MESSAGE FROM THE DEPARTMENT HEAD

It is with great pleasure that I share with you the 2009 annual research report for the Kansas State University Department of Computing and Information Sciences (CIS). First of all, I want to thank Dr. Virgil Wallentine for his excellent leadership over the years in building a strong research and teaching-focused department. It has been a challenging year, given that I started at the department head position last year amid the budgetary constraints imposed due to the current economic environment. However, the CIS department had a great momentum moving forward under Dr. Wallentine and I am happy to report that we continue to move forward strongly. Our faculty is highly productive in research; our graduate program continues to grow and our students are in high demand; and we have strong interdisciplinary teaching and research programs.

Our faculty continue to excel in conducting research at the forefront of the computing and information sciences, with all full-time faculty members having extramural funding last year. In the area of security, Dr. John Hatcliff led a team of researchers from K-State and Princeton University, funded by a five-year $5 million grant from the Air Force Office of Scientific Research to work on development and verification technologies to address security challenges. This team includes CIS faculty Dr. Torben Amoros, Dr. Robby and Dr. Simon Oua. They are also collaborating with researchers at Rockwell Collins where Dr. Hatcliff took a sabbatical last year. Another exciting focus area is that of health information technology. A team of researchers from K-State and the University of Pennsylvania, led by Dr. Hatcliff, was awarded a $1.5 million grant from NSF to study technologies linked to medical device coordination. Dr. Wallentine took a sabbatical at the University of Oklahoma Health Sciences Center to work in this area as well.

CIS has considerable involvement in interdisciplinary research in areas such as high-performance computing, veterinary telemedicine, bio-informatics, and health information technology. The Beoacat cluster with more than 1000 cores, managed by Dr. Dan Andersen, is supporting research in several departments from engineering, science, and agriculture. Dr. Doina Caragea is actively involved in developing the bio-informatics program.

Our undergraduate and graduate teaching programs are strong and our Ph.D. program is growing. We instituted a new Ph.D. fellowship program which has attracted a larger pool of applicants. We have developed several tracks in our undergraduate program which include games programming, security, embedded systems, robotics, data mining and bio-informatics. The outreach program is targeting K-12 education as well as state and national industries.

Because the 2009 report cannot cover all of the CIS accomplishments for the year, please visit our Website at http://www.cis.ksu.edu for a more complete picture.

Gundip Singh
Department Head
Computing and Information Sciences
Kansas State University
Cyber security is an asymmetric warfare; the attackers only need to find one hole to compromise a system, whereas the defenders have to plug them all. The Argus group (http://people.cis.ku.edu/~soul-argus) led by Dr. Simon Ou of the CIS department at Kansas State University seeks to find scientific methodologies to tilt the playground towards the cyber defenders’ advantage.

Ou has been focusing on network security defense ever since his PhD work at Princeton University. Enterprise networks have become essential to the operation of companies, laboratories, universities, and government agencies. As they continue to grow in size and complexity, their security has become a critical concern. Vulnerabilities are regularly discovered in software applications which are exploited to stage cyber attacks. Currently, management of security risk of an enterprise network is more an art than a science. System administrators operate by instinct and experiences rather than relying on scientific methods and metrics to guide and justify decision making.

Two actively pursued research thrusts of the Argus group are network risk mitigation based on quantitative security metrics, and evidential reasoning to automatically apprehend intrusions and breaches. Both thrusts center on the theme of reasoning under uncertainty in cyber security.

“Incomplete, vague knowledge and inaccurate information is an insurmountable truth for cyber security,” said Ou. “We wish to have absolute judgments like ‘this system is secure.’ But in reality there can never be an absolutely secure system. People constantly balance risk and cost, but in cyber space the risks are not always easy to see let alone measure.”

To make things even more difficult, there is virtually no useful data publicly available for this type of security research. To tackle these challenges, Ou and his team have been adopting a somewhat unorthodox approach in their pursuit.

It is called the “empirical approach,” where instead of starting from theories, Argus and its industrial collaborators decided to let empirical experiments guide the theory development process. They start by studying how cyber defenders in the trenches handle security incidents, and try to extract the essence of such reasoning processes in a semi-formal way. This provides a spiral theory development process, where reasoning models are developed that to some degree simulate human thinking. Then the researchers apply prototype tools to fresh new data from production systems and see how they fare. The experiments will reveal gaps and deficiencies in the empirically developed model, and will provide crucial hints on what theories will be most effective in addressing the limitations, leading to the next round of theory development, and the process goes on. Ou hopes that eventually this constant empirical evaluation of research models will lead to a well-formed theoretical foundation which is also firmly grounded in reality.

