

## Department of Electrical Engineering and Computer Science



***COL Andre Sayles, 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 cadets to be Army officers who understand, develop, and exploit current and future technologies. 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. Our 50 faculty members have superb qualifications in computer science, electrical engineering, information systems engineering, and information technology. The Photonics Research Center and the Information Technology and Operations Center have an outstanding track record of finding research opportunities that best support our mission, establishing funding programs, and then inviting faculty to support the project of choice with no 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 over-sampled analog to digital conversion, image processing, information assurance, science and engineering education, diversity, officer education needs in network-centric warfare, information technology, advanced technology classrooms, 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 Information Technology and Operations Center, USMA was re-designated as a Center of Academic Excellence in Information Assurance Education

by the National Security Agency (NSA). The Military Academy was the first-ever undergraduate institution to be so designated. The Information Technology and Operations Center also continues to be the driving force behind the annual Cyber Defense Exercise. The Cyber Defense Exercise challenges cadets from all five 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. This 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. Additionally, the Information Technology and Operations Center serves as the lead agency for the Annual IEEE Information Assurance Workshop, which brings together over 150 representatives from academia, industry and the federal government. The electrical engineering and computer science efforts in the Photonics Research Center continue to be singled out for excellence during reviews by outside 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 Ron Dodge, Ph.D.**

**Information Operations**

***Ancile***  
**MAJ Fernando Maymi**

**SPONSOR: Program Manager, Ground Combat Command and Control**

The Ancile project designed and constructed a PDA prototype device that can, in combination with GPS technology, provide increased survivability of dismounted soldiers by correlating location information with indirect fire data. Ancile is intended as a complementary system to FBCB2 and potentially, LandWarrior. Ancile has been successfully tested under 81mm mortar live-fire conditions at Yuma Proving Ground, AZ, and is currently undergoing commercial productization.

*The Ancile project won second prize at the MIT Soldier Design Competition.*

*F. Maymi, P. Manz, "Dismounted soldier Tracking and Strike Warning", MILCOM 2005, 17-20 October, 2005, Atlantic City, NJ*

***The Effects Based Assessment Support System***  
**MAJ Morel, LTC Mike Kwinn (ORCEN)**

**SPONSOR: Joint Forces Command, Multi-National Forces Headquarters, Iraq**

The Effects Based Assessment Support System (EBASS) was originally developed under the name of the Dynamic Planning and Assessment Support System (D-PASS) to aid Coalition Joint Task Force 180 in the Future Operations planning for the Operation Enduring Freedom campaign in Afghanistan. EBASS, a joint effort between the ITOC and ORCEN, has been selected for use in the Standing Joint Forces Headquarters by JFCOM and is being evaluated for Future Combat Systems by the PM Ground Combat Command and Control.

*M. Kwinn, J Brence, T Morel, E Pohl, and R Deckro, "Assessment in Afghanistan using Value Focused Thinking", Presented at Military Operations Research Society Symposium, June 2004*

***Command Post of the Future***  
**MAJ Fernando Maymi, MAJ Rick Brown (Math)**

**SPONSOR: Program Manager, Ground Combat Command and Control**

The Command Post of the Future (CPoF) provides planning and mapping tools to support the commander's battle management and Information Operations processes by rapidly processing and correlating combat information from all available sources. We conducted a security assessment of the vulnerabilities of CPoF, and identified the major areas of risk. In the upcoming year, we will apply the Mission Oriented Risk and Design Analysis to quantify the system's security.

*F. Maymi, R. Brown, CPOF Security Assessment Technical Report, October 2005*

***Non-Line-Of-Sight Launch System (NLOS-LS)***  
**MAJ Fernando Maymi, Dr. John James**

**SPONSOR: Program Manager, Ground Combat Command and Control**

The Army is developing a family of inexpensive tactical cruise missiles known as the Non-Line-Of-Sight Launch System (NLOS-LS). The Navy recently decided to incorporate this system into their state-of-the-art Littoral Combat Ship. The thrust of current joint efforts is in understanding how NLOS-LS will best support both land and littoral operations. The goal for this year is to model the route planning and target-seeking aspects of missile performance

***PKI/ Cross Domain XML for Coalition Operations***  
**Dr. Aaron Ferguson**

**SPONSOR: DoD/NII**

As the DoD and Intelligence Community migrate from a "need-to-know" to a "need-to-share" environment, XML and PKI will become the de facto enablers of secure cross-domain information sharing. XML facilitates information sharing while the PKI facilitates identity management. The Allied Coalition Information Exchange System is a web-based PKI XML prototype for secure information exchange across security domains (e.g., Top Secret-to-Secret).

