Department of Electrical Engineering and Computer Science

COL Eugene Ressler, Ph.D.
Professor and Head,
Department of Electrical Engineering and Computer Science

The mission of the Department of Electrical Engineering and Computer Science is to educate and inspire cadets to be leaders of character, prepared to think critically and apply engineering and technology expertise as Army Officers. We ensure that our highly productive research programs support our curriculum, enhance the professional development of both cadets and faculty, and contribute to the fields of science and engineering important to the Department of Defense and National government. Our more than 50 faculty members have superb qualifications in computer science, electrical engineering, and information technology. The Photonics Research Center, the Information Technology and Operations Center, and the Network Science Center have an outstanding track record of finding research opportunities that best support our mission. These centers establish funding programs and invite faculty to support projects of choice without overhead requirements or administrative burdens. This approach to department research has resulted in 100% faculty participation and up to 100 publications and presentations in a given year. At the same time, we are making a difference throughout the Defense community as well as in the Federal Government. Of particular note are our contributions to smart pixel technologies, optical and oversampled analog to digital conversion, image processing, novel semiconductor lasers, information assurance, science and engineering education, diversity, officer education needs in network-centric warfare, information technology, advanced educational technology, high speed communications, fiber optics, and the science and engineering underpinning numerous Army battlefield and automation systems. The quality of our scholarship and service is recognized by peers nationally and internationally.

Through the efforts of the Department, the Information Technology and Operations Center (ITOC), including the NSA Fellow as USMA, is a Center of Academic Excellence in Information Assurance Education as designated by the National Security Agency (NSA). The Military Academy was the first-ever undergraduate institution to be so designated and was re-designated last year for the third time. The ITOC also continues to be the driving force behind the annual Cyber Defense Exercise. The Cyber Defense Exercise challenges cadets from all five national service academies to design, implement, and protect a sophisticated computer network

from attack by a NSA-led red team. The winning academy is awarded the NSA Information Assurance Director's Trophy. In 2007 and 2008 the Academy's Team took first place. The CDX program has significantly raised the level of Information Assurance education and understanding for all participants and is being used as the model for both a multi-national Department of Defense exercise and a competition for civilian universities.

The electrical engineering and computer science efforts in the Photonics Research Center, ITOC, and the Network Science Center continue to be singled out for excellence during reviews by supporting agencies. Our cadets, staff, and faculty continue to work as a team to achieve the best possible research experience while supporting the needs of our primary customer—the United States Army.

Information Technology Operation Center Projects:
Center Director: LTC Gregory Conti, Ph.D.

Mobile Device Security
COL Grant Jacoby, Ph.D.

Sponsor: National Reconnaissance Office

Although mobile devices are globally omnipresent, security developments for these devices have not kept pace with their technological advancements. Thus, mobile devices are increasingly vulnerable to intrusions and malicious attacks. Gibraltar combats these growing threats by monitoring demands placed on battery current (mA) as well as correlating power and event activities, such as processes, open ports, and registry keys. This combination serves as an early warning tripwire-like sensor for mobile hosts, blocking as well as identifying attacks. The end state for this program is to provide a totally host-based proactive form of intrusion detection systems (IDS) that can be easily integrated into current network IDS to provide an enhancement in detecting, alerting and responding to various intrusions. This research outlines the design, test, and build methodologies used to resolve attack-sensing and warning research problems and discusses lessons learned.

G. Jacoby and N. Davis, "Mobile Host-Based Intrusion Detection and Attack Identification," *IEEE Wireless Communications Journal*, vol. 14, no. 3, pp. 1-15, June 2007.

G. Jacoby and **S. Mosley**, "Mobile Security Using Separated Deep Packet Inspection," 5th IEEE Consumer Communications and Networking Conference (CCNC08), January 2008.

S. Mosley, M. Potasznik, K. Davis, R. Stevens, M. Ballmann, B. Ancheta, and **G. Jacoby**, "FLIP - Forward Looking Intrusion Protection for Mobile Devices via Snort-Inline Hardware Implementation," Proceedings from The 2007 World Congress in Computer Science, Computer Engineering, and Applied Computing, June 2007.