“A key enabler of this research methodology is the strong local support we get in setting up the in-house data-collection facility,” said Ou. “The CIS department and the university IT security office provide important resources and access so that we can collect a range of data from the CIS departmental network.”

This live data stream has helped the Argus team obtain a number of key insights into the current research model they are working on. They hope eventually their research prototype will also prove useful to system administrators who have been helping the research efforts all along.

Recently, this empirical research methodology got a boost from the National Science Foundation, in the form of a nearly $430K CAREER Award to Dr. Ou in support of this effort titled “Reasoning under Uncertainty in Cybersecurity.” While acknowledging this is a high-risk research, the academic peers who evaluated the proposal believed that this methodology is promising and perhaps the best approach we have today.

“I believe it works and I can show it,” said Ou.

---

Scott DeLoach
Autonomous Resynchronization of Cooperative Robotic Teams for Robustness
Multiagent Systems
4/1/04-3/31/10

John Hatcliff
Partial Evaluation Tool Set for Automatically Customizing Adaptable Software
Software Engineering and Program Specialization
8/1/98-6/30/02

Robby
Formal Method
4/15/07-3/31/10

Daniel Andresen
DESPOTT: Enhanced Dynamic Process Management for Beowulf Clusters on the Grid
Distributed Systems / High Performance Computing
9/15/01-4/30/07

Xinning (Simon) Ou
Reasoning about Uncertainty in Cybersecurity
Security
3/1/16-2/28/15

Gurdip Singh
Modular Design of Protocols
Distributed Computing
5/1/95-4/30/99

Not Pictured:
Anindya Banerjee
Type Systems and Program Analyses for Secure and Reliable Interactive Web Services
Language-based Security/Program Analysis
9/1/01-8/31/07

Matthew Deyer
Engineering High-Quality Concurrent Software
Program Verification
5/1/97-5/31/02

Eight CIS CAREER Awardees
Gurdeep Singh
- 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, optimizations, modular design.
Teaching: Distributed computing, network protocols, operating systems, embedded systems.

Torben Amtoft
- Ph.D., Computer Science, University of Aarhus, 1993
- M.S., Computer Science, University of Copenhagen, 1989
- B.S., 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 Andreassen
- Ph.D., Computer Science, University of California, Santa Barbara, 1997
- M.S., Computer Science, California Polytechnic State University, 1990
- 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.

Anilendra Banerjee
- Ph.D., Computing and Information Sciences, Kansas State University, 1995
- M.S., Computer and Information Sciences, University of Delaware, 1989
- B.S.C.E., Computer Science and Engineering, Jadavpur University, 1987
Research: Logic-based program analysis and verification, programming language-based computer security, modular reasoning and checking of programs, abstract interpretation, concurrency, program transformation, type systems.
Teaching: Programming languages, program analysis, language-based security, logical foundations of computer science.

Elena Caragea
- 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
- 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 agent-based 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
- Ph.D., Computer Science, University of Wisconsin, 1979
- M.S., Computer Science, University of Wisconsin, 1973
- B.S., Meteorology, University of Utah, 1969
Research and teaching: Software engineering, software metrics, software testing, design analysis, robotics, vision, face recognition, emotion recognition, biometrics, healthcare applications of robotics.

John Hattliff
- 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 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
- 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
- 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, 1990
Research: Laboratory for Knowledge Discovery in Databases (L2D)—research group emphasizing machine learning and intelligent systems.

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

Mitch Neilsen
- 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.
Machine Learning and Bioinformatics

Bioinformatics is the field of science in which information and computer sciences are used together to manage and analyze large amounts of molecular biology data such as genomics and proteomics data. Next-generation sequencing technologies have suddenly sped up sequence data generation by orders of magnitude. Entire genomes can be sequenced and assembled within days (for microbes), weeks (for mid-size genomes), or months (for larger genomes), resulting in vast amounts of potentially useful sequence data. The significance of sequencing many diverse genomes cannot be overstated. However, without sophisticated and efficient computational approaches to data management and analysis, the scientific community will simply be unable to take advantage of the great opportunities offered by the next-generation sequencing technologies. Bioinformatics plays an essential role in this "arena" and has the potential to contribute to critical advances in life sciences. Such advances will have direct applications in biotechnology, accelerating the design of cost-effective biosilts, biomaterials, disease-resistant crops, and new therapies.