***Secure Content Dissemination Analysis and Retrieval Computer System***  
**Dr. Aaron Ferguson**

**SPONSOR: NSA**

Using Constructive Key Management technology (provided) and PKI, develop a smart card-enabled content dissemination system that will allow members in an allied-coalition environment to access information based on their role and need-to-know. Involves building two Information Exchange Enterprises (Intelligence Community and Homeland Security), establishing access policies for the enterprises and their members, and writing smart card reader "trustlets" that will allow readers to authenticate multiple smartcards/tokens into the enterprise.

***XML Commercial Digital Signature Testing, Analysis and Integration Tool***  
**Dr. Frank Mabry, Dr. Aaron Ferguson**

**SPONSOR: DoD/NSA**

There are several commercial tools that allow users to digitally-sign XML documents. Compliance of these tools with the XML Digital Signature Standard is inconsistent at best. This tool will allow an XML application developer to test commercial XML digital signature tools for compliance with the XML Digital Signature Standard. A compliance grid will allow DoD Information Technology decision-makers to make informed public-key technology integration decisions.

**Information Assurance**

***Military Academy Attack/Defense Network Simulation***  
**LTC Ronald Dodge, Ph.D., LTC John Hill, Ph.D.**

**SPONSORS: National Science Foundation, Defense Information Systems Agency**

This complete application simulates all facets of building and managing an information system; combining them into a seamless application that provides an integrated, engaging, challenging, and competitive information assurance learning environment. The goal is to build an information assurance simulation that integrates all the complexities involved in maintaining an information system infrastructure, including hardware configuration, service requirements, "sizing" the system to the correct capacity, administrative support and security configuration.

MAADNET has been adopted by the Defense Information Systems Agency as an education tool for user, manager, and technician education.

*D. Edelstein, D. Edwards, "Representing Secure Knowledge Management with Policies and Procedures in a Network Simulator" Workshop for Secure Knowledge Management, Buffalo, NY Sept 2004*

*D. Edelstein, D. Edwards, "A Component-Based Design for a Simulated Network", 2004 IEEE International Conference on Information Reuse and Integration, Las Vega, NV, Nov 2004*

***Honeynets***  
**LTC Ronald Dodge, Ph.D.**

**SPONSOR: 1<sup>st</sup> Information Operations Command**

Honeynets are an ideally suited security tool for detecting new attacks and catching advanced attackers. They reveal the attacker's identity, tools, and means of communication. Data collected from honeynets contribute to the prevention of future attacks. We have worked with the 1st Information Operations Command to develop policies for honeynet implementation. The system designed at West Point is being used as the model for development of Army and DoD systems. We are collaborating with the USMA CERT and CIO on deployment at USMA.

*Dodge, R. Brown, R, Ragsdale, D, "Deploying Honeynets", Sixth Workshop on Education in Computer Security, Naval Postgraduate School, Monterey, California, 15-16 July 2004*

*R. C. Dodge, Chapter Title: "Configuring and Deploying Honeynet Systems," Enterprise Information Systems Assurance and System Security: Managerial and Technical Issues, Idea Group Publishing (to be publish fall 2005 with 2006 copyright)*

***Network Enterprise Security Agent Architecture***  
**MAJ Kenneth Fritzsche, Ph.D.**

**SPONSOR: National Reconnaissance Office**

The diversity of applications, firewalls, and intrusion detection systems present network administrators with a seemingly unmanageable data correlation and storage problem. The goal is to build a scalable system of distributed agents designed to monitor systems at all levels within an enterprise to develop a current assessment of security posture and provide an aggregate threat condition. The purpose of this research is to investigate and apply intelligent methods and Agent-based approaches to provide adaptive intrusion detection and intrusion response. The objectives of this research are to:

- Investigate data reduction methods to possibly find key variables in the data set;

- Apply and assess the accuracy of several types of neural networks regarding the classification of intrusive behavior;
- Develop appropriate metrics and tolerance levels associated with the operation of a given classification system; and
- Assess the risk associated with malicious intrusive behavior versus the resources and time consumed by given classification systems.