S. Mosley and **G. Jacoby**, "A Reconfiguration of Mobile Clustering Architecture for Enhanced and Reliable Small Unit Computing," IEEE Canadian Conference on Electrical and Computer Engineering (CCECE08), May 2008.

P. Renals, J. Chamberlin, and **G. Jacoby**, "Skype-Snype – Defending the Network," Final Technical Report, April 2008.

Hacking and Innovation
LTC Gregory Conti, Ph.D.

Sponsor: ITOC

This research covers the passionate and independent-minded global community of highly skilled technical experts that frequently functions outside the mainstream of computer product development and conventional technology research. Sometimes called the hacker community, these experts are responsible for innovation that pushes the limits of technology, sometimes in unintended or uncomfortable ways, as well as for prescient warnings about the threats of both technology and the government's technology-related policy and regulations. Computer scientists have much to learn about innovation and nontraditional problem solving by listening to and working with them.

G. Conti. "Satellite Imagery Analysis," DEFCON, July 2007.

G. Conti. "Could Googling Take Down a President, a Prime Minister, or an Average Citizen?" DEFCON, August 2008.

Web-based Information Disclosure
LTC Edward Sobiesk, Ph.D., LTC Gregory Conti, Ph.D.

Sponsor: ITOC

Virtually every Internet user on the planet uses the powerful free tools offered by a handful of information service providers in many aspects of their personal and professional lives. As a result, users and organizations are freely providing unprecedented amounts of sensitive information in return for such services as Internet search, email, mapping, blog hosting, instant messaging and language translation. Traditional security measures, such as cryptography and network firewalls, are largely ineffective because of the implicit trust paradigm with the service provider. In this research, we directly address this problem by providing a threat analysis framework of information disclosure vectors, including fingerprinting of individuals and groups based on their online activities, examine the effectiveness of existing privacy countermeasures and clearly outline the critical future work required to protect our corporate, organizational and individual privacy when using these services.

K. Abdullah, **G. Conti**, and R. Beyah. “A Visualization Framework for Self-monitoring of Web-based Information Disclosure.” IEEE International Conference on Communications (ICC), May 2008.

K. Abdullah, **G. Conti** and **E. Sobiesk,** "Self-monitoring of Web-based Information Disclosure;" Workshop on Privacy in the Electronic Society, October 2007.

G. Conti. “Evil Interfaces: Violating the User,” Hackers of Planet Earth: The Last HOPE, July 2008 (accepted for presentation).

G. Conti and **E. Sobiesk**; "An Honest Man Has Nothing to Fear: User Perceptions on Web-based Information Disclosure," Symposium on Usable Privacy and Security (SOUPS); July 2007.

G. Conti, “Could Googling Take Down a President,” *Communications of the ACM*, January 2008.

E. Sobiesk and **G. Conti**, "The Cost of Free Web Tools," *IEEE Security and Privacy*, May/June 2007.

Visualization of Security Data
LTC Gregory Conti, Ph.D., Mr. Erik Dean

Security analysts and network administrators are faced with tremendous amounts of security related data. Unfortunately current tools quickly overwhelm us with too much or the wrong type of information. This research explores solutions to this problem using carefully crafted security visualization systems that produce insightful images, animations and movies of security data. If properly constructed, the results can be dramatic and will help you quickly perform analysis and better communicate results to clients, management and other analysts.

S. Abbott-McCune, A. Newtson, R. Ross, R. Ware, and **G. Conti**. “Free visualization tools for security analysis and network monitoring,” *INSECURE*, Issue 15, February 2008, pp. 18-25.

G. Conti, *Security Data Visualization*, No Starch Press, September 2007.

G. Conti and **E. Dean**. “Visual Forensic Analysis and Reverse Engineering of Binary Data,” Black Hat USA, August 2008 (accepted for presentation).

Eighth Annual IEEE Information Assurance Workshop
LTC Ronald Dodge, Ph.D., LTC John Hill, Ph.D., Dr. John James

Sponsors: IEEE Systems, Man and Cybernetics Society, National Security Agency

The Department of Electrical Engineering and Computer Science, with support from the IEEE and the National Security Agency, has initiated a national-level series of workshops to provide a forum for discussion of information-assurance-related issues and publication of information-assurance-related research. The EE&CS Information Technology and Operations Center has

hosted highly regarded workshops on Information Assurance topics since 2000. The proceedings have been published on compact disk and in book form.

