It is with great pleasure I share with you the 2013 annual research report for the department of computing and information sciences (CIS) at Kansas State University. The CIS department is making continued progress in research and teaching with the support of our excellent faculty. Over the past several years, our research programs have grown steadily and our research expenditure has roughly doubled in the past five years. CIS students are in high demand and our undergraduate enrollment has increased by 60% in the past five years. We have strong interdisciplinary teaching and research programs.

As part of the expansion of the College of Engineering undergraduate program under the Kansas University Engineering Initiative Act, the construction of Phase IV of the Engineering Complex started in early 2014. It is expected to be complete in fall 2015, and the CIS department will be moving to the new building from Nichols Hall. This will provide expanded and better space to grow our research programs.

Simon Ou received the 2013 College of Engineering Frankenhoff Award for Excellence in Research. This is awarded annually to a faculty member in the college based on his or her excellence in research and graduate programs over the past five years. Six CIS faculty members have received this award over the past 18 years.

Research programs in our core areas continue to grow strongly. In particular, the Center for Information and System Assurance received re-designation from 2014-2019 as a Center for Advanced Excellence in Research in Information Assurance from the Department of Homeland Security and National Security Agency. Simon Ou, Scott DeLooch, John Hately and Robby received a $600K grant from the Defense University Research Instruction Program to acquire equipment to conduct security and high-assurance research. Simon Ou, in collaboration with colleagues from the department of anthropology and industry, obtained a $700K grant from NSF to apply innovative ideas from anthropology to security. Dan Andresen led a multidisciplinary group of researchers to obtain a $500K NSF grant to improve networking infrastructure on campus to better enable computational research. Faculty in the CIS department are extensively involved in multidisciplinary research supported by our high-performance computing infrastructure. With additional support from Kansas State University, our computing infrastructure is expanding and we now have three full-time employees to provide HPC support to the K-State community.

This 2013 report cannot cover all CIS accomplishments for the year. Please visit the website cis.ksu.edu for a more complete picture.
A - interoperability — think Wi-Fi, Bluetooth and USB ports matures and spreads in the consumer arena, it is also exhibiting increased penetration into high-assurance areas such as aviation and the military.

One area where this movement has not yet progressed is the medical field, where it has the potential to reduce treatment costs and clinician workload while improving quality of care. A team at Kansas State University is working to change this.

The distributed systems security group, headed by Eugene Vasserman, assistant professor in computing and information sciences, is collaborating with the SAnToS — specification, analysis and trans-man, assistant professor in computing and information sciences, is collaborating with the SAnToS — specification, analysis and transformation of software — lab at K-State, as well as other academic collaborators with SAnToS, to develop a secure ‘plug and play’ system.

For example, a pulse oximeter, the widely used device connected to a patient’s finger to measure blood oxygen saturation, can easily slip off, sometimes generating alarms because blood oxygen is instantly read as 0%. If that patient is also wearing a blood pressure cuff, and the cuff records blood pressure as normal, it is generally assumed the patient is okay and the low blood oxygen reading only a false alarm.

“A coordinating system would not only be able to suppress the pulse oximeter alarm, knowing that the blood pressure cuff is producing readings within expectations,” Vasserman said, “but could also look up that patient’s up-to-date electronic health record, determine whether any medication may cause blood pressure or oxygen saturation to appear abnormally high or low, and adjust the pulse oximeter alarm threshold appropriately.”

Today, clinicians are overwhelmed with the constant sound of alarms, making it more difficult to differentiate true alarms from real ones, putting patients at risk in cases when the alarms are positive rather than the frequent false positives. The interoperability required to prevent this is currently impossible in practice: either a facility must buy an entire interoperable system from a single manufacturer — expensive to both purchase initially or expand as it locks the facility into a single manufacturer’s products — or it must “roll its own” solution, which introduces two new problems. The homegrown system may be unsafe, and it may also classify the hospital as a “device manufacturer” under some interpretations of current U.S. FDA rules.

“Significant challenges exist in realizing this goal,” Vasserman said, “including questions of policy, difficulties of high-assurance design and development, as well as the design of robust protocols that will govern such interoperability and ensure its safety. Security is a major hurdle on the path to safety, since insecure systems cannot be safe — they are vulnerable to tampering at the physical and electronic level, and may cause harm to patients or users if improperly designed or if malicious devices are incorporated into the system.”

