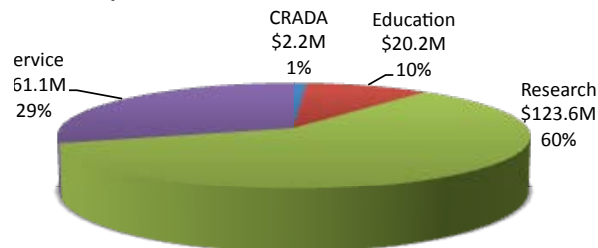
Bulk\_extractor is a C++ program that scans computer disks seized in the course of law enforcement or military operations and finds useful information of immediate value such as names, email addresses, credit card numbers, and terms entered into internet search engines. The program is designed as a triage tool, making it possible to rapidly identify which computer systems should be analyzed first.

**Associate Professor Simson Garfinkel** of the Department of Computer Science heads the Deep Lab research team. Garfinkel also received notification of an award from the Department of Homeland Security for his project “Gaming Systems Monitoring and Analysis Project,” which will develop software to assist law enforcement organizations.

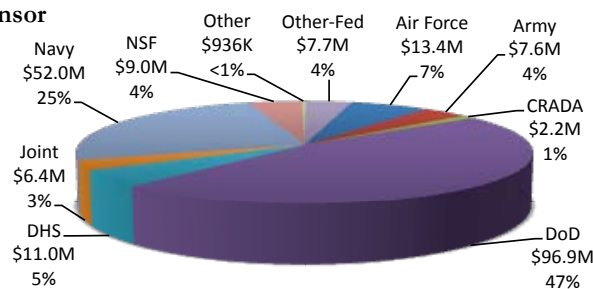
### SPONSORED PROGRAMS STATUS, JUNE 2011

FUNDS AVAILABLE: \$207.1M

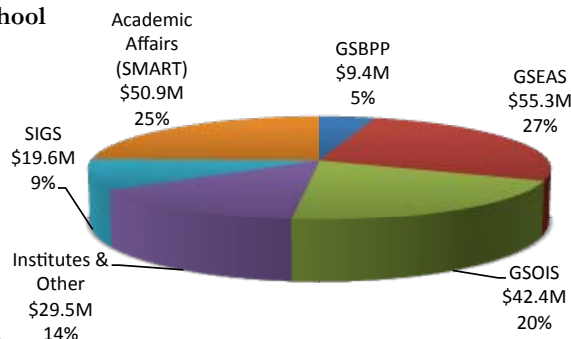
#### By Type of Activity



#### By Sponsor



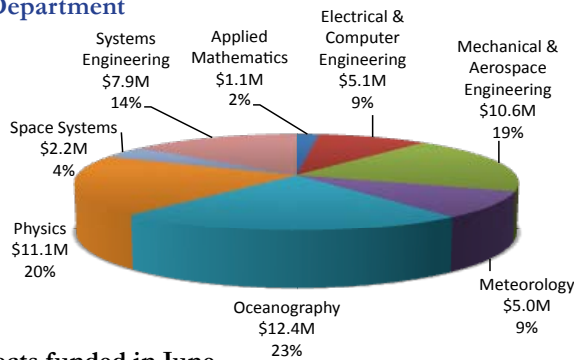
#### By School



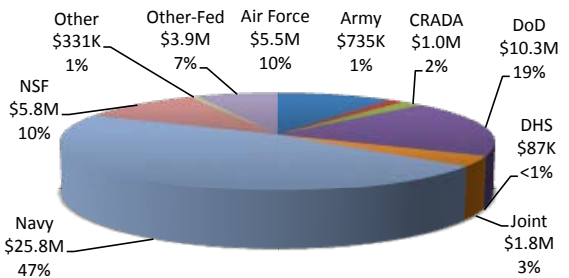
## Graduate School of Engineering and Applied Sciences