Proceedings of the Seventh Annual IEEE SMC Information Assurance Workshop, West Point, NY. June 15-17, 2007.

Information Warfare Analysis and Research Lab
LTC Joe Adams, Ph.D.

Sponsor: ITOC, NSA, NRO

The Information Warfare, Analysis, and Research (IWAR) Lab represents six LAN segments consisting of approximately 200 nodes. It provides an "enterprise" appearance to the users of the network by running many operating system versions and multiple similar services on various hardware architectures. The network segments contain both "vulnerable" and "hardened" targets. These systems are used in support of Information Assurance education and training at USMA. The lab also serves as the resource center for computing assets supporting sponsored research. New technologies and applications are integrated into the IWAR network as appropriate, adding to the complexity and realism of the network.

Cyber Defense Exercise 2008
LTC Joe Adams, Ph.D., Mr. Erik Dean

Sponsor: National Security Agency

The inter-academy Cyber Defense Exercise (CDX) is a hands-on, competitive real-life learning experience initiated and implemented by faculty and cadets of the US Military Academy, with funding and direction provided by the National Security Agency. The concept of "defending the network" was derived to evaluate cadet skills and the effectiveness of the Information Assurance (IA) education at West Point. The CDX served as the final project for senior-level Computer Science majors enrolled in the IA course. All five service academies competed in 2008. A team of analysts from the National Security Agency served as the Red Team. Remote access was provided to each participating school's Cyber Defense Network (CDN) via a Virtual Private Network configured to provide authentication and encryption of all traffic. The team verified the student's efforts to provide security to the CDN while ensuring the predetermined services and applications were available, with a baseline set of network resources and operating systems provided by the DoD Public Key Infrastructure Program Management Office. The Red Team then, based on predetermined assessment criteria, designated the school with the strongest information assurance posture the winner of the exercise.

Classroom XXI
MAJ Duane Fairfax, MAJ Sam Abbot-McCune

Sponsor: TRADOC

This project provides technical expertise and maintains the test-bed laboratory for the TRADOC multimedia classroom of the 21st Century. In addition, it evaluates and recommends proposed technologies. The researcher performs test and acceptance of Classroom XXI implementations and conducts courseware development training. Objectives include:

- Determine benefits and limitations of student computer management tools;
- Evaluate collaborative tools and other methods to enhance student learning;
- Evaluate and test hardware, software, and audio-visual equipment for possible use in future Classroom XXI implementations; and
- Assess knowledge/learning management systems to enhance school administrator ability to conduct soldier Human Capital Management.

Information Assurance Education and Curriculum Development
LTC Joe Adams, Ph.D., MAJ Matt Dunlop

Sponsor: ITOC

Our nation's economy and our military are becoming increasingly dependent on information systems. Assuring the confidentiality, integrity, and availability of these systems is a national security issue. A significant effort is being expended to develop information assurance curriculum for use in undergraduate programs. Objectives include:

- Develop consistent IA curriculum criteria for all undergraduate universities to employ;
- Share advances in IA education with other universities as well as industry by facilitating technology transfer;
- Work with the NSA and other organizations to continue to expand cadet and faculty internships;
- Ensure IA education is conducted employing a multi-disciplinary approach; and
- Identifying means for universities resource bounded to include IA into existing curriculum.

Network Science Center Projects:
Center Director: Dr. John R. James

First USMA Network Science Workshop
LTC Ronald Dodge, Ph.D., LTC John Graham, Ph.D., Dr. John James

Sponsors: NSC, ARI, ARO

The first USMA Network Science Workshop was held 18-20 April, 2007 http://www.netscience.usma.edu/NSW1/Index.htm. The theme of the workshop was "Network Science in Full-Spectrum Warfare". The theme explored the challenges in understanding and predicting human & cyber networks given the rapid decline of the rigid hierarchical structure. The challenge that was posed was to identify directions for basic and applied research that have

break-though implications for near term applications. Links to all presentations and papers presented at the workshop are available at http://www.netscience.usma.edu/NSW1/Program/Index.htm.

Network Science Report, United States Military Academy (USMA) Network Science Center (NSC) Report, West Point, NY 10996, ISBN-13: 978-1-934808-00-9, pp 1-44.