*F. Maymi, "Point/Counterpoint: Are You For or Against Intrusion Prevention Systems (IPS)?" The ISSA Journal, June 2004*

*T. Nix, K. Fritzsche, and F. Maymi, "Anatomy Of A Secure And Scalable Multiagent System For Event Capture And Correlation" 7<sup>th</sup> International Conference on Enterprise Information Systems, Maimi, Florida, 24-28 May 2005*

*Y. Bea-Hob, B. Olson, K. Thomen, "Son of Advanced Collated Intrusion Detection System (ACIDS)", Proceedings of The National Conference On Undergraduate Research (NCUR) 2005, Virginia Military Institute Washington and Lee University Lexington, Virginia April 21 – 23, 2005*

*A. Perez, "Service Verifier Pro", Proceedings of The National Conference On Undergraduate Research (NCUR) 2005, Virginia Military Institute Washington and Lee University Lexington, Virginia April 21 – 23, 2005*

### ***WebDAV Security Analysis***

**Dr. Aaron Ferguson, MAJ Rick Brown (Math)**

**SPONSOR: National Security Agency**

WebDAV is the IETF standard mechanism for distributed authoring and versioning in collaborative environments. Although widely implemented in DoD, a detailed security analysis of this mechanism has not been performed, leaving many DOD servers vulnerable to attack. This deficiency is highlighted by the 2004 WebDAV exploit. The ITOC is building a prototype network to provide an analysis of the various WebDAV features and inherent security risks.

### ***Open Source Tool Assessment***

**LTC Ronald Dodge, Ph.D.**

**SPONSOR: G6/CIO, Army Information Assurance Directorate**

Many open source tools provide functionality that exceeds commercial products and/or are more affordable. The ITOC conducted a security assessment of the KISMET wireless tool to determine if it posed a security risk if used. The assessment consisted of a source code review for malicious or questionable coding practices and a run time assessment. During the run-time assessment, operating system processes were monitored for anomalous activity and communications by the KISMET application were monitored and evaluated.

*R. Dodge, KISMET Security Assessment Technical Report, October 2005*

## **Information Assurance Education**

### ***Virtual Information Assurance Networks*** **LTC Ronald Dodge, Ph.D.**

**SPONSOR: National Security Agency, Microsoft**

The Virtual Information Assurance Network (VIAN) project at USMA uses new technologies to allow for robust testing on a single platform. The VIAN solution has been demonstrated to several Federal Agencies and is currently in use by the 1st Information Operations Command and the State Department. The agencies use the system for both live exploit experimentation and for education. VIAN provides a "real" network using only one machine. In this machine, virtual networks can be rapidly configured. The project provides the Army with the capability to analyze malicious Virus/Trojan/Worms in mobile isolated environments.

*R. Dodge and D. J. Ragsdale, "Technology Education at the US Military Academy," IEEE Security and Privacy, Volume 3, Number 2, March/April 2005, pp. 49-53.*

### ***Sixth Annual IEEE Information Assurance Workshop*** **LTC Ronald Dodge, Ph.D., LTC Ken Fritzsche, Ph.D., Dr. Aaron Ferguson, Dr. John James, MAJ Fernando Maymi** **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 Sixth Annual IEEE SMC Information Assurance Workshop, June 15-17 2005, West Point, NY.*

**Cyber Defense Exercise 2005**  
**LTC Ron Dodge, Ph.D.**

**SPONSOR: Public Key Infrastructure Program Office, 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 and the Air Force Institute of Technology competed in 2005.