Funds available to date: \$55.3M

### By Department



### By Sponsor



### Projects funded in June

- Electromagnetic Aircraft Launch Systems Power Electronics Performance Evaluation, *Bob Ashton, EC* (NAVSEA)
- Practical Anti-Tampering Applications, *Doug Fouts, EC* (ONR)
- ECE Distance Learning Program, *Clark Robertson, EC* (Various)
- Research Support to MSD, *Clark Robertson, EC* (SAF)
- Development and Testing of the Nonhydrostatic Atmospheric Model of the Atmosphere with Subgrid-Scale Parameterization, *Francis Giraldo, MA* (NRL)
- Summer Internship Program on HEL Beam Control, *Brij Agrawal, MAE* (AFRL)
- Adaptive Optics Center of Excellence for National Security, *Brij Agrawal, MAE* (AFRL)
- Bathymetric Mapping for Change Detection in Harbor and Riverine Environments, *Doug Horner, MAE* (ONR)
- Study of Composite Materials for Ship Applications, *Young Kwon, MAE* (NSWC-Carderock Division)
- Nanomaterials Architectures for Ballistic Armor Applications, *Claudia Lubrs, MAE* (ONR)
- Combustions of Bio/Synthetic Fuels, Characterization in Gas Turbines and Diesel Engines, *Knox Millsaps, MAE* (ONR)
- Regional Numerical Weather Prediction for Aerosol Modeling, *Chih-Pei Chang, MR* (NRL)
- Aircraft Measurements for Understanding Air-Sea Coupling and Improving Model Predictions, *Qing Wang, MR* (ONR)
- 32-Channel Digitizer for Moored Hydrophone Array in Shallow-Water Acoustics Experiments, *CS Chiu, OC* (ONR)
- Characterization and Classification of Marine Mammal Vocalizations, *Curt Collins, OC* (CNO)
- ONR FEL Development Program at NPS-INP, *Bill Colson, PH* (ONR)
- Beam-Physics Laboratory Directed Energy (FEL) Basic Experimental Research Program, *John Lewellen, PH* (ONR)
- Nonlinear Electrodynamics of Metamaterials, *James Luscombe, PH* (ONR)
- Integrated Signatures Program, *Chris Olsen, PH* (JIEDDO)
- MASINT Research, *Chris Olsen, PH* (DIA)

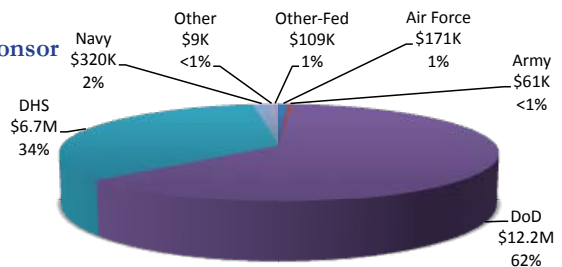
## School of International Graduate Studies

Funds available to date: \$19.6M

### Projects funded in June

- Analytical Template for Assessing Insurgent IO Effectiveness, *Tom Johnson, NS* (CENTCOM)
- Resource Allocation Deterrence Modeling, *Ted Lewis, NS* (U.S. Coast Guard)
- Asia Conference 2011, *Chris Twomey, NS* (OSD)

### By Sponsor

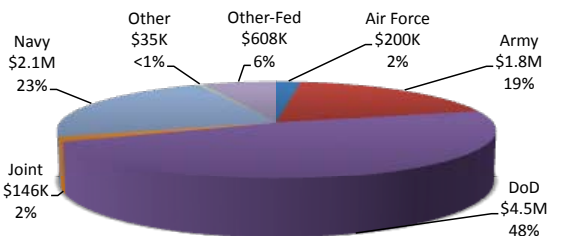


## Graduate School of Business and Public Policy

Funds available to date: \$9.4M

### Projects funded in June

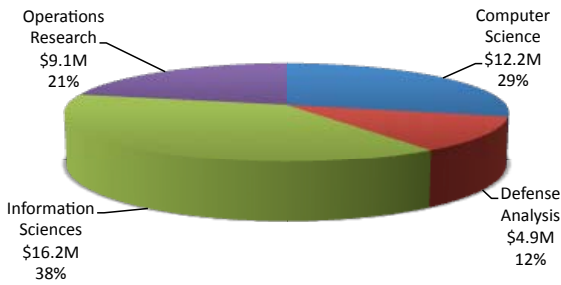
- Multimodal Information Sharing Team: Security and the Private Sector, *Susan Hocerar, GSBPP* (DNI)
- Contract/Program Management Distance Learning Program, *Wally Owen, GSBPP* (Various)
- Chair of Acquisition and Research Program, *Keith Snider, GSBPP* (PEO IWS)



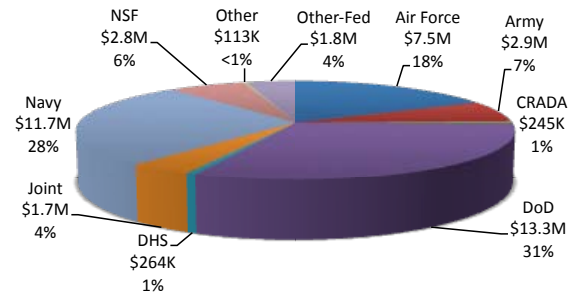
## Graduate School of Operational and Information Sciences