Vasserman’s group is working on designing and implementing a security infrastructure to minimize or eliminate such unfortunate possibilities. They are also collaborating with policymakers, regulators and third-party certifiers to ease the future design and implementation process of secure medical components, both software and hardware.

Flexible manufacturer-agnostic interoperability can be achieved through standardization of device communications, but such efforts are lacking in many respects. Often they are overly specific to one area of medicine, for example radiology, or only address limited parts of the problem, or lack even basic security protections. Development of secure systems will require progress in various domains of science and policy. This will include incorporation of minimum device security and privacy standards into medical regulations, and new network hardware and/or protocols to guarantee real-time communication.

“A unified suite of standards for safe and secure interoperability is needed before we can reap the rewards of device integration,” Vasserman said. “Some existing interoperability standards are flexible, with systems that can support integration of robust security, but are limited in scope. In looking at existing hospital medical systems, we find infrastructure reuse common, such as new devices being connected to a hospital-wide Ethernet, making the assumption of per-patient isolation unrealistic. Next-generation medical device coordination systems must support existing environments, expect minimal network isolation, and maintain and exceed current safety and security standards.”

Vasserman and his students are developing an extensible, policy-driven safety and security framework and protocols for large-scale device interoperability, extending current safety-critical software from a semi-random fault model to incorporate intelligent adaptive adversaries. They are working with manufacturers, regulators, clinicians and medical facility operators to account for differences in systems development and production processes, as well as varying laws, regulations and facility-local policies that govern modern medical practice.

“Medical and cyber-physical systems rely on real-time feedback and control, where microseconds could mean the difference between correct functionality and a fault, and ultimately, in medical systems, life and death,” he said. “Since we cannot count on technology functioning flawlessly, especially when intelligent active attackers may have access to medical devices or the network through which the systems communicate, we are developing requirements and best practices for ‘optimistic real-time’ safety-critical systems. Our plan includes built-in fallback to safe states if timing or performance guarantees cannot be met.”

Other ongoing work includes developing hardened alarm systems to detect interoperability faults, adapting public key infrastructure to work with power-constrained medical devices and integrating mutual authentication into a proof-of-concept middleware system.

A key component to future success is developer and manufacturer adoption, so the team is also implementing developer-friendly tools for easily producing default-secure interoperable devices. Ensuring these new systems can be used effectively by clinicians is also critical, so Vasserman and the students are developing user-friendly, unobtrusive but effective “security indicators” to allow untrained users to get a sense of the safety properties currently provided by a running system. They have recently published a paper on fundamental security requirements for such systems, outlining nine basic requirements from which other safety-driven security objectives can be derived.
Gurdip 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.

Toiben Antoft  
**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: Algorithms, logic and verification, formal language theory, programming languages.

Daniel Andresen  
**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, telemedicine.  
Teaching: Operating systems, distributed systems, computer architecture, WWW technology.

Doina Caragea  
**Associate 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.

Patrice Chalin  
**Associate Professor**  
Ph.D., Computer Science, Concordia University, 1995  
M.S., Computer Science, Concordia University, 1989  
B.S., Computer Science, Concordia University, 1988  
Research: Program synthesis and software verification, medical device integration, coordination and interoperability, software engineering, web-based enterprise applications.  
Teaching: Software specification, semantics of programming languages.

Scott A. DeLoach  
**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 multiagent systems; applying adaptive techniques to computer network security and cyber-physical systems; building tools and techniques necessary to design and build adaptive 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 Minnesota, 1967  
Research and teaching: Software engineering, software metrics, software testing, design analysis, robotics, vision, face recognition, emotion recognition, biometrics, healthcare applications of robots.

John Hatcliff  
**Professor**  
Ph.D., Computer Science, Kansas State University, 1994  
M.Sc., 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 analyses 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 Hsu  
**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 (KDD)—research group emphasizing machine learning and intelligent systems.

Massaki 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.

Mitchell Neilsen  
**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.
Xinming (Simon) Ou  
Associate 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 and information security, enterprise network security, security analysis, moving-target defense, smart phone security, programming languages, high-assurance systems.

Assistant Professor  
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.

David A. Schmidt  
Professor  
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.

Eugene Vasserman  
Assistant Professor  
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.