Second USMA/ARI Network Science Workshop
Dr. John James, Dr. Frederick Moxley, LTC John Graham, Ph.D.

Sponsors: NSC, ARI, ARO, NSF

The second USMA Network Science Workshop was held 20-22 October, 2007 http://www.netscience.usma.edu/NSW2/Index.htm. The Second USMA Network Science Workshop encouraged participants to explore what is meant by Network Science. We devoted the opening Panel Session to discussing the definition of Network Science and the areas of interest from the point of view of several different disciplines. We had plenary speakers discuss scientific results and user representatives stated the needed capabilities. Four tracks explored Network Science tools, theory, policy, and modeling. A final panel session summarized results from the four tracks. Links to all presentations and papers presented at the workshop are available at http://www.netscience.usma.edu/NSW2/Program/Index.htm.

Third USMA Network Science Workshop
Dr. John James, Dr. Frederick Moxley, Dr. Helen Armstrong

Sponsors: NSC, ARI, ARO, NSF

The third USMA Network Science Workshop was held 15-17 October, 2008 http://www.netscience.usma.edu/NSW3/Index.htm. The theme of the third USMA Network Science Workshop was “Transforming Net Centric Operations Through Network Science. Session themes included: Modeling and Simulation, Social networks and leadership, Semantics and cognitive networks, Understanding and managing complex networks, Building and analyzing social networks, Analyzing evidence in complex, dynamic environments, Understanding mission needs across echelons. The theme of the final panel session was “What did we learn about: Transforming Military Applications Through Network Science?” Links to all presentations and papers presented at the workshop are available at http://www.netscience.usma.edu/NSW3/Program/Index.htm.

Network Reporting (STEGASOAR)
Dr. Frank Mabry and Dr. John James

Sponsor: Network Science Center

The Network reporting project (STEGASOAR) conducted experiments in applying the Unicode steganographic vulnerability in two areas:
STEGASOAR-Offensive: Prototyped an offensive information operations application which will enable creation of internal, exploitable covert channels in otherwise innocuous documents written in Unicode. The prototype will be a watermarking application.
STEGASOAR-Defensive: Investigated detection, alerting, and mitigation of Unicode-enabled and steganographic-based covert channels.
The outcomes of the project included: (1) interim reports and a final report detailing an approach for offensive and defensive applications of the Unicode steganographic vulnerability. (2) design of offensive and defensive applications which exploit the Unicode steganographic vulnerability, (3) prototypes of offensive and defensive information operations applications which apply the Unicode steganographic vulnerability, and (4) demonstration that the technology enables separation of document semantics from content (e.g. enables unclassified development of applications for analyzing classified data differences).

F. J. Mabry, J. R. James, and A. J. Ferguson, Steganographic Exploits: Maintaining Enterprise Border Security, *IEEE Security and Privacy*, November, 2007, pp 24-31.

Network Cognizance
Dr. John James and Dr. Frank Mabry

Sponsor: Network Science Center

This project is focused on the development of an analytical approach for network cognizance and the implementation of a prototype demonstration of applying the analytical technique. We will design an interface for construction of an overlay interface for visual display of the status of a power generation and distribution system and an associated network. The intent is to attempt to resolve the differences between those values predicted by a given model and those values observed as system parameters shared over a network Supervisory Control And Data Acquisition (SCADA) system. The model used for prediction of system values will be a PowerWorld model of the same complexity as the implementation of a Matlab/Simulink model of a two-generator, three-bus network with 700 kilometers of transmission lines which is unstable without proper feedback control implementation (i.e. a Power System Stabilizer (PSS)). A model of this complexity is expected to provide an initial demonstration of the validity of the approach for objective-driven-evidence-accumulation-and-analysis.

Survivability of Process Control Systems
Dr. John James, LTC Ronald Dodge, Ph.D., and LTC John Graham, Ph.D.

Sponsor: Department of Homeland Security

This project is focused on the development of technologies which will assist process control systems operators to fight through cyber events and recover lost functionality. The project is sponsored by the Department of Homeland Security (DHS) through the Institute for Information

Infrastructure Protection (I3P), http://www.thei3p.org, headquartered at Dartmouth College. The majority of the I3P Process Control System (I3P-PCS) project thrusts, http://www.thei3p.org/research/srpcs.html, are developing prototypes of applications which will assist operators to achieve survivable and recoverable PCS. The USMA role is to perform a gap analysis of the current state of the art and assist in technology transfer of the prototype tools being developed.