Funds available to date: \$42.4M

### By Department



### By Sponsor



### Projects funded in June

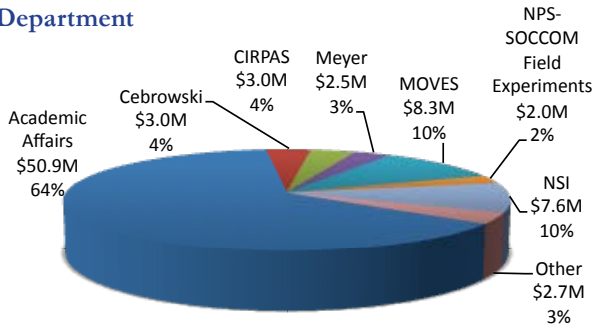
- Theory-Based Approaches for Complex Probabilistic Software Verification (Thrust 2), *Doron Drusinsky, CS* (DTRA)
- Information Assurance Scholarship Program Support - 2011, *Cynthia Irvine, CS* (NSA)
- Cyberciege Development of ICDW, *Cynthia Irvine, CS* (OSD)
- F6 Security Assistance, *Cynthia Irvine, CS* (DARPA)
- Xplane, *Dennis Volpano, CS* (ONR)
- DoD Supply-Chain, Risk-Management, Threat-Analysis Center Collaboration, *Dorothy Denning, DA* (DIA)
- Mobile Data-Views Architecture: from DMEA ISR, *Dan Boger, IS* (SSC-PACIFIC)

- Implementing a COPS Performance Accounting Data Collection Tool to Support OPNAV Budgeting Allocation for Signal Intelligence Collection Systems, *Tom Housel, IS* (SPAWAR)
- ISR Net-T and Tactical Rover Integration, Analysis and Certification Activities, *Bill Roeting, IS* (USAF)
- LSD Recapitalization Capabilities-Based Assessment Study SEA Curriculum, *Jim Eagle, OR* (OPNAV)
- Afghanistan Infiltration Disruption Analysis, *Lee Ewing, OR* (NGIA)
- Cultural Prism, *Moshe Kress, OR* (HQ, USATRADOCC)
- Habitability Assessment Testing, *Nita Shattuck, OR* (USMC - MARCORSSYSCOM)

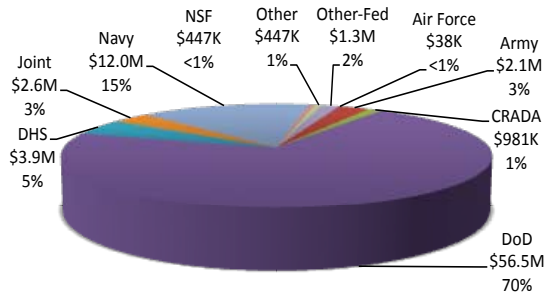
## Research and Education Institutes, Centers, and Other

Funds available to date: \$80.4M

### By Department



### By Sponsor



### Projects funded in June

- Netcentric Certification Office, *Chris Gunderson, Cebrowski* (DISA)
- Hastily Formed Networks, *Brian Steckler, Cebrowski* (OSD)
- Standard Heat Experiment Modeling and Analysis, *Mike Melich, Meyer* (DTRA)
- Marine Corps Warfighting Laboratory Moving Targets Engagement Trainer, *Bill Becker, MOVES* (ONR)
- ADL Support, *Paul Chatelier, MOVES* (DHRA)

- Healing Heroes Program, *Paul Chatelier, MOVES* (DARPA)
- Advanced Distributed Learning Initiative, *Kristy Murray, MOVES* (DHRA)
- TRAC Information Technology, *CDR Joe Sullivan, USN, MOVES* (TRAC - MONTEREY)
- T-20 UAV Testing, *Bob Bluth, CIRPAS* (Arcturus UAV, LLC)
- I MEF Realistic Urban Training with Pelican SUAV, *Bob Bluth, CIRPAS* (I MEF HQ GROUP)

Back editions of *Research at NPS* can be found at [www.nps.edu/Research/Newsletters.html](http://www.nps.edu/Research/Newsletters.html). NPS thesis abstracts are online at [www.nps.edu/Research/MoreThesisAbst.html](http://www.nps.edu/Research/MoreThesisAbst.html). Other information about research at NPS is available at [www.nps.edu/Research/index.html](http://www.nps.edu/Research/index.html).

BEAM-PHYSICS LAB GAINS MARK I

NPS has completed initial onsite acceptance testing of the Mark I superconducting radiofrequency, quarterwave (SRF QW) electron-beam source. The Mark I was fabricated by Niowave, Inc. and delivered to the NPS Beam Physics Laboratory in June. The NPS PI on the project is **Associate Professor John Lewellen**, Department of Physics.

Funded by the Office of Naval Research, the injector-development program has had a series of successes, including generation of an electron beam last summer at Niowave’s facility and first operation of a fully US Navy-funded SRF beam source. Follow-

-up involves design and fabrication of a second-generation QW SRF source incorporating data and lessons from initial trials.

Recent activity entailed inspection and setup of the new Mark I in the NPS Beam Physics Lab, followed by cooling the interior to four degrees above absolute zero, at which point the RF resonator becomes superconducting, allowing extremely efficient operation. At present, studies are limited to low-power measurement of the beam source’s RF properties. These measurements represent firsts for the Navy, NPS, and Niowave:

- First delivery of an SRF beam source to a USN facility.
- First cool-down and characterization of an SRF beam source at a USN facility.



