It is with great pleasure I share the 2010 annual research report for the Kansas State University Department of Computing and Information Sciences (CIS). The CIS department continues to move forward strongly with our faculty excelling in research and teaching. Our graduate program continues to grow, our students are in high demand, and we have strong interdisciplinary teaching and research programs.

In 2010, the Center for Information and System Assurance (CISA) in CIS, with Dr. Simon Ou as director, was designated as a National Center of Academic Excellence for Research in Information Assurance by the National Security Agency and Department of Homeland Security for the period 2010-2015. This designation was received based on the excellent record of CIS faculty in research, extramural funding and teaching in cybersecurity, as well as external collaborations with leading researchers in both academia and industry.

I am also pleased to note that Dr. Eugene Vaverman joined our department as an assistant professor starting fall 2010. He completed his Ph.D. in computer science from the University of Minnesota in Minneapolis in 2010, specializing in the area of computer security.

As a significant achievement, Dr. John Hatcliff and Dr. Robby received the International Conference on Software Engineering prestigious Most Influential Paper Award for their paper "Bandura: extracting finite-state models from Java source code" published in 2000. The Most Influential Paper Award is given jointly by ACM and IEEE at the world’s premier software engineering conference, to the paper that is judged to have had the most influence on the theory and practice of software engineering during the 10 years since its original publication. Separately, this paper also received the Impact Paper Award from ACM SIGSOFT.

Our faculty continue to be strong in multidisciplinary research. In 2010, a multidisciplinary, five-year, $5 million project led by Dr. Mitch Nielsen from CIS was funded by the NSF GK-12 STEM Fellows program. This project, with collaborators Virg Wallentinc (CIS), Nathan Bean (CIS), Gurdip Singh (CIS), Naiqian Zhang (biological and agriculture engineering) and Jackie Spears (education), will place up to eight graduate students each year in up to 16 schools to integrate information technology and sensor systems into K-12 curriculum.

We renovated several classrooms and labs in Nichols Hall in 2010 to provide a better learning environment for students. This includes making Nichols 126 available 24 hours a day to students exclusive as their work area. Our ACM student chapter, advised by Dr. Dan Andrenes, has been very active in engaging students in activities. Their accomplishments include a 3rd place finish in the High-Performance Computing Contest held at the International SuperComputing Conference in New Orleans in November 2010, and four teams placing 3rd, 6th, 10th and 15th among 32 teams competing at the ACM Programming Contest held in Lincoln, Nebraska, in 2010.

The 2010 annual report cannot cover all CIS accomplishments for the year. Please visit our website at http://www.cis.ksu.edu for a more complete picture.

Gurdip Singh
Department Head
Computing and Information Sciences
Kansas State University
Self-adaptive systems
by Dr. Scott DeLoach

Computing and Information Sciences 2010

Today's software is at least an order of magnitude more complex than that being developed a decade ago. Users today are demanding applications that operate autonomously, adapt in response to dynamic environments and interact with other distributed applications in order to provide solutions to a wide range of problems. To respond appropriately, software needs to be aware of what it is doing and why, in order to take the appropriate steps to achieve its objectives. There are several instances of these kinds of systems including information systems, service-oriented systems, wireless sensor networks and multi-robot systems. In each of these types of systems, one key element of adaptability is the allocation of tasks to appropriate system elements. However, an equally important aspect of adaptability is understanding why these tasks need to be performed.

Self-adaptive systems are designed in a top-down, engineering approach. This is in contrast to self-organising systems where system behavior emerges from the composition of components that act and interact locally. Self-adaptive systems evaluate their current behavior in light of their overall objectives and change that behavior to better achieve their goals. What is "best" depends on the application. Typical objectives include efficiency, robustness or secure operation. One of the key challenges of self-adaptive systems is allowing the system to adapt its behavior without introducing unintended consequences. Science fiction is replete with examples of intelligent systems that become smarter than their human creators.