J. James, R. Dodge, and **J. Graham**, "Gap Analysis for Survivable PCS," United States Military Academy (USMA) Network Science Center (NSC) Report, West Point, NY 10996, ISBN-13: 978-1-934808-01-6, pp 1-28.

J. James, "Perils and Possibilities: Security Gaps and Ongoing Efforts to Close Those Gaps," National Petroleum and Refiners Association (NPRA) Cyber Security Workshop, Houston, Texas, March 2008.

Photonics Research Center Projects:
EECS Director: LTC Gregory Kilby, Ph.D.

Photonic Analog-to-Digital Conversion and Image Processing Applications of the Error Diffusion Neural Network

COL Barry L. Shoop, Ph.D., COL Eugene K. Ressler, Ph.D., Dr. Thomas D. Wagner, Dr. Jean R. S. Blair, COL Robert W. Sadowski, Ph.D., BG(R) Andre H. Sayles, Ph.D., Dr. Wenli Huang, Department of Electrical Engineering and Computer Science
Dr. Pankaj K. Das, University of California at San Diego, La Jolla, California
Dr. Liu Jaing, Dr. Joseph N. Mait, Dr. George Simonis, U.S. Army Research Laboratory, Adelphi, Maryland

Sponsors: Army Research Office and Defense Advanced Research Projects Agency

Since the majority of signals encountered in nature are continuous in time and amplitude, the analog-to-digital (A/D) interface is generally considered to be the most critical and challenging part of any signal acquisition and processing system. Because of the difficulty in achieving high-resolution and high-speed A/D converters, this A/D interface has been and continues to be a barrier to the realization of high-speed, high-throughput systems. As a result, photonic-based systems have received increased emphasis because of their high-speed switching capability and the inherent parallelism that comes with a 2-D photonic system.

This research investigates photonic-based A/D conversion employing oversampling and spectral noise shaping techniques. In these applications, a low-resolution quantizer is embedded in a feedback architecture in an effort to reduce the quantization noise through spectral noise shaping. Here a large error associated with a single sample is diffused over many subsequent samples and then linear filtering techniques are applied to remove the spectrally shaped noise thereby improving the overall signal-to-quantization noise ratio of the converter. A two-

dimensional extension of this concept diffuses error spatially using an error diffusion neural network realization for digital image halftoning and image processing applications.

Applications under consideration include high-speed, high-resolution photonic A/D conversion, photonic-based digital image halftoning, and data reduction and classification of multispectral and hyperspectral imaging systems.

W. Huang, E. K. Ressler and **B. L. Shoop**, "A Three-Dimensional Interconnect Scheme for Color Error Diffusion," *J. of Electronic Imaging*, vol. 17 issue 2, Apr-Jun 2008.

Mixed Signal Applications of Smart Pixel Technology

COL Robert W. Sadowski, Ph.D., COL Barry L. Shoop, Ph.D., BG(R) Andre H. Sayles, Ph.D., and Dr. Wenli Huang
Department of Electrical Engineering and Computer Science
Dr. Pankaj K. Das, University of California at San Diego, La Jolla, California
Dr. George Simonis, US Army Research Laboratory, Adelphi, Maryland

Sponsors: Defense Advanced Research Projects Agency and Army Research Office

Smart pixel technology is a relatively new field that integrates electronic circuitry with optoelectronic devices in an effort to improve overall performance of existing applications and enable new applications not previously envisioned with either single technology. Smart pixels leverage the functionality and programmability of established electronic circuit technology and the high-speed switching and parallelism of arrays of optoelectronic devices. A smart pixel hardware implementation of the error diffusion neural network has been investigated and experimentally characterized. This hardware approach to the error diffusion neural network provides the ability to perform real-time image halftoning for applications such as xerography, laser printing, and facsimile.

Previously, we designed and fabricated proof-of-concept smart pixel circuits that realize the error diffusion filter. The earlier 5 × 5 CMOS-SEED implementation demonstrated correct functionality, however the design was not optimal. We then initiated a VLSI circuit design, modeling, simulation and testing program using the MOSIS foundry for our precision analog circuits.