The team: Andrea Holmes, Mark Galt, Mike DeRosa (Niowave), John Harris, Richard Swent, Wayne Bennett. Not shown: John Lewellen, LT Amanda Baxter.



Mark I (center) connected to a liquid nitrogen tank (left) in the Beam Physics Laboratory

MOVES Students, from page 1

the Simulation Interoperability Workshop (Spring 2011 SIW) conducted in parallel with the multiconference. Blais and the students also had opportunity to visit the MIT Media Laboratory for discussion with Dr. Alex Pentland on analysis and application of social media data. Upon return to NPS, the students presented their experiences to faculty and students attending a MOVES Lunch Seminar series. The week was a great learning experience in addition to a show-case of student abilities. Any students interested in this area of study and the potential to participate in next Spring’s conference, sign up for MV4657 for the Fall quarter, Academic Year 2012 (Oct-Dec, 2011). Papers presented at the multi-conference symposium in Boston were:

- *The Application of MTWS in the Simulation of Non-Kinetic Environments*, by Maj Don Herod, USMC, and John LaCrosse (L-3)
- *Using a Text Analysis and Categorization Tool to Generate Bayesian Belief Networks for Use in Cognitive Social Simulation from a Document Corpus*, by LCDR Daniel C. McKaughan, LTC Jonathan Alt, USA (TRAC-Monterey), Zachary Heath (Sandia National Laboratory), J. T. McClain (Sandia National Laboratory)
- *Manual Wargaming as a Method for Training: An Analysis of the Commercial Wargame Battle for Baghdad*, by MAJ Mike K. Stinchfield, USA and MAJ Jason Caldwell, USA
- *Balancing Exploration and Exploitation Ratio in Reinforcement*

Learning, by 1st Lt Ozkan Ozcan, Turkish Air Force, LCDR Claudio Coreixas de Moraes, USN, and LTC Jonathan Alt, USA (TRAC-Monterey).

11TH MOVES RESEARCH AND EDUCATION SUMMIT



MOVES director CDR Joe Sullivan, and ADM Wendi Carpenter, keynote speaker

The MOVES Institute hosted its 11th annual MOVES Research and Education Summit (RES) on July 12–14. The RES demonstrates leading-edge modeling and simulation, discusses emerging virtual-environment technology, and shares academic knowledge among faculty and researchers.

The RES is also a valuable time to connect government, military and civilian industry sectors for networking and collaboration opportunities. The motive behind discussions is to enhance the operational effectiveness of joint forces and allies by providing superior training and analysis products, education, and exemplary research in the field of modeling and simulation.

## APPLIED MATHEMATICS

**Aguilar, Cesar O.** and **Krener, Arthur J.**, “Piecewise smooth solutions to the nonlinear output regulation PDE,” *Proceedings of the 2011 American Control Conference*, pp. 1426–1427

**Canright, D.**, Gangopadhyay, S., Maitra, S., & **Stanica, P.** (2011). Laced boolean functions and subset sum problems in finite fields. *Discrete Applied Mathematics*, 159(11), 1059-1069.

## COMPUTER SCIENCE

**Peterson, Zachary, Gondree, Mark** and **Beverly, Rob**, “A Position Paper on Data Sovereignty: The Importance of Geolocating Data in the Cloud,” USENIX Workshop on Hot Topics in Cloud Computing (HotCloud), held in Portland, OR.

Sung, Y. E., Sun, X., Rao, S. G., **Xie, G. G.**, & Maltz, D. A. (2011). Towards systematic design of enterprise networks. *IEEE-ACM Transactions on Networking*, 19(3), 695-708.

**Anand, P.**, Escudero, H., **Gera, R.**, & **Martell, C.** (2011). Triangular line graphs and word sense disambiguation. *Discrete Applied Mathematics*, 159(11), 1160-1165.

**Denning, P. J.** & Frailey, D. J. (2011). Who are we now? *Communications of the ACM*, 54(6), 25-27.

## DEFENSE ANALYSIS

**Blanken, L. J.**, & Lepore, J. J. (2011). Slowing down to keep the lead in military technology. *Defence and Peace Economics*, 22(3), 317-334.

**Freeman, M.** (2011). The sources of terrorist financing: Theory and typology. *Studies in Conflict & Terrorism*, 34(6), 461-475.

## DEFENSE RESOURCES MANAGEMENT INSTITUTE

**McNab, R.M.** (2011). Implementing program budgeting in the Serbian Ministry of Defense. *Public Budgeting and Finance* 31 (2), 117-131.