The machine-learning and bioinformatics (MLB) group at K-State has been involved in several interdisciplinary projects that focus on machine-learning approaches to bioinformatics problems including identification of protein-coding genes and regulatory elements, prediction of alternative splicing events, and discovery of protein localizations and functions. Several genome annotation projects, partially funded through grants from NSF, Ecological Genomics Institute, and Arthropod Genomics Center at K-State, are described below:

- Identification of regulatory elements is important for understanding gene regulation. To address this problem, the MLB group has cast the transcription problem as a machine learning prediction problem using a motif-based feature representation of the data. Motifs that are highly predictive for transcription are identified as regulatory elements.

- Alternative pre-mRNA splicing is an important means for increasing proteome diversity. Alternative splicing is believed to be regulated by splicing factors that bind to regulatory elements, called splicing motifs or enhancers/silencers. The MLB group has studied the predictive power of a large set of gene features that have been experimentally shown to have effects on alternative splicing. Their results emphasize the importance of motif features for accurately predicting alternative splicing.

- The MLB group is also researching statistical and machine-learning approaches to model gene regulatory networks using gene expression data together with sequence data. The ultimate goal of this project is to use the resulting network to predict how variation in genes affects the overall pathways and, consequently, responses to deterrent conditions or environments.

The approaches used in the projects described above rely on supervised learning techniques, which assume that labeled data is readily available. However, supervised learning techniques will not meet the challenges that the bioinformatics and biology communities are now faced with in the form of massive amounts of data accumulating every day. A promising solution explored by the MLB group relies on semi-supervised and domain-adaptation algorithms. Semi-supervised algorithms can learn from large amounts of unlabeled data along with small amounts of labeled. Furthermore, domain-adaptation algorithms can transfer knowledge from a well-labeled source domain to a related (although not identical) scarcely labeled (if at all) target domain. Bioinformatics is one area that could greatly benefit from semi-supervised and domain-adaptation algorithms while, at the same time, it can contribute to a better understanding of such algorithms.
Argus Group—Cyber Security Research
http://people.cis.ku.edu/~sauangel
CISA—Center for Information and Systems Assurance
http://cisa.ku.edu

Argus 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 automated coordination of various observation and action points in an enterprise environment. Traditional solutions for the firewall model 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 conducts, mentors 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, DRDC-Ottawa, National Institute of Standards and Technology, Idaho National Laboratory, JAI Inc., and Telcordia 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/~andreas/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 ESGen and Targeted Excellence Program).

Collaborative Work on Computational Engineering — M. Neilsen
www.demosafety.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 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 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 slider intercooler preditor (Sandia TurboSP) tool to evaluate Pb-free solder joints in electronic control packaging for satellite systems, etc.

Distributed Systems Lab
http://www.cis.ku.edu/brew

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, BeeCar, the largest academic cluster in Kansas with 1,000 cores; enhancing the efficiency of SOAP/XML communications; medical informatics, design and implementation of a cooperative 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.kdd.cs.ku.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
- visualizing, 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 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, 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).

The MultiAgent and Cooperative Robotics Laboratory
http://macr.cs.ku.edu
(MACR) focuses on applying software engineering methods, techniques and tools 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 robots work together 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 genetic 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 Training 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.

The Sensor Networks Laboratory
http://snet.cs.ku.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 has been supported by the K-State’s Targeted Excellence Program to promote multidisciplinary research, and instrumentation grants from NSF and DoD. 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.
Publications


Antklef

Andresen
- Co-PI, (with Peter Dodds et al.), NSF EPSCoR RII Track II (Award no. 0919443), “Oklahoma and Kansas: A cyberCommons for Ecological Forecasting.” $34M ($1.5M to K-State, $6M between KS and OK) September 2009 – August 2012.

Caragea
- Co-PI (with Steve Welch PI and Sanjay Das co-PI), NSF Cyberinfra structure Implementation for Genotype to Phenotype Research, Award amount: $103,250, 2009 – 2010.
- Senior personnel, (with Peter Dodds, co-PI Daniel Anderson et al.), NSF Collaborative Research: EPSCoR RII Track 2 Oklahoma and Kansas: “A cyberCommons for ecological forecasting.” $3M ($1.5M to K-State, $6M between KS and OK) September 2009 – August 2012.
- Co-Principal Investigators: Eduard Althofer, Birkram Gill, Frank White,

Delach

Gustafson

Hatchfield
- PI (with co-PIs Dan Andersen, Robby, Steve Warren), National Science Foundation, "Development of an Open Test Bed for Application of Formal Methods to Plug and Play Medical Devices," $55,000, September 2007 – August 2008.
- Co-PI (with PI John Hahnfeld, and co-PIs Daniel Andersen, Steve Warren at K-State, Inasp Lee, and Oleq Soloby at University of Pennsylvania) on CPS/Security Collaborative Research: Infrastructure and Technology Innovations for Medical Device Coordination. National Science Foundation (NSF) CNS-0932829, project total: $1,500,000, K-State’s portion: $480,000, September 2009 – August 2012.

