



Department of Computer Science & Engineering
Michigan State University
3115 Engineering Building
East Lansing, MI 48824-1226

computer
science and
engineering

E N G I
N E E R
I N G

AT A GLANCE
2006-2007

MICHIGAN STATE
UNIVERSITY

HISTORY AND MISSION

Founded in 1967, the Department of Computer Science and Engineering (CSE) enjoys a rich history of innovative teaching, research, and outreach in support of Michigan State University's land-grant mission.

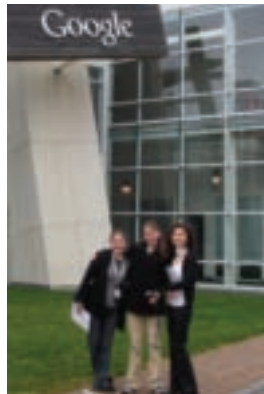
Starting with a faculty of four and an undergraduate class of 31, the department has grown to encompass 22 faculty, 335 undergraduate computer science majors, 180 undergraduate computer engineering majors, and 120 master's and doctoral students. Ten affiliated faculty contribute interdisciplinary expertise to the department's teaching and research programs.

We are committed to providing the highest quality instruction to our students, conducting world-class research, and providing leadership and service to our various stakeholders.

UNDERGRADUATE EDUCATION

Our undergraduate curriculum is centered on teaching fundamental underlying principles using state-of-the-art technologies. As a result, our graduates have a lifelong foundation for building dynamic and rewarding careers, as well as a competitive skill set that enables them to secure their first jobs.

- Our curriculum reflects new advances in both theory and practice.
- Our computing facilities give students access to diverse, state-of-the-art computing platforms.
- Our undergraduates conduct research with faculty.
- Our undergraduates participate in internships and cooperative education with a variety of companies.
- A number of our students continue academic study in top graduate programs, including our own.
- Our graduates are recruited aggressively by multi-national and Michigan-based organizations ranging in size from small startups to Fortune 500 companies.



GRADUATE EDUCATION

The department offers graduate study leading to the master of science and doctor of philosophy degrees. Advanced study is available in four general areas: software systems, intelligent systems, networking and ubiquitous computing, and biological computing. Specific subjects in these areas include high-assurance software, computer security, database systems, computer vision, humanoid robots, data mining, machine learning, augmented and virtual reality, mobile computing, sensor networks, biometrics, and artificial life.

A graduate degree paves the way to exciting career opportunities — for example, careers in national and industrial laboratories performing cutting-edge research and development, or in academia discovering knowledge and inspiring the next generation of computing professionals. Our graduate program provides a deeper exposure to computer science and engineering and enhances a student's ability to pursue further independent study in new, emerging areas of our discipline.

PROGRAM HIGHLIGHTS

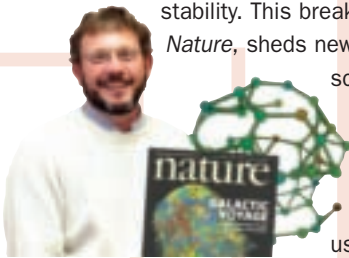
Digital Evolution: Faculty in CSE and the life sciences have gained insights into previously unsolved questions of evolution using high-end computing and a kind of artificial life, or ALife. A virtual petri dish allows experiments requiring analysis of changes in species diversity across thousands of generations. This work, which has enabled the study of evolution to go in directions never before thought possible, has been published in *Nature*, *Science*, and *Discover* magazine.

Biometrics: CSE's Pattern Recognition and Image Processing Lab is a world leader in biometric research and technology. *Biometrics* refers to the automatic recognition of individuals based on their physiological (e.g., face, fingerprint, or iris) and/or behavioral (e.g., signature) characteristics. Because of increased concerns about terrorist attacks, security breaches, and financial fraud, many systems now require reliable personal recognition schemes to confirm or determine the identity of an individual.

High-Assurance Systems Initiative: High-assurance computing systems are designed to tolerate failures, and even direct attacks,

in order to continue system operation and preserve system integrity. Our High-Assurance Systems Initiative uses a real-world problem-driven, multidisciplinary approach to deliver instruction, conduct research, and develop reliable and secure cyber infrastructure. The initiative has received funding from numerous federal agencies (e.g., NSF, ONR, AFRL, DARPA), and recently received NSF funding to establish a national industry-university collaborative research center for high-assurance systems at MSU.