As device features shrink to sub-micron scales, available transistor models fail to accurately predict their operation. Most external research focuses on modeling digital circuitry at these dimensions. Analog CMOS circuits offer particular challenges at the sub-micron level because current simulation tools fail to accurately predict their behavior. We initially conducted statistical analysis of extracted run parameters to see how we can minimize device mismatch from run-to-run parameter variations. Using these matching guidelines, we explored a variety of different topologies to implement the smart pixel neuron. As a result, we have developed a neuron topology that overcomes many of the inherent limitations of the proof-of-concept circuit. The key element of the new neuron is a modified current starved inverter. The modification

consists of a novel loading scheme that allows us to effectively determine the quantizer slope independent of the transistor parameters. This means that run-to-run variations should not adversely effect the neuron operation. We are using MOSIS foundry runs to validate our design and the initial results look very promising.

Biologically Motivated Analog-to-Digital Conversion

COL Eugene K. Ressler, Ph.D. and COL Barry L. Shoop, Ph.D.
Department of Electrical Engineering and Computer Science
Dr. Pankaj K. Das and Dr. Brian Watson
University of California at San Diego, La Jolla, California

Sponsors: Defense Advanced Research Projects Agency and Army Research Office

Biologically-motivated analog-to-digital conversion considers the coordinated neuronal firings of biological systems to allow for the low-noise processing and transmission of analog signals through a network of coupled neurons. The inherently high noise levels associated with biological neurons has been found to be mitigated over a specific frequency range using a network of interconnected neurons. These neural interconnections cause statistical temporal patterns in the summed output of the network which result in spectral noise shaping and improved signal to noise ratio performance.

Photonic Crystal Vertical-Cavity Surface-Emitting Lasers

LTC Gregory R. Kilby, Ph.D., MAJ Kirk A. Ingold
LTC James J. Raftery, Jr., Ph.D., and COL Robert W. Sadowski, Ph.D.
Department of Electrical Engineering and Computer Science
Prof. Kent D. Choquette, University of Illinois at Urbana-Champaign, Urbana, IL

Sponsor: Army Research Office

The incorporation of a two-dimensional (2D) photonic crystal (PhC) lattice containing a lattice defect into a distributed Bragg reflector (DBR) of a vertical-cavity surface-emitting laser has proven to be effective for introducing a precisely controlled index step for lateral optical beam confinement leading to single mode device operation. Such devices are desirable for short-haul optical communication systems, as well as other applications such as light sources for very compact atomic clocks. PhC VCSELs with a single lattice defect have demonstrated single fundamental mode operation at high power (> 3 mW) and at high speed (> 9 Gb/s).

Creating multiple defects in the PhC lattice of a PhC VCSEL has lead to coherently coupled arrays of vertically emitting microcavities producing both out-of-phase and in-phase far field radiation patterns. It has been found that the phase difference between these emitting defect cavities can be tuned with injection current, and can result in an electronically steerable beam as observed in the far field radiation pattern. Coherently coupled 2D arrays of vertically emitting lasers offer the potential of extended area coherent sources with high spectral purity,

useful in a variety of applications, such as electronically steerable laser sources for spectroscopic sensing or navigation vision systems for unmanned ground systems.

A. C. Lehman, **J. J. Raftery**, Jr., P. S. Carney, and K. D. Choquette, "Coherence of Photonic Crystal Vertical Cavity Surface Emitting Laser Arrays," *IEEE J. Quantum Electron.*, vol. 43, no. 1, pp. 25-30 (2007).

Piezoelectric Polyimide Scanning Micromirror for use in Endoscopic Optical Coherence Tomography

MAJ Paul Patterson, COL Robert W. Sadowski, Ph.D.
Department of Electrical and Computer Engineering
Prof. Jason M. Zara, George Washington University

Sponsor: Army Research Office, Army Research Lab and The George Washington University

The objective of this research to develop a scanning micromirror capable of achieving large scan angles (>60° optical) for use in an endoscopic optical coherence tomography system which can be fabricated on a silicon wafer with minimal post processing requirements. The research includes the modeling, development and characterization of several parametric variations of a prototype mirror developed earlier in this project. The mirrors have been fabricated and tested producing excellent results.