A combined team of analysts from the National Security Agency and the 92<sup>nd</sup> Aggressor Squadron, US Air Force 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.

*L. J. Hoffman, R. Dodge, T Rosenberg, and D. J. Ragsdale, "Exploring a National Cybersecurity Exercise for Universities," IEEE Security and Privacy, September 2005, page. 52-58*

*R. Dodge and D. Ragsdale, "Organized Cyber Defense Competitions", IEEE International Conference on Advanced Learning Technologies, Joensuu, Finland 30 Aug - 2 Sept 2004*

**Email Phishing Exercise 2005**  
**Dr. Aaron Ferguson, Ph.D.**

**SPONSOR: Information Technology and Operations Center**

User security education and training is one of the most important aspects of an organizations security posture. Using security exercises to reinforce this aspect is frequently done by education and industry alike; however these exercises usually enlist willing participants. We have taken the concept of using an exercise and modified it somewhat to evaluate a users propensity to respond to email phishing attacks.

*Ferguson, A., "Duty, Honor, Country and Email Attachments: The West Point Carronade" Educause Quarterly, Number 1 2005, pp 54-57*

*Jackson, J., Ferguson, A., Cobb, M., "Building a University-wide Automated IA Awareness Exercise: The West Point Carronade", Frontiers in Education Conference, 19-22 October 2005, pp T2E7-10*

***Classroom XXI***  
**MAJ Tracy Mann**

**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 Ronald Dodge, Ph.D., COL Daniel Ragsdale, Ph.D.**

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.

*D. J. Ragsdale and R. Dodge, "Author's Commentary: The 2004 Interdisciplinary Contest in Modeling (ICM)," The UMAP Journal, Fall 2004.*

*R. Dodge, "Do Military Forces Need Ph.D.s?", 19th IFIP International Information Security Conference, Toulouse, France 23-26 Aug 2004*

*A. Ferguson, "Infrastructure Assurance: The New 'I' in Information Assurance Education", Presentation to the 8th Colloquium for Information systems Security Education, West Point, NY, June 2004*

## **Photonics Research Center Projects**

More Department of Electrical Engineering and Computer Science projects are described in the Photonics Research Center section.

## **Additional Department Research Papers**

### **Book chapters:**

S. Demurjian, K. Bessette, T. Doan, and C. Phillips., "Concepts and Capabilities of Middleware Security," in *Middleware for Communications*, Chapter 9, John Wiley&Sons, June 2004.

Chris Okasaki, "Functional Data Structures," in *Handbook of Data Structures and Applications*, CRC Press, January 2005.

B. L. Shoop, "Optical Digital Image Processing," in *The Encyclopedia of Modern Optics*, Elsevier, 2004.

### **Journal and Conference Papers:**

K. L. Alford. "Multidisciplinary Computer Science Design Projects." *American Society for Engineering Education (ASEE) Annual Conference*, Salt Lake City, Utah, June 20-23, 2004.

K. L. Alford. "Teaching Resources for Handheld Computers." *American Society for Engineering Education (ASEE) Annual Conference*, Salt Lake City, Utah, June 20-23, 2004.

K. L. Alford and A. Gandolfo. "Helping Teachers to Teach: Ideas from West Point." *American Society for Engineering Education (ASEE) Annual Conference*, Salt Lake City, Utah, June 20-23, 2004.

Kenneth L. Alford, Curtis A. Carver, Daniel J. Ragsdale, Eugene K. Ressler, Charles W. Reynolds, "Specification And Managed Development Of Information Technology Curricula", Proceedings of the SIGITE Conference, October 2004.

Kenneth L. Alford, Curtis A. Carver, Eugene K. Ressler and Charles W. Reynolds, "A Curriculum Framework for Evolving an Information Technology Program," 34<sup>th</sup> ASEE/IEEE Frontiers in Education Conference, October 2004.

Edwin Bachetti, C. M. Chewar, and D. Scott McCrickard. "'But Where's the Spec?' – Learning Through Collaborative Development and Discovery." In *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, November 2004.