For the past several years, the K-State CIS Multisagent and Cooperative Reasoning (MACR) Laboratory has brought together researchers with various expertise to solve interesting problems in the area of distributed, intelligent and self-adaptive systems. Application areas have included multistatic systems, cooperative robotics, sensor networks and a wide variety of networked systems. MACR Lab research incorporates existing methodologies and techniques from other related disciplines — including artificial intelligence, robotics and software engineering — into an integrated and comprehensive approach to developing distributed, self-adaptive systems. Current research areas include the following:

- Development of methodologies, techniques, models and tools to support the creation of self-adaptive systems that can adapt to achieve their overall goals without the threat of destructive and unexpected behavior. MACR Lab researchers have developed a tailorable methodology, the organization-based multistatic systems engineering (O-MaSE) methodology, that allows designers to create highly adaptive systems based on an organization-theoretic approach. The O-MaSE methodology and its accompanying integrated design and development environments, agentTool, have been used to develop adaptive multistatic systems at K-State and several other institutions around the world. These designs are translated into systems that use runtime models to determine their current state of problem solving and adapt their behavior to produce an efficient solution.

- Use of semi-autonomous robot teams for dangerous missions such as search and rescue, minefield operations, reconnaissance and patrol, surveillance, ordnance detection and clearance, and urban warfare. Currently deployed ground robots typically require one operator per robot, while more sophisticated UAVs require multiple operators due to the concurrent demands of control, monitoring and decision-making. MACR researchers have been working on key technologies to allow a small number (one or more) of operators to control multiple teams of robots in a variety of applications. This technology will be able to be widely applied to multiple situations where human operators need to provide oversight and control of teams of semi-autonomous robotic vehicles.

- Collaborative human-robot teams where humans and robots are deployed side by side as partners on missions that require tightly integrated and choreographed activities. These combined teams will require team members to adapt to each other, the environment and the state of the team problem-solving process.

The key to adaptation is providing teams with the knowledge of how team members' performance capabilities change over time. CIS researchers have been developing a common framework for incorporating humans and robots into a single team. The impact will be a clearer understanding of the applicability of human performance factors in the use of human-robot teams.

- How to apply self-adaptation to computer networks to provide enhanced systems security. One approach being considered maps the output of current intrusion detection systems to the security goals of the system. The system then weighs possible responses and their impact on the operational goals of the system to determine the best response in terms of effectiveness in dealing with attacks and minimal impact on the system. In related work, CIS researchers are attempting to create a dynamically evolving system that adapts proactively without affecting system functionality. The goal is to allow the network to reason about its current state and make changes that are invisible to the user but appear chaotic and exponentially increase the difficulty of infiltrating the network for an attacker.

A key result of MACR laboratory research over the last decade has been the development of a set of technologies and methodologies that can be easily adapted to a wide variety of distributed complex and adaptive systems. These technologies and methodologies are derived from the central concepts of a human organization, which in general are highly adaptive to external as well as internal influences. While most people have an intuitive idea of what an organization is, when asked to define it explicitly, there are large numbers of "correct" answers. From early research on artificial organizations, we learn that organizations have typically been defined as including the concept of a set of agents who play rules within a structure that define the relationships between various roles. Thus, our central model of an organization consists of a set of agents (human or artificial) who play roles within the organization in order to achieve goals of interest to the organization. Based on this simple model, we have defined a set of architectures and algorithms that support organizations and their ability to adapt themselves to their ever-changing environment.

The overall goal of the MACR Laboratory is to allow future systems to meet the high expectations of their users by allowing those systems to adapt effectively to their dynamic environment and changing objectives without unintended or detrimental results. More details on current and past MACR Lab research and researchers can be found online at https://macr.cis.k-state.edu/.
Ganpati Singh
Department Head and Professor
Ph.D., Computer Science, State University of New York at Stony Brook, 1991
M.S., Computer Science, State University of New York at Stony Brook, 1989
B.Tech., Computer Science and Engineering, Indian Institute of Technology, 1986
Research: Distributed algorithms, middleware services, sensor networks, optimization, modular design.
Teaching: Distributed computing, network protocols, operating systems, embedded systems.