Argus Lab—Cyber Security Research  
http://www.arguslab.org  
The Argus Lab carries out cyber security research under the direction of Dr. Simon Ou. Argus’ focus is on the defense aspect of cyber space, and the philosophy that successful cyber defense can only be achieved through effective coordination between human and technologies in a networked world. The research focuses on aiding human security analysts through automation. Industry partners include Arbor Networks, Honeywell, and HP; governmental agencies include the National Institute of Standards and Technology, and Idaho National Laboratory. New security paradigms investigated include bringing anthropological research methods into cyber security study, moving-target defense, cloud security and mobile system security. The research aims at providing solutions both theoretically and practically relevant – “Start from real problems, create solutions that last.”

CISA—Center for Information and Systems Assurance  
http://www.cisa.ksu.edu  
The Center for Information and Systems Assurance (CISA) at Kansas State University is an umbrella organization established in 2009 for all cybersecurity and information assurance research at the university. Faculty at CISA conduct research in computer and network security; high-assurance software systems; language-based security, security in health IT systems, privacy and anonymity, censorship resistance and security for smart grids. CISA has extensive collaboration with a number of external industry and government partners such as Rockwell Collins, HP Labs, DRDC–Ottawa, National Institute of Standards and Technology (NIST), Idaho National Laboratory, Honeywell and General Dynamics. Research in CISA is funded by the National Science Foundation, Department of Defense, NIST, NIH and a number of industry partners.

Machine Learning and Bioinformatics (MLB) Group  
http://people.cis.ksu.edu/~dcaragea/mlb  
The MLB group aims to design algorithms and develop tools for analyzing large amounts of data, in particular, molecular sequence and text data. Main projects focus on the following:  

- design and development of semi-supervised and domain adaptation algorithms  
- RNASeq analysis, alternative splicing discovery and gene prediction  
- sentiment analysis and recommender systems  
- ontology engineering and classifier learning from semantically heterogeneous data sources  

Among others, the MLB group is collaborating with the Bioinformatics Center at Kansas State University to produce bioinformatics and genomics tools (funding from NSF and KSU Arthropod Genomics Center). It is also collaborating with the distributed systems lab to improve the infrastructure and enable big data research (funding from NSF), and with the Argus group on aiding intrusion detection systems using machine learning tools.

Collaborative Work on Computational Engineering – M. Neilsen  
www.damsofiy.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 protect embankments and spillways. Tools developed and under development through this cooperative work were highlighted in a booth and special presentation at the Association of State Dam Safety Officials’ Annual Conference in 2012. Current work involves developing tools to analyze internal erosion and breach failures, and tools to perform risk assessment across the United States. Other computational engineering research involves collaboration with engineers at Sandia National Laboratories. High-performance computing and finite-element analysis (FEA) is used to develop thermal battery models to evaluate thermal, mechanical and chemical properties of thermal batteries, and to analyze solder interconnections for electronic component packaging. Preliminary results were reported in Sandia SAND Technical Reports in 2012.
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, BroCat, 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 1999, 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.

Projects include the following:
- compositional security and safety of dynamic medical systems (in collaboration with SanToS lab)
- large-scale censorship resistance
- low-power and ad hoc network security and user privacy
- usability of security software and password creation systems
- Theories, systems and protocols being developed will help secure future health care and mobile networking, and make them easier to use.

SanToS Laboratory
http://santos.cis.ksu.edu

The laboratory for specification, analysis and transformation of software (SanToS) 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 framework for component-based systems, and the Indus static analysis and slicing frameworks that are widely recognized within the academic software engineering and verification communities. SanToS researchers are currently focusing on applications in security, software product lines, integrated medical devices and sensor networks. Since 1998, SanToS 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 Advanced Projects Agency (DARPA), NASA, Lockheed Martin, Rockwell Collins, IBM, Honeywell and Intel.

The Sensor Networks Laboratory
http://persis.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.

Research highlights

Distributed Systems Lab
http://www.cis.ksu.edu/bocat

The distributed systems research includes the KDD lab, the Networked and Distributed Systems Security Group, the MACR lab, the Sensor Networks Laboratory, and the Distributed Systems Security Group. 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 spacial data: georeferencing, spatial outlier detection, deduplication, etc.
- modeling cognitive processes to better understand how humans reason about causality, especially with spacial and temporal data

Application of these algorithms 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, ONR, ARL, Raytheon and American Diagnostic Medicine.