J. R. S. Blair, P. Heggernes, S. B. Horton, and F. Manne. "Broadcast Domination Algorithms for Interval Graphs, Series-Parallel Graphs, and Trees". *Congressus Numerantium*, 2004.

M. Buck, D. Spears, B. Gollsneider and J.S. Ransbottom, "Biologically Motivated Analog-Digital Conversion Technique", *Proceedings of The National Conference On Undergraduate Research*, April 2005.

C. M. Chewar, D. Scott McCrickard, and Alistair G. Sutcliffe. "Unpacking Critical Parameters for Interface Design: Evaluating Notification Systems with the IRC Framework." In *Proceedings of the 2004 Conference on Designing Interactive Systems*, August 2004.

C. M. Chewar and D. S. McCrickard, "Links for a Human-Centered Science of Design: Integrated Design Knowledge Environments for a Software Development Process". In *Proceedings of the 2005 Hawai'i International Conference on System Sciences*, January 2005

C. M. Chewar, D. S. McCrickard, and J. M. Carroll. "Analyzing the Social Capital Value Chain in Community Networks." *Journal of Internet Research*. To appear.

G. Conti, D. J. Ragsdale, and S. Lathrop, "Implementation and Lessons Learned from an Undergraduate Special Interest Group in Information Assurance," *Proceedings of the 8th Colloquium for Information Systems Security Education*, June 2004.

R. Dodge, "Do Military Forces Need PhD.s?", 19th IFIP International Information Security Conference, August 2004.

T. R. Flowers, C. Carver, J. W. Jackson, "Empowering Students and Building Confidence in Novice Programmers through Gauntlet" *Frontiers in Education*, October 2004.

Carl E. Fossa, Jr., and Glen P. Dudevoir, "Teaching Engineering Design - The Evolution of a Senior Design Course in Electrical Engineering", In *Proceedings of the American Society for Engineering Education Annual Conference*, June 2005.

Carrie Gates and Damon Becknel, "Host Anomalies from Network Data", *Proceedings of the Information Assurance Workshop*, June 2005.

John C. Giordano, Paul F. Reynolds, Jr. and David Brogan, "Exploring the Constraints of Human Behavior Representation", *Proceedings of the 2004 Winter Simulation Conference*, December 2004.

Brian Gollsneider, "The West Point BattleBots Project and Competition," *Academic Exchange Quarterly*, June 2004.

Brian Gollsneider, J. Jiang Liu, Barry Shoop, Wayne Chang and George J. Simonis, "Two-Dimensional Optoelectronic Digital Halftoning Processor," ARL-USMA technical Symposium, West Point, NY, Nov 5, 2004.

Jong-Ru Guo, Chao You, M. Chu, R. Heikaus, K. Zhou, O. Erdogan, B.S. Goda, R.P. Kraft, J.F. McDonald, "The Gigahertz FPGA: Design consideration and Applications," *ISFPGA 2004*.

Peter D. Hanlon, Bryan S. Goda, and Lisa A. Shay, "Experience with Multidisciplinary Design Projects at the US Military Academy," *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition*, June 2004.

L. Hobby, J. Booker, D. S. McCrickard, C. M. Chewar, and J. Zietz, "Facilitating and Automating Empirical Evaluation for Education." In *Proceedings of the ACM Southeast Conference*, March 2005.

J. W. Jackson, M. Cobb, K. Gossett, C. Carver, "Designing Engineering Courses for Design" *International Conference on Engineering Education*, October 2004.

S. Krasser, J. Grizzard, H. L. Owen, J. Levine "The Use of Honeynets to Increase Computer Network Security and User Awareness," *Journal of Security Education*, 2005.

Mike Lanham, "Developing An Undergraduate Distributed Development Course," *Proceedings of International Conference on Education & Information Systems: Technologies and Applications*, July 2004.

Jason Chong Lee, Sirong Lin, C. M. Chewar, and D. Scott McCrickard. "From Chaos to Cooperation: Teaching Analytic Evaluation with LINK-UP." In *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, November 2004.