Torben Aanstof
Associate Professor
Ph.D., Computer Science, University of Aarhus, 1993
M.Sc., Computer Science, University of Copenhagen, 1989
B.Sc., Mathematics and Computer Science, University of Copenhagen, 1985
Research: Program analysis, language-based security, program slicing, information-flow analysis, dependency analysis.
Teaching: Databases, algorithms, logic and verification, formal language theory, programming languages.

Daniel Andersen
Associate Professor
Ph.D., Computer Science, University of California, Santa Barbara, 1997
M.S., Computer Science, California Polytechnic State University, SLO, 1992
B.S., Computer Science and Mathematics, Westminster College, 1990
Research: Parallel and distributed computing, scheduling and run-time systems, high-performance scientific computing, distributed-sensor networks, telemedicines.
Teaching: Operating systems, distributed systems, computer architecture, WWW technology.

Dolna Caragea
Assistant Professor
Postdoctoral, Computer Science, Iowa State University, 2004-2006
Ph.D., Computer Science, Iowa State University, 2004
M.S., Computer Science, University of Bucharest, Romania, 1997
B.S., Computer Science, University of Bucharest, Romania, 1996
Research and teaching: Bioinformatics, artificial intelligence, machine learning, data mining and knowledge discovery, visual data mining, ontologies and information integration, information retrieval and semantic web.

Scott A. DeLoach
Associate Professor
Ph.D., Computer Engineering, Air Force Institute of Technology, 1996
M.S., Computer Engineering, Air Force Institute of Technology, 1987
B.S., Computer Engineering, Iowa State University, 1982
Research: Applying software engineering methods, techniques, and models to design and development of intelligent, complex, adaptive, and autonomous multilateral systems; building tools and techniques necessary to design and build cooperative robotic systems; building and developing hybrid intelligent systems that include humans, software agents, and mobile hardware agents.
Teaching: Agent-oriented software engineering, software engineering, software management.

David A. Gustafson
Professor
Ph.D., Computer Science, University of Wisconsin, 1979
M.S., Computer Science, University of Wisconsin, 1973
B.S., Meteorology, University of Utah, 1969
B.S., Mathematics, University of Wisconsin, 1967
Research and teaching: Software engineering, software metrics, software testing, design analysis, robotics, vision, face recognition, emotion recognition, biometrics, healthcare applications of robots.

John Hatchett
Professor
Ph.D., Computer Science, Kansas State University, 1994
M.S., Computer Science, Queen’s University, Kingston, Ontario, Canada, 1991
B.A., Computer Science/Mathematics, Mount Vernon Nazarene College, 1988
Research: Formal methods in software engineering, software verification, security analysis and certification, model checking, static analysis of programs, concurrent and distributed systems, middleware, model-integrated computing, semantics of programming languages, compiler construction, logics and type theory.
Teaching: Foundations of programming languages, software specification and verification, logic and set theory, construction of concurrent systems, compiler construction, formal language theory, software engineering, functional programming, logic programming.

Rodney Howell
Associate Professor
Ph.D., Computer Science, The University of Texas at Austin, 1988
B.S., Computer Science, Wichita State University, 1984
Research: Real-time scheduling, algorithm analysis, self-stabilizing systems.
Teaching: Analysis of algorithms, data structures, formal language theory, symbolic logic, real-time scheduling theory.

William Hau
Associate Professor
Ph.D., Computer Science, University of Illinois at Urbana-Champaign, 1998
M.S., Computer Science, Johns Hopkins University, 1993
B.S., Computer Science and Mathematical Sciences, Johns Hopkins University, 1993
Research: Laboratory for Knowledge Discovery in Databases (LADD)—research group emphasizing machine learning and intelligent systems.

Masaki Mizuno
Professor
Ph.D., Computer Science, Iowa State University, 1987
M.S., Computer Science, Pennsylvania State University, 1982
M.S., Electrical Engineering, Keio University, Japan, 1980
B.S., Electrical Engineering, Keio University, Japan, 1978
Research and teaching: Operating systems, distributed systems, real-time embedded systems, object-oriented systems.