Schmidt
- PI, Subcontract NSF ITR 0325677, Language-based software security, October 2003–September 2009, $135,000 (award total $900,000).

Singh

Wollancine
- PI, Center CAmusAware-Software and Hardware, Center Corporation, $160,000, 2009.
Amitoff
- Program committee member, 18th European Symposium on Programming (ESOP'09), 25-27 March 2009, York, United Kingdom.
- Reviewer, Studia Logica
- Reviewer, Higher-Order and Symbolic Computation

Andersen
- Reviewer, IEEE International Conference on Computational Science and Engineering (CSE'09)
- Reviewer, IEEE Engineering in Medicine and Biology Society (EMBC'09)
- NSF grant review panel member (twice)
- Review Board, Int'l. Journal of Next-Generation Computing
- Program committee member, GPN Annual Meeting, Kansas City, MO, May 28-29, 2009
- Program committee member, IEEE International Conference on Computational Science and Engineering (CSE-09), Vancouver, BC, August 29-31, 2009.
- Session organizer and co-chair, ACM Local Chapter Enhancement & Organization, OU Supercomputing Symposium, Norman, OK, October 6-7, 2009
- Kansas State Collegian, quoted in article "Google introduces new operating system," by Aaron
- Wesley, Manhattan, KS, July 15, 2009
- Kansas State Collegian, quoted in article "Professors: total internet control by Obama impossible," by Karen Ingram, Manhattan, KS, September 2, 2009

Banerjee
- Program committee chair, 11th Workshop on Formal Techniques for Java-like Programs (FTJFP), a satellite workshop of ECOOP 2009
- Program committee member, 15th European Symposium on Programming (ESOP'10), March 2010, Paphos, Cyprus

Caragea
- Reviewer, IEEE Transactions on Knowledge and Data Engineering (TKDE), Elsevier, Data and Knowledge Engineering (DKE), IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB), Multimedia Tools and Applications (MTAP)
- Program committee member, First ACM International Conference on Bioinformatics and Computational Biology (ACM-BCB), 2010
- Program committee member, The 13th Pacific-Asia Conference on Knowledge Discovery and Data Mining (PakDD), 2009
- Program committee member, International Joint Conferences on Bioinformatics, Systems biology and computational intelligence (IJBCSI), 2009
- Program committee member, The 20th Midwest Artificial Intelligence and Cognitive Science Conference (MAICS), 2009
- Program committee member, IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 2009
- Program committee member, The 21st IEEE International Conference on Tools with Artificial Intelligence (ICTAI), 2009
- Reviewer and panelist, NSF, CESE Distinguished, IIS Division, 2009
- Honored with two WESP Making a Difference Awards, 2009
- Invited panelist, Spring 2009 ADVANCE Distinguished Lecture Series Luncheon

Deo
- Panel member, NSF Robust Intelligence
- Proposal review, Air Force Office Scientific Research (AFOSR/NM)
- Editorial board, International Journal of Agent-Oriented Software Engineering
- Program committee member, Intl Workshop on Agent-Oriented Software Engineering (AOSE) 2009

- Program committee member, ACM SAC--special track on AOx Methodologies, Infrastructures, and Processes, 2009
- Program committee member, 5th IEEE Workshop on Situation Management (SIMA) 2009
- Program committee member, International Conference on Agents and Artificial Intelligence (ICARIS) 2009
- Reviewer, International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2009

Gustafson

Hatcliff
- Editorial board: International Journal for Software Tools for Technology Transfer
- Program committee member, 7th International Conference on Integrated Formal Methods (IFM 2009), Dusseldorf, Germany

Hsu
- Editorial board, Intelligent Data Analysis
- Co-Editor with S. Das, D. Caragea, and S. Welch, Computational Models of Gene Regulatory Networks

Hu
- Poster and demo co-chair, ACM Conference on Computer and Communications Security (CCS), 2009
- TPC member, Workshop on Assurable & Usable Security Configuration (SafeConf), 2009
- Reviewer for numerous journals, conferences, and funding agencies

Robby
- Research program committee member, 2009 ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)

Schmidt
- Program committee member, International Andrei Ershov Memorial Conference: Perspectives of System Informatics, Novosibirsk, Russia, June 2009, Springer LNCS (http://isit.inn.RU/ pub09/)
- Program committee member, Conference on Verification, Abstract Interpretation, and Model Checking, Madrid, Spain, January 2010, Springer LNCS (http://software.inria.org/events/vmcai10/)
- Steering committee member, conference series on Static Analysis (SAS); conference series on Verification, Abstract Interpretation, and Model Checking (VMCAI)
- Advisory board member, Journal of Higher Order and Symbolic Computation (http://www.brics.dk/~hosc/)
UNDERGRADUATE STUDIES

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.