## ELECTRICAL AND COMPUTER ENGINEERING

**Butler, J. T., Frenzen, C. L.**, Macaria, N., & Sasao, T. (2011). A fast segmentation algorithm for piecewise polynomial numeric function generators. *Journal of Computational and Applied Mathematics*, 235(14), 4076-4082.

Laddomada, M., Dolecek, G. J., Ching, L. Y., Luo, F., Renfors, M., & Wanhammar, L. (2011). Advanced techniques on multirate signal processing for digital information processing. *IET Signal Processing*, 5(3), 313-315.

## GRADUATE SCHOOL OF BUSINESS AND PUBLIC POLICY

**Wang, Chong** and **San Miguel, Joseph**, “Designing Optimal Defense Contracts: Are Cost-plus Contracts (Justifiably) Out of Favor?”, at the 2011 American Accounting Association (AAA) Annual Meeting in Denver, CO, August 6-10.

**Wang, Chong**, “Understanding the Role of Language in Management Forecast Press Releases,” accepted for presentation at the

2011 AAA Annual American Accounting Association meeting. This paper is a joint work with Stephen Baginski at University of Georgia, Elizabeth Demers at INSEAD, and Julia Yu at Nanyang Technological University in Singapore.

**Shatnawi, D.**, Oaxaca, R., & Ransom, M. (2011). Applying fixed effects to hierarchical segregation models. *American Economic Review*, 101(3), 588-592.

**Shen, Y.**, & Hsia, R. Y. (2011). Association between ambulance diversion and survival among patients with acute myocardial infarction. *JAMA-Journal of the American Medical Association*, 305(23), 2440-2447.

**Franck, Chip**, Impact of Export Control and Technology Transfer Regimes: International Perspective, Western Economics Association International Meetings, San Diego, June 29–July 3.

**Coughlin, Pete**, A Shared Procurement Model to Address Contract Bid Protests, Western Economics Association International Meetings, San Diego, June 29–July 3.

**Pema, Elda and Mehay, Stephen**, The Impact of Distance Education on Course Completion and Performance, Western Economics Association International Meetings, San Diego, June 29–July 3.

**Franck, Chip**, Emerging Patterns in the Global Defense Industry, Western Economics Association International Meetings, San Diego, June 29–July 3.

**Myung, Noah**, The Quality Adjusted Retention Auction Mechanism, Western Economics Association International Meetings, San Diego, June 29–July 3.

## MECHANICAL AND AEROSPACE ENGINEERING

**Kwon, Y. W.**, Esmaceli, Y., & **Park, C. M.** (2011). Stress-strain behavior of an aluminum alloy under transient strain-rates. *Journal of Pressure Vessel Technology-Transactions of the ASME*, 133(4), 044501.

**Su, J., Nelson, T. W., McNelley, T. R.**, & Mishra, R. S. (2011). Development of nanocrystalline structure in CU during friction-stir processing (FSP). *Materials Science and Engineering A-Structural Materials Properties Microstructure and Processing*, 528(16-17), 5458-5464.

**Su, J., Swaminathan, S., Menon, S. K., & McNelley, T. R.** (2011). The effect of concurrent straining on phase transformations in NiAl bronze during the friction stir processing thermomechanical cycle. *Metallurgical and Materials Transactions A-Physical Metallurgy and Materials Science*, 42A(8), 2420-2430.

Tehrani, M., **Luhurs, C. C.**, Al-Haik, M. S., Trevino, J., & Zea, H. (2011). Synthesis of WS<sub>2</sub> nanostructures from the reaction of WO<sub>3</sub> with CS<sub>2</sub> and mechanical characterization of WS<sub>2</sub> nanotube composites. *Nanotechnology*, 22(28), 285714.

**R. Romero**, and N. Goodman, “Adaptive Beamsteering for Search-and-Track Application with Cognitive Radar Network,” *Proceedings of IEEE Radar Conference*, Kansas City, MO, May 2011

**METEOROLOGY**

Berner, J., **Ha, S., Hacker, J. P.**, Fournier, A., & Snyder, C. (2011). Model uncertainty in a mesoscale ensemble prediction system: Stochastic versus multiphysics representations. *Monthly Weather Review*, 139(6), 1972-1995.

Lee, C., Wu, C., Wang, T. C., & **Elsberry, R. L.** (2011). Advances in understanding the “perfect monsoon-influenced typhoon”: Summary from international conference on typhoon morakot (2009). *Asia-Pacific Journal of Atmospheric Sciences*, 47(3), 213-222.

**Wang, Q.**, Kalogiros, J. A., Ramp, S. R., **Paduan, J. D., Buzorius, G., & Jonsson, H.** (2011). Wind stress curl and coastal upwelling in the area of Monterey Bay observed during AOSN-II. *Journal of Physical Oceanography*, 41(5), 857-877.

**NATIONAL SECURITY AFFAIRS**

Matei, F. C., & **Bruneau, T.** (2011). Intelligence reform in new democracies: Factors supporting or arresting progress. *Democratization*, 18(3), 602-630.