Mitch Nelson
Associate Professor
Ph.D., Kansas State University, Computer Science, 1992
M.S., Kansas State University, Computer Science, 1989
M.S., Kansas State University, Mathematics, 1987
B.S., University of Nebraska-Kearney, Mathematics, 1982
Research: Distributed computing systems, real-time embedded systems, computational engineering, natural resources.
Teaching: Computer architecture, operating systems, networking, real-time systems.

Xinning (Simon) Ou
Assistant Professor
Ph.D., Computer Science, Princeton University, 2005
M.E., Computer Science, Tsinghua University, 2000
B.E., Computer Science, Tsinghua University, 1998
Research and teaching: Computer security, enterprise network defense, intrusion detection and analysis, security metrics, programming language, high-assurance systems.
**Ph.D., Computer Science, Kansas State University, 2004**

**M.S., Computer Science, Kansas State University, 2000**

**B.S., Computer Science, Oklahoma State University, 2000**

**Research:** Software verification, specification, analysis, transformation, specialization, testing, software engineering, model-driven software development.

**Teaching:** Specification and verification of software, programming languages, compiler design and implementation.

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**David A. Schmidt**

**Ph.D., Computer Science, Kansas State University, 1981**

**M.S., Computer Science, Kansas State University, 1977**

**B.A., Mathematics, Fort Hays State University, 1975**

**Research:** Abstract interpretation, static program analysis, denotational semantics.

**Teaching:** Programming methodology, program validation, software architecture.

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**Eugene Vaserman**

**Ph.D., Computer Science, University of Minnesota, 2010**

**M.S., Computer Science, University of Minnesota, 2008**

**B.S., Biochemistry, Neuroscience, University of Minnesota, 2003**

**Research:** Distributed system security, privacy and anonymity, peer-to-peer systems, network security, medical and embedded device security, applied cryptography, usable security.

**Teaching:** Secure networks and distributed systems.

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**Vincent Wallantaine**

**Professor**

**Ph.D., Computer Science, Iowa State University, 1972**

**M.S., Computer Science, Iowa State University, 1970**

**B.S., Mathematics, Iowa State University, 1965**

**Research:** Parallel scientific simulations, verification of concurrent software, health IT systems.

**Teaching:** Parallel and distributed systems, impact of computing on society.

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**Research**

**Argus Group—Cyber Security Research**

http://people.cis.kansas.edu/~mccune/argus/

**CISA—Center for Information and Systems Assurance**

http://www.cisa.ku.edu

The Argus group carries out cyber security research under the direction of Dr. Simon Ou. Argus' focus is on the defense aspect of cyber warfare, and our philosophy is that successful cyber defense can only be achieved through an automated coordination of various observation and action points in an enterprise environment. Traditional solutions like firewalls and IDS systems are limited in effectiveness, since they only look at one aspect of the system and lack the capability of "connecting the dots" among various information sources to gain a global picture of a system's security status. Our research aims at providing enabling technologies for such automated correlation and analysis with solid theoretical foundation and empirical study.

Argus is part of the Center for Information and Systems Assurance (CISA) at Kansas State University, an umbrella organization established in 2009 for all cybersecurity and information assurance research in the university. Faculty at CISA conduct research in computer and network security, high-assurance software systems, language-based security, security in health IT systems and security in distributed sensor systems. CISA has extensive collaboration with a number of external industry and government partners such as Rockwell Collins, HP Labs, DARPA-Orans, National Institute of Standards and Technology, Idaho National Laboratory, IAI Inc. and Teledyne Technologies. Research in CISA is funded by the National Science Foundation, Department of Defense and a number of industry partners.