J. C. Lee, C. M. Chewar, and D. S. McCrickard, "Image is Everything: Advancing HCI Knowledge and Interface Design Using the System Image." In *Proceedings of the ACM Southeast Conference*, March 2005.

J. Levine, J. Grizzard, and H. L. Owen, "Using Honeynets to Protect Large Enterprise Networks," *IEEE Security & Privacy*, November/December 2004.

J. Levine, J. Grizzard, and H. L. Owen, "Methodology to Detect and Categorize Kernel-Level Rootkits to Aid in Subsequent Detection", to appear *IEEE Security & Privacy*.

J. J. Liu, W. Chang, G. J. Simonis, B. Gollsneider, B. L. Shoop, and M. Gerhold, "Integrated 64-channel optoelectronic interconnect and application to image processing," in *Proceedings of Conference on Lasers and Electro-Optics*, May 2005.

J. Jiang Liu, Brian Gollsneider, Wayne Chang, Gary Carhart, Mikail Vorontsov, George J. Simonis, and Barry Shoop, "Two-Dimensional Opto-Electronic Interconnect-Processor and Its Operational Bit-Error-Rate," *Optics East Conference*, October 2005.

D. S. McCrickard and C. M. Chewar. "Designing Attention-Centric Notification Systems: Five HCI Challenges". *Cognitive Systems: Human Cognitive Models in Systems Design*. To appear.

O. Milenkovic, D. Leyba, D. Bennett, And N. Kashyap "New Partition Regular Sequences And Array Codes Of Large Girth", *Proceedings of forty-second annual Allerton conference on communication, control, and computing*, October 2004.

C. Montabert, D. Bussert, S. Gifford, C. M. Chewar, and D. S. McCrickard. "Supporting Requirements Reuse in Notification Systems Design Through Task Modeling." In *Proceedings of the 11th International Conference on Human-Computer Interaction*, July 2005

Amihai Motro, Jacob Berlin and Philipp Anokhin, "Multiplex, Fusionplex, and Autoplex - Three Generations of Information Integration", *SIGMOD Record*, December 2004.

Ali Ndiwalana, Nithiwat Kampanya, Ian McEwan, C. M. Chewar, D. Scott McCrickard, and Kevin Pious. "A Tool for Participatory Negotiation: LINKing-UP Participatory Design and Design Knowledge Reuse." In *Proceedings of the Eighth Biennial Participatory Design Conference*, July 2004.

A. Ndiwalana, J. Lee, J. L. Smith, S. Wahid, L. Hobby, C. M. Chewar, D. S. McCrickard, "From Personas to Design: Creating a Collaborative Multi-disciplinary Design Environment." In *Proceedings of the 11th International Conference on Human-Computer Interaction*, July 2005.

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M. Reilly, W. Huang and F. Jain, "Photonic Crystal Beam-Splitting Laser Diode," *Proceedings of SPIE 49th Annual Meeting: Optical Science and Technology*, August 2004.

Lisa A. Shay, Bryan S. Goda, Peter Hanlon, and John M.D. Hill, "Outcome Assessment at the US Military Academy," *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition*, June 2004.

B. L. Shoop, "Education: The foundation of a nation," *Optics Photonics News*, April 2005.

B. L. Shoop, G. A. Nowak, and L. A. Shay, "Deliberate curricular integration: Topical linkages and concept reinforcement," *Proceedings of the 2005 American Society for Engineering Education Annual Meeting*, June 2005.

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Brian Watson, Barry Shoop, Eugene Ressler and Pankaj Das, " Analog-to-Digital Conversion Using Single-Layer Integrated-and-Fire Networks with Inhibitory Connections," *EURASIP Journal on Applied Signal Processing*, 2004.

N. Wiedenman and B. L. Shoop, "A collaborative and interdisciplinary approach to mechatronics," *Proceedings of the 2005 American Society for Engineering Education Annual Meeting*, June 2005.

K. Zhou, J. R. Guo, C. You, J. Mayega, R. P. Kraft, J. F. McDonald and B.S. Goda, "Multi-GHz SiGe BiCMOS FPGAs with new architecture and novel power management techniques", *Journal of Circuits, System, and Computers*, April 2005.