The KDD 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.
Torben Amtoft


Daniel Andresen


Feldhausen, R., Bell, R.S., and Andresen, D.: “Introducing HPC and Multithreaded Computing to Middle School Girls Using Scratch,” in the poster session and online archives, the International Conference for High Performance Computing, Networking, Storage, and Analysis (SC13), Denver, CO, Nov 17-22, 2013. Accept rate: 40%.


Feldhausen, R., Bell, R.S., and Andresen, D.: “Engaging Students in STEM Fields through High-Performance Computing,” student poster session, 3rd Place Winner in the Student Poster Competition, ASEE Midwest Section Annual Conference, Salina, Kansas, September 18-20, 2013.


Doina Caragea


Patrice Chalin


Scott DeLoach


David Gustafson


John Hatcliff


Publications


William Hsu


Mitchell Neilsen


Xinning Ou


Robby


David Schmidt


Gurdip Singh


Eugene Vasserman

- Bell, R.S., Miller, A., Perry, T., and Vasserman, E.Y.: “Empowering pre-service teachers to utilize programming in the classroom.” In Proceedings of the ASEE Midwest conference (posters), September 2013. (AWARD: Best graduate student poster).
- Gajjani, S., and Vasserman, E.Y.: “The usability of TrueCrypt, or how I learned to stop worrying and fix an interface.” In Proceedings of the ACM Conference on Data and Application Security and Privacy (CoDASPY), February 2013. (acceptance rate: 22%).
Caragea

DeLoach

Chalin
- PI (with co-PI John Hatcliff and Robby), National Science Foundation (NSF), "FDA SIR: Tools, Process, and Artifacts for Certifiable Clinical Applications in Interoperable Medical Device Frameworks," $80,000, October 2012 – September 2013.

Hatcliff
- PI [with co-PIs Torben Amtoft, Xinming Ou, Robby, and Andrew Appel (Princeton University)], Air Force Office of Scientific Research (AFOSR), “Evidence-Based Trust in Large-Scale MLS Systems,” Total Amount: $1,000,000, KSU Portion: $2,000,000, March 2009 – November 2014.
- PI (with co-PIs Daniel Andresen, Robby, and Steven Warren), National Science Foundation (NSF) CPS (Award no. 0932289), “CPS: Medium: Collaborative Research: Infrastructures and Technologies for Medical Device Frameworks,” $80,000, October 2012 – September 2014.
- Co-PI (with PI John Hatcliff, co-PIs Robby and Steve Warren), National Science Foundation (NSF) CPS (Award no. 0932289), “CPS: Medium: Collaborative Research: Infrastructures and Technologies for Medical Device Frameworks,” $80,000, October 2012 – September 2014.
- PI (with co-PIs Walter Doods, Brett Ery, David Steward, and Doina Caragea), National Science Foundation (NSF), “MRI: Acquisition of a Hybrid GPU Computing Cluster for High-End Applications in Science and Engineering,” $700,000, September 2011 – August 2014.
- Co-PI [with co-PIs Torben Amtoft, Xinming Ou, Robby, and Andrew Appel (Princeton University)], Air Force Office of Scientific Research (AFOSR), “Evidence-Based Trust in Large-Scale MLS Systems,” Total Amount: $1,000,000, KSU Portion: $2,000,000, March 2009 – November 2014.
- PI (with co-PIs Daniel Andresen, Robby, and Steven Warren), National Science Foundation (NSF) CPS (Award no. 0932289), “CPS: Medium: Collaborative Research: Infrastructures and Technologies for Medical Device Frameworks,” $80,000, October 2012 – September 2014.
Grants

- PI (with co-PIs Patrice Chalin and Steven Warren), National Science Foundation (NSF), “FDA SIR: Risk Assessment Techniques for Apps and Devices within Interoperable Medi- cal Frameworks,” $80,000, October 2013 – September 2014.
- Co-PI (with PI Patrice Chalin, co-PI Robby), National Science Foundation (NSF), “FDA SIR: Tools, Process, and Artifacts for Certifiable Clinical Applications in Interoperable Medical Device Frameworks,” $90,000, October 2012 – September 2013.