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

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

Certificate program

- Graduate certificate in real-time embedded systems.

Resources for current and prospective graduate students

- CIS admissions: http://cis.ku.edu/programs/gradadmissions
- CIS research projects: http://cis.ku.edu/research
- CIS profile on Peterson’s Online guide: http://graduate-schools.petersons.com

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@kau.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 advisors 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 academic. 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 academic 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.

William Cary
President and CEO
Innovation Corporation

Susan Chambers
Senior Vice President, Benefits/Insurance Admin.
Walmart

Katherine (Kacy) Clark
Vice President
Wellington Management Company

Terry Ecklund
Partner
Accenture

Lynn Frick
Database Administrator
Kansas State University Foundation

Dominic Gelinhas
Programmer
Texas Instruments

Dr. Mary Lou Hines
Vice Provost
UMSC (Board Chair)

Connie Jaynes
Retired
Shell Oil

Martin Halley
Vice President of Information Technology
Union Pacific

Don Mandal
President
Falcon Technology Group

Shane Rumpist
Software Engineer
Garmin

Mark Schonhoff
Vice President
Cerner Corp.

Ken Switzer
President
Pegasystems Programming Solutions

Norman Tsiguloff
President
Mile High Sir Speedy

Neil Tucker
Retired
PeopleSoft

Dr. Ray Vaughn
Professor and Department Head
Computer Science and Engineering
Director, Center for Computer Security Research
Mississippi State University

Dr. Tieren Zhou
Founder and President
Techxcel Corp.

Emeritus Members

Jerry Havemann
Vice President, Retired
Garbell

Jacqueline Trombly
Operations Director, Retired
Lucent Inc.

Dennis Yeo
Founder
Multigen/Paradigm

Singh, Gurdeep
Dept. Head/Professor
(785) 532-7945
Nichols 234
gurdeep@ksu.edu

Amtoft, Torben
Associate Professor
(785) 532-7917
Nichols 219C	tamtoft@ksu.edu

Andresen, Dan
Associate Professor
(785) 532-7914
Nichols 219B
dan@ksu.edu

Caragea, Doina
Assistant Professor
(785) 532-7908
Nichols 227C
dcaragea@ksu.edu

DeLoach, Scott
Associate Professor
(785) 532-7951
Nichols 324E
deloach@ksu.edu

Gustafson, David A.
Professor
(785) 532-7923
Nichols 227A
dag@ksu.edu

Hatcliff, John
Professor
(785) 532-7950
Nichols 324D
hatcliff@ksu.edu

Howell, Rodney R.
Associate Professor
(785) 532-7735
Nichols 227D
rhowell@ksu.edu

Hsu, William
Associate Professor
(785) 532-7905
Nichols 324C
bhsu@ksu.edu

Mizuno, Masaaki
Professor
(785) 532-7928
Nichols 227B
masaki@ksu.edu

Nielson, Mitchell L.
Associate Professor
(785) 532-7918
Nichols 219D
n Neilson@ksu.edu

Ou, Ximing (Simon)
Assistant Professor
(785) 532-7941
Nichols 316B
xou@ksu.edu

Robby
Associate Professor
(785) 532-7904
Nichols 324B
robby@ksu.edu

Schmidt, David A.
Professor
(785) 532-7912
Nichols 219A
das@ksu.edu

Stoughton, Alley
Associate Professor
(785) 532-7906
Nichols 214
sthought@ksu.edu

Unger, Elizabeth A.
Professor
(785) 532-6521
Hale 218A
beth@ksu.edu

Wallentine, Virgil
Professor
(785) 532-7365
Nichols 316C
virgil@ksu.edu
Notice of nondiscrimination
Kansas State University is committed to nondiscrimination on the basis of race, sex, national origin, disability, religion, age, sexual orientation, or other nonmerit reasons, in admissions, educational programs or activities and employment (including employment of disabled veterans and veterans of the Vietnam Era), as required by applicable laws and regulations. Responsibility for coordination of compliance efforts and receipt of inquiries concerning Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, and the Americans With Disabilities Act of 1990, has been delegated to Clyde Howard, Director of Affirmative Action, Kansas State University, 214 Anderson Hall, Manhattan, KS 66506-0124, (Phone) 785-532-6220; (TTY) 785-532-4807.