P. Patterson, R. Polcawich, and J. Zara, " Polyimide as a Structural Material in Piezoelectrically Actuated Microelectromechanical Systems," The 15th Annual Army Research Laboratory/United States Military Academy Technical Symposium, Atlantic City, NJ, October 30-31, 2007.

Additional Department Research

Publications:

R. Burk, *Reasoning via a Formal Ontology in a Complex Domain,* New Trends in Informatics Research 2008, State University of New York at Albany, May 2, 2008.

D. J. Chang, G. Jacoby, and **L. A. Shay**, 2007, "Educating and Advising Future Leaders in Robotics", *Assembly*, November 2007.

E. Gethner, B. Kallichanda, **A. Mentis**, S. Braudrick, S. Chawla, A. Clune, R. Drummond, P. Evans, B. Roche, and N. Takano, "How False is Kempe's Proof of the Four Color Theorem? (Part II)," *Involve*, submitted.

W. Huang and F. Jain, "Pseudo quantum dot behavior due to excitonic transitions in wide gap quantum wire lasers: InGaN-AlGaN and ZnCdSe-ZnMgSSe material systems," submited to *Solid State Electronics*, Dec. 14, 2007.

D. Raymond, R. Marchany, **M. Brownfield**, and S. Midkiff, "Effects of denial of sleep attacks on wireless sensor network MAC protocols," to appear in *IEEE Transactions on Vehicular Technology*, Nov. 2008.

J. Nagle, C. Blais, **R. Kewley**, P. Richmond, **N. Goerger** and **R. Burk,** "Using an Ontology for Entity Situational Awareness in a Simple Scenario," accepted for publication in The *Journal for Defense Modeling and Simulation*.

E. K. Ressler, S. J. Ressler, and C. Bale, "Engineering a Nationwide Engineering Design Contest," *Computers in Education Journal*, vol. 17, no. 2. April – June 2007.

L. A. Shay, K. Huggins, J. R. S. Blair, and B. L. Shoop, " Increasing the Efficiency of an Effective Outcome Assessment Process: Perspectives from an Electrical Engineering and a Computer Science Program," accepted by the *International Journal of Engineering Education*, April 2008.

Conference Presentations:

W. J. Adams and N. J. Davis, IV, "Validating a Trust-based Access Control System," In the Proceedings of the Joint iTrust and PST Conferences on Privacy, Trust Management and Security (IFIPTM 2007), Moncton, New Brunswick, July 29 – August 3, 2007.

C. Blais, **R. Burk**, B. Gates, **N. Goerger**, J. Nagle and P. Richmond, "Exploring Ontology-Based Interactions Among C2 and M&S Systems: The Common Maneuver Network and Mobility Common Operational Picture Demonstration," 2008 Spring Simulation Interoperability Workshop.

R. Burk, "Project-Based Team Learning: Teaching Systems Engineering When the Data Are Sparse." Presented at Engineering Education: 21st Century Frontiers (ASEE Zone 1), March 28-29, 2008.

R. Burk, K. Huggins and **L. Knotts,** "Rhetorical Analysis as an Automated Means to Discover Networks of Influence." Sixth LACCEI International Latin American and Caribbean Conference for Engineering and Technology (LACCEI'2008), Tegucigalpa, Honduras, June 4-6, 2008.

D. J. Chang, G. Jacoby and **L. A. Shay**, "Preparing and Advising a Fast-Track Education in Robotics", Proceedings of 2007 ASEE Annual Conference and Exposition, June 2007.

D. J. Chang, and E. K. Morlok, "Network Flexibility in Disaster and Degradation Management," Proceedings of 2nd Networks Science Workshop, October 2007.

M. Dunlop, G. Perng, and D. G. Andersen. "SWAP: Shared Wireless Access Protocol (using Reciprocity)." Proceedings from the Eighth Annual IEEE Systems, Man, and Cybernetics Information Assurance Workshop, pages 191-198, West Point, NY, June 20-22, 2007.

M. Dunlop, C. Gates, C. Wong, and C. Wang. "SWorD: A Simple Worm Detection Scheme," Proceedings of the On the Move to Meaningful Internet Systems 2007: CoopIS, DOA, ODBASE,

GADA, and IS, the International Symposium on Information Security, pages 1752-1769, Algarve, Portugal. November 26-30, 2007.