**Assistant Professor Sophal Ear** has been elected to a five-year term on the Council on Foreign Relations, through 30 June 2016.

**Assistant Professor Zachary Shore** was a fellow of Stanford University’s Center for Advanced Study in the Behavioral Sciences for academic year 2011-12. He was also appointed a Discipline Review Committee member by The Fulbright Foundation, for scholarship applications to Western Europe. Shore’s review of Erik Larson’s book, *In the Garden of Beasts*, about the Nazis’ early years in power, was recently published in Newsweek’s online magazine, *The Daily Beast*.

**OCEANOGRAPHY**

Park, S., **Chu, P. C.**, & Lee, J. (2011). Interannual-to-interdecadal variability of the yellow sea cold water mass in 1967-2008: Characteristics and seasonal forcings. *Journal of Marine Systems*, 87(3-4), 177-193.

Voronovich, A. G., Ostashev, V. E., & **Colosi, J. A.** (2011). Temporal coherence of acoustic signals in a fluctuating ocean. *Journal of the Acoustical Society of America*, 129(6), 3590-3597.

**OPERATIONS RESEARCH**

**Buttrey, S., Washburn, A.**, Price, W.: “Estimating NHL Scoring Rates,” *Proceedings of the Northern California Conference on Statistics and Operations Research in Sports*, 2010.

**Salmeron, J., Kline, J., and Densham, G.:** Optimizing Schedules for Maritime Humanitarian Cooperative Engagements, *Interfaces* 41(3), pp. 238-253

**PHYSICS**

**Hu, Q., Osswald, S., Daniel, R., Zhu, Y., Wesel, S., Ortiz, L., et al.** (2011). Graft copolymer-based lithium-ion battery for high-temperature operation. *Journal of Power Sources*, 196(13), 5604-5610.

McCarthy, B. L., **Olsen, R. C., & Kim, A. M.** (2011). Creation of bathymetric maps using satellite imagery. *Ocean Sensing and Monitoring III*, 8030, 80300C.

**Lee, K. R., Kim, A. M., Olsen, R. C., & Kruse, F. A.** (2011). Using WorldView-2 to determine bottom-type and bathymetry. *Ocean Sensing and Monitoring III*, 8030, 80300D.

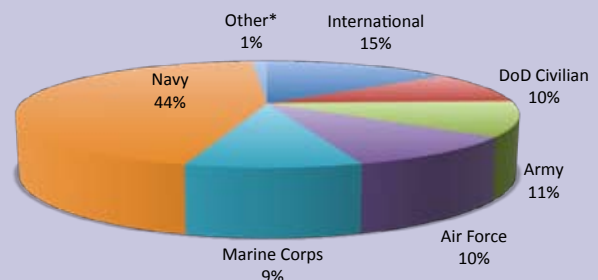
**SYSTEMS ENGINEERING**

**Millar, Richard**, “Integrated Sensor Node as an Approach to Integrated Instrumentation Sensor Systems for Aerospace Systems Control” (R.C. Millar & B. Tulpule), Propulsion Safety and Affordable Readiness Conference, Ponte Vedra Beach, FL.

**Millar, Richard**, “Turbo-Machinery Monitoring Measures for Propulsion Safety and Affordable Readiness” ASME Turbo Expo, Vancouver, Canada, June 2011.

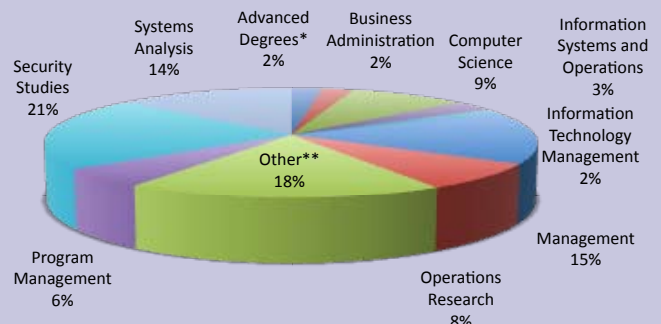
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**THESIS STATS FOR MARCH 2011**



\*Army Reserve, Army Reserve National Guard, Coast Guard, NOAA

**Resident Student Population for March 2011 (1,612 total)**



\* Advanced degrees: doctorate in computer science (1), mechanical engineering (1), physical oceanography (1), \*\* Other master’s degrees: Applied math (1), defense analysis (3), electrical engineering (2), engineering acoustics (2), human systems integration (3), mechanical engineering (3), meteorology (2), meteorology and physical oceanography (2), physical oceanography (1), physics (1), software engineering (2), systems engineering (1)

**Degrees Conferred in March 2011 (148 Degrees Conferred)**

**AN ANALYSIS OF U.S. NAVY HUMANITARIAN ASSISTANCE AND DISASTER RELIEF OPERATIONS****Cameron A. Ingram**—Lieutenant, United States Navy**Cullen M. Greenfield**—Lieutenant, United States Navy**Master of Business Administration—June 2011****Co-Advisors: Aruna Apte and Keenan D. Yoho, Graduate School of Business and Public Policy**

This project investigates the response of the U.S. Navy (USN) and Military Sealift Command (MSC) to different types of natural disasters and identifies the types of assets deployed as well as the dwell times for those assets. Using the recent history of U.S. Navy humanitarian assistance and disaster relief (HADR) operations, we explore opportunities to shape the fleet force structure to adapt to the increased mission importance of HADR operations, and we identify current hard power assets that may be effective in achieving soft power goals.