Hsu

- PI, IQ Gateway LLC, “Computational Information and Knowledge Management: Data Mining, Analytics, and Information Extraction and Integration Tasks,” $70,000, December 2011 – August 2014.
- Co-PI (with PI Eleanor Sayre, co-PI Eugene Vasserman), National Science Foundation (NSF), “Collaborative Research: Community Implementation: WIDER: Data Explorer and Assessment Resources for Faculty,” $422,603, September 2012 – August 2015.
- Co-PI (with PI John Hatchiff, co-PIs Daniel Andreessen 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. Total Amount: $1,500,000, KSU Portion: $839,548, September 2009 – August 2013.
- Co-PI (with PI Xinming Ou, co-PIs John Hatchiff and...
Grants


- Co-PI (with PI Patrice Chalin, co-PI John Hatcliff), National Science Foundation (NSF), "FDA SIR: Tools, Process, and Artifacts for Certifiable Clinical Applications in Interoperable Medical Device Frameworks," $80,000, October 2012 – September 2013.

Schmidt


Singh


- Co-PI (with PI Mitchell Neilson, co-PIs J. Spears, N. Zhang and Vegil Wallentine), National Science Foundation (NSF), "GK-12 STEM Fellowship Program: Infusing System Design and Sensor Technology in Education (INSIGHT)," $2.8M, April 2010 – March 2015.

- Co-PI (with PI Xinming Ou, co-PIs John Hatcliff, and Daniel Andresen), National Science Foundation (NSF), "Components, Run-Time Substrates, and Systems: Medium: Holonic Multi-Agent Control of Intelligent Power Distribution Systems," $1,100,000, September 2011 – August 2015.

Vasserman


- PI (with co-PIs Daniel Andresen and John Hatcliff), National Science Foundation (NSF), "TWC TTP: Small: Security, Privacy and Trust for Systems of Coordinating Medical Devices," $482,125, September 2012 – August 2015.


Senior Personnel (with PI Anil Palwai, co-PIs Sanjoy Das, Scott DeLoach, Balasubramanian Natarajan and Xinming Ou), National Science Foundation (NSF), "Components, Run-Time Substrates, and Systems: Medium: Holonic Multi-Agent Control of Intelligent Power Distribution Systems," $1,100,000, September 2011 – August 2015.

Amtoft

- Member, program committee, 1st International Workshop on Interference and Dependence, 2013.
- Panel member, National Science Foundation (NSF), 2013.
- Reviewer, ACM TOPLAS, 2013.
- Reviewer, post-proceedings of LOPSTR ’12, 2013.
- Reviewer, SAIRP, 2013.