**Machine Learning and Bioinformatics (MLB) Group**

http://people.cis.ku.edu/~dronosko/mlb/

The MLB group aims to design algorithms and develop tools for analyzing large amounts of data, in particular, molecular sequence and gene-expression data. Main projects focus on the following:

- ontology engineering and classifier learning from semantically heterogeneous data sources
- EST data analysis, alternative splicing discovery and gene prediction
- gene regulatory network discovery from gene-expression data and sequence information

The MLB group is collaborating with the artificial intelligence and machine learning group at Iowa State University to produce an open-source system for knowledge acquisition and information integration from semantically heterogeneous data sources (NSF funding), and with the Bioinformatics Center at Kansas State University to produce bioinformatics and genomics tools (funding from K-State EcoGen and Targeted Excellence Program).

**Collaborative Work on Computational Engineering — M. Nielsen**

www.demofsafety.info

The U.S. Department of Agriculture (USDA) and U.S. Army Corps of Engineers (USACE) are partnering with Kansas State University to incorporate research and field experience into computational tools for use in design and analysis of water-control structures. These tools provide the basis for optimal use of natural materials such as vegetation to promote embankments and spillways. Tools developed or under development through this cooperative work were highlighted in a booth at the Association of State Dam Safety Officials' (ASDSO) Annual Conference in 2009. Current work involves developing tools to analyze...
Research

breach failures and tools to perform risk assessment across the United States. Other computational engineering research uses finite-element analysis (FEA) to develop a turbo, solder interconnect predictor (Sandia TurboSIP) tool to evaluate Pb-free solder joints in electronic control packaging for satellite systems, etc.

**Distributed Systems Lab**

http://www.cis.ksu.edu/brocatt

The Distributed Systems Lab supports a wide range of interdisciplinary research around a core interest in efficient, effective distributed systems. Key projects include the K-State research computing cluster, BrocAtt, the largest academic cluster in Kansas with 1,000 cores; enhancing the efficiency of SOAP/XML communications; medical informatics; ecological modeling; and veterinary telemedicine. Our work is frequently cross-disciplinary and common collaborators go beyond engineering, ranging from agricultural economics to veterinary medicine. Since 1998, the Distributed Systems Lab has received funding from agencies such as the National Science Foundation, U.S. Food and Drug Administration, U.S. Department of Agriculture and NSF EPSCoR.

**KDD Lab**

http://www.bsdal.cis.ksu.edu

The laboratory for Knowledge Discovery in Databases (KDD Lab) aims at developing technologies for building models of events and processes from data, and then using these models to help make decisions. Research in the KDD lab focuses on developing algorithms and techniques for the following:

- data mining, machine learning, and probabilistic reasoning over large data sets and text collections
- human language technologies: computational linguistics and information extraction
- visualization, learning, and reasoning about events and event streams
- analysis of spatial data: georeferencing, spatial outlier detection, deduplication, etc.
- modeling cognitive processes to better understand how humans reason about causality, especially with spatial and temporal data

Applications of these technologies include software tools for bioinformatics, epidemiology, health informatics, computational physics, sensor network optimization and computer security.

Tools developed by the lab have been used by the Department of Defense, Office of Naval Research (ONR), Army Research Lab (ARL), National Agricultural Biosecurity Center (NABC) and Kansas Department of Transportation (KDOT), Federal and corporate sponsors of the KDD lab since 1999 include the NSF, DHS, ONR, ARL, Raytheon and American Diagnostic Medicine.

The KDD lab maintains a research collaboration with the University of Illinois at Urbana-Champaign, including the National Center for Supercomputing Applications (NCSA).

**MACR Laboratory**

http://macr.cis.ksu.edu

The MultiAgent and Cooperative Robotics (MACR) Laboratory focuses on applying software engineering methods, techniques, and models to the design and development of intelligent, complex, adaptive and autonomous multiagent systems.

Current research focuses on building the tools and techniques necessary to design and build cooperative robotic systems, where the robot work autonomously but cooperate as part of a team. This research also includes building and developing hybrid intelligent systems that include humans, software agents and mobile hardware agents. Key elements of this work are:

- a set of methods and techniques for analyzing and designing complex, adaptive systems;
- a set of organization-based models upon which the system analysis, design and implementation are based;
- a set of generic technologies that implement organization-based models;
- a set of multiagent and cooperative robotic systems used to demonstrate our approaches.