By analyzing disaster characteristics and U.S. Navy platform capabilities, we can determine which assets are better suited for mission requirements brought on by disasters. Knowing the best possible asset to assign to a disaster will improve the DoD's effectiveness in regaining stability, both monetarily and logistically, within the affected region when disasters occur. Further, understanding which assets are better suited for disaster response will help the USN make future force structure and fleet composition decisions. *LT Ingram won the RADM Donald R Eaton Logistics Award for Outstanding Achievement.*

**LASER PEENING FOR MITIGATION OF STRESS CORROSION CRACKING AT WELDS IN MARINE ALUMINUM****Heather R. Mattern**—LCDR, United States Coast Guard**Master of Science in Mechanical Engineering—June 2011****Advisor: Luke N. Brewer, Department of Mechanical and Aerospace Engineering****Co-Advisor: Joseph C. Farmer, Visiting Professor, Lawrence Livermore National Laboratory**

This work examines the use of laser peening for mitigating stress corrosion cracking in marine grade aluminum alloys (Al-Mg). These alloys can be sensitized during welding and develop a tensile residual stress in the heat affected zone that may promote stress corrosion cracking in a salt water environment. Metal inert gas welded 5083 (4.8wt% Mg) aluminum plate was laser peened using a variety of laser intensities to create compressive stresses. Mechanical tests were performed to investigate the stress corrosion cracking of the material including slow strain rate testing and potentiostatically driven, salt-water exposure. Microstructural and micromechanical tests were performed to characterize the effects of laser peening on the microstructure of the material. The slow strain rate testing showed a systematic decrease in ductility with increasing laser peening intensity. The fracture surfaces on all welded samples were indicative of ductile fracture but with a pre-crack length that scaled inversely with laser peening intensity. The hardness of the material increased with laser peening intensity. This work suggests that welded 5083 does not readily stress corrosion crack. Laser peening does affect the mechanical behavior of the material, but its full effect on stress corrosion behavior requires further study. *LCDR Mattern was the recipient of the Surface Navy Association's Award for Excellence in Surface Warfare Research and the Naval Sea Systems Command Award in Naval/Mechanical Engineering.*

**MODELING AND VISUALIZING COMPLEX SURVEY RESULTS: APPLICATION TO COUNTERTERRORISM IN THE SAHEL****Joseph D. Rix**—Captain, United States Marine Corps**Master of Science in Operations Research—June 2011****Advisor: Ronald Fricker, Department of Operations Research****Second Reader: Samuel Buttrey, Department of Operations Research**

Theories of support for terrorist organizations are tested while providing a model that accounts for spatial variation and survey design. Survey-weighted logistic regression and hot-deck imputation procedure finds that the most significant factor in whether a person in the Sahel region of Africa will support terrorist organizations is religious extremist views. Support for other factors such as good governance, economic outlook, or democratic ideals is not present in the data.

Additionally, a web-based geographic and analytical tool is developed to enable decision-makers rapid access to information contained in a multi-country multi-year survey. The goal of this tool is to provide methods, tools, and models to facilitate analysis and understanding of social survey data in efforts to provide decision makers with the sociocultural awareness and understanding of complex West African societies. Operationally, it permits analysts to "free" themselves from the tremendous overhead associated with modern statistical and geographic information systems. Via the Internet, the warfighter can access insightful exploratory analysis that may provide an edge when interacting with unfamiliar, and sometimes hostile, foreign nationals. *Capt Rix won the Military Operations Research Society Stephen A. Tisdale Graduate Research Award.*

**SENSITIVITY OF MERIDIONAL OVERTURNING CIRCULATION TO THE PATTERN OF SURFACE DENSITY FLUX****David R. Lewis**—LCDR, United States Navy—September 2010**Master of Science in Meteorology and Physical Oceanography****Advisor: Timour Radko, Department of Oceanography****Second Reader: Gabriele Jost, Department of Oceanography**