Andresen

- External advisory committee member, NSF MRI (MRI): Acquisition of a High-Performance Compute Cluster for Multidisciplinary Research," Oklahoma State University, Stillwater, OK, August 19, 2013.
- Member, Collaborative Data Lifecycle Project Working Group (with KU, Greater Western Library Alliance, and GPN), September, 2013.
- Member, program committee, GPN Annual Meeting, Kansas City, MO, June 1-3, 2014.
- Member, program committee, GPN Big Data workshop, 2012-2013.
- Committee member, IMLS Lifecycle Management for Research Data Research Group, 2012-2013.
- Reviewer, Environmental Modeling and Software, 2013
- Reviewer, IMCIC’14, 2013.
- Reviewer, CITT’13 (6), 2013
- Reviewer, HFCC’13 (7), 2013
Caragea
Member, program committee, IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2013).
Member, program committee, International Symposium on Network Enabled Health Informatics, Bio-Medicine and Bioinformatics (Hi-BI-BI 2013).
Member, program committee, 3rd IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS 2013).
Member, program committee, Computational Scientometrics Workshop, 2013.
Member, program committee, 9th International Symposium on Bioinformatics Research and Applications (ISBRA 2013).
Member, program committee, International Conference on Knowledge Engineering and Ontology Development (KEOD 2013).
Reviewer, IEEE Conference on Bioinformatics and Biomedicine (BIBM) (7), 2013.
Reviewer, Hi-BI-BI (2), 2013.
Reviewer, ICCABS (2), 2013.
Reviewer, International Conference on Knowledge Engineering and Ontology Development (KEOD) (2), 2013.
Reviewer, Computational Scientometrics Workshop: reviewed 2 papers.
Reviewer, ISBRA 2013: reviewed 2 papers.
Reviewer, ISRN Computational Biology, (1), 2013.
Reviewer, Computational Scientometrics Workshop: reviewed 2 papers.
Reviewer, International Conference on Knowledge Engineering and Ontology Development (KEOD) (2), 2013.
Gustafson
Member, IEEE, 2013.
Member, ACM, 2013.
Member, Tau Beta Pi, 2013.
Member, AAAI, 2013.
Panel member, NSF Graduate Research Fellowship, 2013.
Hatchfield
Co-organizer, Dagstuhl Seminar on Software Certification: Methods and Tools, January 27 - February 1, 2013, Dagstuhl Seminar 13051, Warden, Germany.
Steering committee member, Software Engineering in Health Care, 2013
Steering committee member, Software Certification Consortium, 2013.
Howell
Member, Sigma Xi, 2013.
Hsu
Program committee, 29th International Joint Conference on Uncertainty in Artificial Intelligence (UAI) – program committee, 3 papers, 2013.
Neilsen
Member, ACM, 2013.
Member, ASEE, 2013.
Member, IEEE Computer Society, 2013.
Member, CSTA, 2013.
Session chair, PDPTA, 2013.
Session chair, CSC, 2013.
Panelist, CPS-Ed, 2013.
Reviewer, National Sciences Foundation (NSF), (3), 2013.
Reviewer, USDA, CReES, SBIR Program, (2), 2013.
Ou
Member, ACM, 2013.
Steering committee chair, Central Area Networking and Security (CANSec) Workshop (formerly KanSec workshop), 2013.
Technical program committee, Annual Computer Security Applications Conference (ACSAC), (10), 2013.
Technical program committee, Symposium on Security Analytics and Automation (SafeConfig), (2), 2013.
Robby
Member, EASST, 2013.
Schmidt
Steering committee member, Static Analysis Symposium, 2013.
Steering committee member, Conference Series on Verification, Model Checking, and Abstract Interpretation, 2013.
Reviewer, National Science Foundation, (4), 2013.
Undergraduate studies

The CIS department offers two B.S. degrees: one in information systems (IS) and one in computer science (CS). The department also offers a minor in computing and information sciences (CIS).

IS is the study of applying information technology to managing information, and enabling communication and commerce. IS majors learn to build and administer computer networks, web servers, and enterprise information systems. They study software programming skills as employed by system developers and administrators, enterprise information system developers and administrators, webserver developers and software programmers/engineers.

CS is the study of computing and its applications. The CS degree program has two options:
- a traditional computer science track, which focuses on foundational and scientific issues, including courses on operating systems, databases, programming languages and algorithms, and
- a software engineering track, which focuses on software development, including enterprise information systems, project management, 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.

ACM Student Chapter

One of the primary ways CIS students make social and professional connections with other students, faculty and potential employers is through the student chapter of the Association for Computing Machinery (ACM), the largest educational and scientific computing society in the world. Monthly meetings host speakers from faculty and industry, and include barbecues and LAN/Console gaming nights each semester. The group hosts a local programming contest one Saturday per semester, sponsored by local industry, providing prizes such as iPads and 42” LCD TVs for the winners. Getting involved with ACM offers a great way to make friends and increase visibility both at K-State and with future employers.

Graduate studies

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

These include programming language, high-assurance software, distributed computing, networking, software engineering, bio-informatics, computer security and data-mining, and 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/grad/admissions
- CIS research projects: http://cis.ksu.edu/research
- CIS profile on Peterson’s Online guide: www.petersons.com/graduate-schools

How to apply

For a graduate application and other information, contact:

Graduate Studies
Department of Computing and Information Sciences
234 Nichols Hall
Kansas State University
Manhattan, KS 66506 USA
Phone: 785-532-6350; Fax: 785-532-7353
email: cis-gradapps@ksu.edu
The CIS Advisory Board is composed of leaders in the development and deployment of software in industry. Because software is pervasive throughout our society, these advisers are technical, management and executive leaders in a broad spectrum of industrial sectors—software development, e-commerce, health IT, transportation, manufacturing, retail, communications, wealth management, military and academia. This industrial leadership helps us in three ways:

- 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 results into real products and industrial processes.
- Advisory board members provide financial support from both personal and industry sources.

### Advisory board

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  Nichols 219B  
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