The lab has produced the organization-based multiagent systems engineering methodology (OMaSE) and its associated agent/Tool development environment. The MACR Lab is collaborating with the Human-Machine Teaming Laboratory at Vanderbilt University to integrate humans as teammates into cooperative robotics teams. Since 2002, the MACR Lab has received more than $3.8 million in funding from the National Science Foundation, the Air Force Office of Scientific Research, United States Marine Corps, M2 Technologies and Stanford Systems Inc.

**SaTiToS Laboratory**

http://santos.cis.ksu.edu

The Laboratory for Specification, Analysis and Transformation of Software (SaTiToS) aims to develop technologies and tools for effective construction of high-confidence software systems. Work in the lab emphasizes:

- use of rigorous analysis techniques with solid mathematical underpinnings,
- a variety of forms of code and model-integrated software specifications to capture crucial system correctness properties,
- use of software models as a key mechanism for capturing essential software structure leading to system analysis and verification.

The lab has produced tools including the Bandera and Bogor software model checking frameworks, the Cadena modeling frameworks for component-based systems, and the Indus static analysis and slicing frameworks that are widely recognized within the academic software engineering and verification communities. SaTiToS researchers are currently focusing on applications in security, software product lines, integrated medical devices and sensor networks. Since 1998, SaTiToS Laboratory has received more than $8.5 million in funding through agencies and companies such as the National Science Foundation, Army Research Office, Air Force Office of Scientific Research, Defense Department Advanced Projects Agency (DARPA), NASA, Lockheed Martin, Rockwell Collins, IBM, Honeywell and Intel.

**The Sensor Networks Laboratory**

http://psenavl.cis.ksu.edu

The Sensor Networks Laboratory is conducting research to develop tools and methodologies for development of sensor applications, and supports multidisciplinary research that draws on faculty expertise from several disciplines. The lab has the following goals:

- develop model-driven tools for designing and deploying large-scale sensor networks
- provide the infrastructure support necessary to enable K-State researchers to perform multidisciplinary research and address challenges posed by the next generation of sensor systems
- provide laboratory support in various courses to educate and train students for networking and distributed computing research

The lab is currently supported by the K-State's Targeted Excellence Program to promote multidisciplinary research. With additional instrumentation support grants from NSF and DoD, an experimentation test bed has been established to rapidly prototype large-scale sensor applications and to evaluate developed technologies. Multidisciplinary projects in the areas of veterinary telemedicine, hydrology, grain science, agronomy, agricultural engineering and environmental monitoring are being pursued in collaboration with researchers from several departments in engineering, veterinary medicine, agronomy and agriculture.

and analysis and slicing frameworks that are widely recognized within the academic software engineering and verification communities. SaTiToS researchers are currently focusing on applications in security, software product lines, integrated medical devices and sensor networks. Since 1998, SaTiToS Laboratory has received more than $8.5 million in funding through agencies and companies such as the National Science Foundation, Army Research Office, Air Force Office of Scientific Research, Defense Department Advanced Projects Agency (DARPA), NASA, Lockheed Martin, Rockwell Collins, IBM, Honeywell and Intel.

**The Sensor Networks Laboratory**

http://psenavl.cis.ksu.edu

The Sensor Networks Laboratory is conducting research to develop tools and methodologies for development of sensor applications, and supports multidisciplinary research that draws on faculty expertise from several disciplines. The lab has the following goals:

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Robby


Schmidt


Singh


Ou

DeLoach

Gustafson

Hatcliff
PI (with co-PIs Daniel Andreason, Robby, and Steve Warren), National Science Foundation (NSF) CPS (Award no. 0932289), "CPS/Medium:Collaborative Research: Infrastructure and Technology Innovations for Medical Device Coordination," NSF Collaborative Grant with the University of Pennsylvania for Total Amount $1,500,000, KSU Portion: $839,548, September 2009 – August 2012.
Co-PI (with co-PI Torben Ammott, Robby, Xinning Ou, and Appell (Princeton University), Air Force Office of Scientific Research (AFOSR), "Evidence-Based Trust in Large-Scale MLS Systems," Total Amount $1,500,000, KSU Portion: $720,000, June 2007 – June 2010.
Co-PI (with co-PIs Torben Ammott, Xinning Ou, and Robby), Rockwell Collins Advanced Technology Center, "Domain-Specific Language for Defining High-Assurance Secure-Network Guards (Phase II)," $85,000, September 2009 – August 2010.
Co-PI (with co-PIs Torben Ammott, Xinning Ou, and Robby), Rockwell Collins Advanced Technology Center, "A Domain-Specific Language for Defining High-Assurance Secure-Network Guards (Phase II)," $85,000, September 2009 – August 2010.
Co-PI (with co-PIs Robert, Gunipudi Singh, Xinning Ou, and Robby), Rockwell Collins Advanced Technology Center, "A Domain-Specific Language for Defining High-Assurance Secure-Network Guards (Phase II)," $85,000, September 2009 – August 2010.
Co-PI (with co-PIs Robert, Gunipudi Singh, Xinning Ou, and Robby), Rockwell Collins Advanced Technology Center, "A Domain-Specific Language for Defining High-Assurance Secure-Network Guards (Phase II)," $85,000, September 2009 – August 2010.
Co-PI (with co-PIs Robert, Gunipudi Singh, Xinning Ou, and Robby), Rockwell Collins Advanced Technology Center, "A Domain-Specific Language for Defining High-Assurance Secure-Network Guards (Phase II)," $85,000, September 2009 – August 2010.

Ou
Co-PI, National Science Foundation (NSF), "Research Experience for Undergraduates Supplement," $15,000, March 2012 – February 2012.
Co-PI, National Science Foundation (NSF), "CISE: Research Infrastructure and Technology Innovations for Medical Device Coordination," NSF Collaborative Grant with the University of Pennsylvania for Total Amount $1,500,000, KSU Portion: $839,548, September 2009 – August 2012.

Schmidt
Co-PI (with PI Mitchell Neleen, co-PIs J. Sprars, N. Zhang, and V. Wallace), National Science Foundation (NSF), GR-12 STEM Field Fellowship Program, "Instructing System Design and Sensor Technology in Education (INSIGHT)," $2.8M, ($540K for 2010), April 2010 – March 2013.

Wasserman

Wallentine
Antoft

Andersen
- Program committee, 1st IET International Conference on Future Computing (FC10), Taichung, Taiwan, August 2010.
- International program committee, 10th IEEE International Conference on Computer and Information Technology (CIT'10), Bradford, UK, June 29 – July 1, 2010.
- International program committee, the 2010 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA’10), Las Vegas, NV, July 12-15, 2010.
- K-State representative, GPN CI Program Committee, 2010.

Caragea
- Session chair, First ACM International Conference on Bioinformatics and Computational Biology (ACM-BCB), Niagara Falls, August 2010.
- Program committee, AAAI Doctoral Consortium (DC) Program, in conjunction with The National Conference on Artificial Intelligence (AAAI), 2010.
- Program committee, IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 2010.
- Program committee, The 16th Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), 2010.
- Reviewer, IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB), International Journal on Data Mining and Bioinformatics (IJDDB), 2010.
- IEEE Transactions on Neural Networks (TNN), Multimedia Tools and Applications (MTAP), 2010.
- Reviewer and panelist, NSE CISE Directorate, IIS Division, 2010.
- Honored with WESP Making a Difference Award, Spring 2010.
- Invited panelist, Society of Women in Engineering (SWE), KSU, Fall 2010.

DeLoach
- Program committee, International Workshop on Agent-Oriented Software Engineering (AOSE), 2010.
- Program committee, ACM SAC—Special track on AOse Methodologies, Infrastructures and Processes, 2010.