R. A. Ebel, S. D. Abbott-McCune, and **D. J. Chang,** "Undergraduate Mechatronics Course Design Project", Proceedings of 2008 ASEE Zone 1 Conference and Exposition, March 2008.

D. Fairfax, K. Huggins, and B. Goda, "A Deliberate Integration of Information Technology into the Classroom," ASEE Annual Conference 2007, Honolulu Hawaii, June 23-27, 2007.

G. Jacoby and **D. J. Chang**, "Towards Command and Control Networking of Cooperative Autonomous Robotics for Military Applications (CARMA)," IEEE Canadian Conference on Electrical and Computer Engineering (CCECE), May 2008.

J. Gribshaw, P. Patterson, and **B. Goda**, "Active-HDL, Multisim, Cadence…There has got to be a better way to teach CAD/E Tools," ASEE Annual Conference 2007, Honolulu Hawaii, June 23-27, 2007.

T.B. Hallmark and **E. K. Ressler**, "Parallel Evolution of Game Evaluation Functions in Ada," presented at 2007 SIGAda, Fairfax, Virginia, November 4-9, 2007.

V. Kareh and **G. R. Kilby**, "Energy generation, storage and delivery for a practical HEL system in a tactical environment," High Energy Laser Lethality Conference, Monterey, California, March 3-7, 2008.

G. R. Kilby and T. K. Gaylord, "The Single-Angle Plane Wave Spectral Response of One-Dimensional Photonic Crystal Structures," Optical Society of America Annual Meeting, San Jose California, September 15-19, 2007.

C. M. Korpela and **W. J. Adams**, "Robotics in Multidiscipline Multicultural Projects," Proceedings of the American Society for Engineering Education, Middle Atlantic Section Fall Regional Conference, Philadelphia, PA, November 3, 2007.

C. M. Korpela, S. Wilkerson, **K. A. Ingold,** "Designing a Universal Robotic Control System for Military Platforms," The 15th Annual Army Research Laboratory/United States Military Academy Technical Symposium, Atlantic City, NJ, October 30-31, 2007.

P. Leonowich-Graham, "Programming to Music," Proceedings of the American Society for Engineering Education Zone I Conference, March 28-29, 2008.

C. Okasaki, "GemBots: An Educational Game," IFIP WG2.8, Salt Lake City, Utah.

C. Reynolds, and **B. Goda**, "The Affective Dimension of Pervasive Themes in the Information Technology Curriculum," SIGITE Conference, Destin Florida, October18-20, 2007.

B. Ring, **J. Giordano,** and **J. S. Ransbottom**, "Problem Solving Through Programming: Motivating the Non-Programmer," Proceedings of the Eastern Conference of the Consortium for Computing Sciences in Colleges, October 2007.

R. Sadowski, L. A. Shay, C. Korpela, and **E. Fretheim** "Assessing the EE Program Outcome Assessment Process," presented at the American Society for Engineering Education Conference in Honolulu, Hawaii, June 24-27, 2007.

E. J. Sobiesk, W. K. Suchan, and Roland L. Trope, "Overcoming the Ethical Dangers of Academic Fair Use in the High Technology Classroom," Proceedings of 2007 American Society for Engineering Education Annual Conference, June 2007.

P. Stanton, and **D. Fairfax**, "Establishing Individual Accountability for Learning in an Examless, Group Project Course," Proceedings of the ASEE Mid-Atlantic Section Fall 2007 Conference, Temple University, November 3, 2007.

P. Stanton, "Establishing a Computer Science Curriculum in Afghanistan: A Mentor's Perspective," ASEE 2008 Annual Conference, Pittsburgh, Pennsylvania, June 2008.

P. Stanton, and **E. K. Ressler**, "A Framework for Building Sustainable IT Infrastructure To Support Undergraduate Education In A Developing Nation," Proceedings of ASEE Annual Conference, (Pittsburgh, Pennsylvania), June 22-25, 2008.

W. K. Suchan, S. K. Schwartz, and **E. J. Sobiesk**, "Information Technology Literacy for Non-Engineers," ASEE Conference, Pittsburgh, PA, June 2008.