The dynamic response of the thermocline to thermodynamic forcing on the sea surface is analyzed in terms of pattern of the oceanic meridional overturning. The technique expands on Walin's (1982) water-mass transformation theory, developed by Radko et al. (2008). Using general circulation model (GCM), experiments are performed where surface air-sea density flux distributions are systematically perturbed to test the Meridional Overturning Circulation (MOC) response. The experiments are diagnosed using water-mass transformation theory, making it possible to quantify the role of adiabatic processes in the global overturning circulation. This study finds that adiabatic processes dominate the MOC in the upper ocean and the general circulation structure can be described using the improved water-mass transformation model. However, strength of flow in the Western Boundary regions is not well described. The highest sensitivity of the MOC to thermodynamic forcing is in the eastern Atlantic circumpolar regions. Western boundary regions are characterized by low sensitivity. The MOC does not show a high sensitivity to heating perturbations in the context of a larger zonal temperature structure. The finding has potential application to U.S. Navy's ocean modeling and strategy related to climate change. *LCDR Lewis won the Oceanographer of the Navy Award for Outstanding Academic Performance in the METOC Curriculum.*

**TECHNICAL SERVICES AGREEMENT (TSA)**

**T-20 Testing**

**Partner: Arcturus, UAV, LLC**

**PI: Robert Bluth, CIRPAS**

Summary: NPS/CIRPAS will provide pre-flight coordination, flight coordination, range management, flight safety and facility management of Arcturus activities at the CIRPAS facilities.

**MEMORANDA OF UNDERSTANDING/AGREEMENT (MOUs/MOAs)**

**Support for the Chair of MASINT at NPS**

**Partner: National MASINT Management Office (NMMO)**

**NPS POC: Chris Olsen, Department of Physics**

Summary: This MOU continues an established relationship for the sponsorship of the Chair, Measurement and Signature Intelligence at NPS in the Graduate School Engineering and Applied Sciences. The chairman will serve as deputy director of the Remote Sensing Center and liaison between the two organizations.

**Alarm Monitoring of DIA SCIF**

**Partner: Fleet Numerical Meteorology and Oceanography Center**

**NPS POC: Andy Anderson, Security Office**

Summary: The purpose of this agreement is to delineate responsibilities for the monitoring of the Sensitive Compartmented Information Facility (SCIF) alarm at the Naval Postgraduate School.

**Center for Civil–Military Relations**

**Partner: United States Department of State**

**NPS POC: Timothy Byrne, Center for Civil–Military Relations**

Summary: This agreement defines the responsibilities of each party with regard of a Senior Military Leaders Course; Funds provided under this agreement will be used by the Center for Civil–Military Relations (CCMR) to support the Senior Mission Leaders (SML) course in Tokyo, Japan.

**LETTERS OF ACCORD**

**Exploring Potential Activities between the Naval Postgraduate School and the Inter-American Defense College**

**Partner: Inter-American Defense College**

**NPS POC: Tom Hazard, Office of the Provost**

Summary: Inter-American Defense college and NPS declare intent to develop research and academic programs in the areas such gender, building integrity, maritime security, and cyber security. The parties intend to establish other form of collaboration such as the organization of workshop, conferences, seminars, and cooperative research projects.

**International Education Alliance between the Polish Military University of Technology and the Naval Postgraduate School**

**Partner: Military University of Technology**

**NPS POC: Gary Roser, School of International Graduate Studies**

Summary: The objective of this LOA is to explore areas of common interest for potential collaboration in the field of science, engineering, and technology applications.



**MICRO-ANALYSIS SOCIETY HONORS NPS PROFESSOR**

**Associate Professor Luke Brewer**, Department of Mechanical and Aerospace Engineering has been announced as the recipient of the

Microanalysis Society K.F.J. Heinrich Award. This award honors a scientist under the age of forty for distinguished technical contributions to the field of microanalysis. The award winner is chosen annually by the MAS president.

Brewer’s research has focused on the development and application of electron backscattered diffraction (EBSD) methodologies, hyperspectral analysis techniques, and micromechanical testing procedures. In his short career, he has served both the Microanalysis Society and the broader microanalysis community in many ways, and has been honored with numerous awards for his technical achievements and service in the field of microanalysis.

The award will be presented August 7th at the Microscopy Microanalysis 2011 Meeting in Nashville.

**TECHNICAL REPORTS PUBLISHED**

NPS-OR-11-003	Human Factors in the Joint Typhoon Warning Center Watch Floor	E. Regnier, A. Kirlik
NPS-SE-11-003	Influence of Foreign Humanitarian Assistance/Disaster Relief in a Coastal Nation	Systems Engineering Analysis Cohort 17, Team A
NPS-SE-11-004	Advanced Undersea Warfare Systems	Systems Engineering Analysis Cohort 17, Team B
NPS- SE-11-006	A System to Integrate Unmanned Undersea Vehicles with a Submarine Host Platform	W. Calvert, R.Cohn, G. Goodman, <i>et al.</i>

*Technical reports may be obtained at <http://www.nps.edu/Research/TechReports.html>*