Gustafson

Hatchiff
- Co-organizer, Software Certification Consortium Workshop (Toronto, Canada), November 2010.
- Program committee, International Conference on Runtime Verification (Mara), 2010.
- Program committee, International ACM Workshop on Software Engineering in Health Care (Cape Town, South Africa), 2010.

Hsu

Nielsen
- Session chair, PDPTA, 2010.

Ou
- Review panel, National Science Foundation, 2010.

Robby
- 12th Workshop on Formal Techniques for Java-like Programs (FTJJP), 2010.
- Reviewer, ACM Transactions on Software Engineering and Methodology (TOSEM), 2010.
- Panelist, NSF CCF Program Panel, 2010.

Schmidt
- Steering committee, Static Analysis Symposium, 2010.
- Steering committee, VMCAI (Verification, Model Checking, and Abstract Interpretation) and secretary of the VMCAI Corporation, 2010.

Singh
- Panelist, Graduate Research Fellowship Program Panel, February 2010.
- Panelist, CNS Program Panel, April 2010.
- Publications chair, IASTED International Conference on Parallel and Distributed Computing and Systems, November 2010.
The CIS department offers two B.S. degrees: one in information systems (IS) and one in computer science (CS). The CS degree program now has two options:

- a traditional computer science track, which focuses on foundational and scientific issues, including courses on operating systems and databases; and
- a software engineering track, which focuses on software development, including enterprise information systems, project management, software security, parallel programming and software development in a team environment.

Both degree programs allow students flexibility in their programs of study. Students are encouraged to pursue a minor or to study interdisciplinary subjects while still completing their degrees within four years.

Computer science requirements for each of the three options have a core consisting of 16 credit hours and an option-specific set of 17 hours of advanced courses. The 16 credit-hour core also serves as the minor in computer science.

ACM Student Chapter

The local ACM chapter is a professional organization for CIS majors. Average attendance at monthly meetings is 30-40 students. Typically more than a dozen attend the ACM regional programming contest for a chance to interact with their peers and develop professional skills.

AAAI Robotics Competition

The joint undergraduate and graduate robotics team prepares to participate in robotics events at the annual convention of the Association for the Advancement of Artificial Intelligence. The team has competed each of the last five years in this event, a popular project for both undergraduate and graduate students.

The department of computing and information sciences is committed to excellence in scholarly activities in research and graduate teaching. We offer courses and a rich variety of projects in the areas of programming languages, high-assurance software, distributed computing, networking, software engineering, bio-informatics, computer security and data mining. In addition to basic research, our curriculum emphasizes collaborative and interdisciplinary research, collaboration with industrial partners, and development and distribution of software tools. We offer two master-level degrees, the master of science (M.S.) and master of software engineering (M.S.E.), and the doctor of philosophy degree in computer science. We offer the M.S.E. degree via distance learning, and a graduate certificate program in real-time embedded systems in collaboration with other engineering departments.

Admission requirements

Applicants for our graduate degrees must possess a bachelor’s degree, with at least a 3.0 grade point average or equivalent, from an accredited institution. Students not possessing a degree in computer science must have background that includes the equivalent of core undergraduate computer science courses.

Areas of concentration

Programming language, high-assurance software, distributed computing, networking, software engineering, bio-informatics, computer security and data mining, high-performance computing.

Certificate program

Graduate certificate in real-time embedded systems.

Resources for current and prospective graduate students

- CIS admissions: http://cis.ksu.edu/programs/guides/admissions
- CIS research projects: http://cis.ksu.edu/research
- CIS profile on Pennson’s Online guide: http://graduate-schools.pennson.com

How to apply

For a graduate application and other information, contact:

Graduate Studies
Department of Computing and Information Sciences
234 Nichols Hall
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- Through industrial and university affiliations, it connects us to our alumni, practicing professionals, industry leaders, government leaders, and academic researchers. These connections enable us to build collaborative relationships between academia and industry.
- It provides advice on the "state of the practice" in the software industry. This perspective helps us better prepare students for the software development profession, and better integrate our research into real products and industrial processes.
- Advisory board members provide financial support from both personal and industry sources.

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