Genetic Algorithms Research and Applications: CSE faculty, working with physics researchers, found a way to characterize the structure of non-crystalline matter using a genetic algorithm to predict how different numbers of atoms would structure themselves under certain constraints in order to maintain stability. This breakthrough, published in *Nature*, sheds new light on a decades-old scientific mystery and may lead to treatments for sickle cell anemia and to an understanding of the atomic arrangements of nanotubes used in quantum computing.



CSE Collaborative Design: CSE 498, Collaborative Design, is our senior capstone course in which teams of students design and deliver a complete software system. They are responsible for the entire development cycle including specification, architecture, implementation, documentation, and deployment. Clients include Auto-Owners Insurance, Boeing, DaimlerChrysler, Ford, General Motors, IBM, Microsoft, Motorola, MSU Men's Basketball, MSU College of Human Medicine, TechSmith, Two Men and a Truck, and Union Pacific Railroad.

Popular Undergraduate Cognates and Specializations: business • game design • psychology • cognitive science • criminal justice • natural science • premedical studies • genetics • telecommunications • information technology • math.

Student Organizations: CSE student groups provide opportunities to develop leadership and communication skills and to form lasting friendships. The student chapter of the

Association for Computing Machinery (ACM) has long sponsored a wide variety of activities, from video game contests to weekly faculty/student doughnut hours.

MSU Women in Computing (WIC) seeks to promote, recruit, and retain women while providing educational and networking opportunities for all students. Collaborating with ACM, WIC members volunteered at the College of Engineering Career Expo and the MSU Science, Engineering and Technology (SET) day. WIC activities this year included organizing computing workshops and conducting an outreach program for the Girl Scouts of America.



Awards: CSE faculty, students, and staff consistently win awards for exemplary work. Recent awards include:

FACULTY – MSU Distinguished Faculty Award; Teacher-Scholar Award; Fellow of the International Society for Optical Engineering; Fellow of the American Association for the Advancement of Science; Withrow Distinguished Scholar Award; and Withrow Teaching Excellence Award.

STUDENTS – MSU Senior Class Council Outstanding Senior Award; Service Recognition Award; first place in the IBM Student Mainframe Contest; and awards for papers presented at prestigious international research conferences.

Recent Textbooks Coauthored by CSE Faculty:

- *Handbook of Multibiometrics* (Springer)
- *Handbook of Face Recognition* (Springer)
- *Biometric Systems: Technology, Design and Performance Evaluation* (Springer)
- *Handbook of Fingerprint Recognition* (Springer)
- *An Introduction to Technical Problem Solving with MATLAB v. 7* (Great Lakes Press)
- *Computer Vision* (Prentice Hall)
- *Introduction to Data Mining* (Addison-Wesley)

FACULTY

The faculty of the Department of Computer Science and Engineering are internationally renowned for their teaching, research, and outreach. They are regularly awarded competitive grants from national funding sources including the National Science Foundation, the Office of Naval Research, the Defense Advanced Research Projects Agency, and the National Institutes of Health. A number of our faculty hold patents for computer science inventions.

PARTNERSHIPS

The Department of Computer Science and Engineering engages with a diverse set of strategic and corporate partners on a wide range of issues such as recruitment, curriculum development, internships, partnered learning activities, and research. Our current partners include:

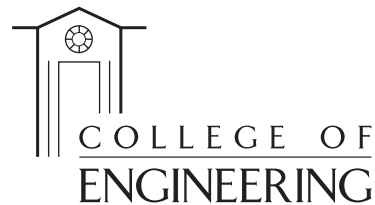
- Crowe Chizek and Company, LLP
- DaimlerChrysler
- Dow Chemical Corporation
- General Motors Corporation
- Hewlett-Packard
- International Business Machines (IBM)
- Liquid Web, Inc.
- Microsoft Corporation
- Motorola, Inc.
- Nortel Networks
- Rose Packing Company
- Science Applications International Corporation (SAIC)
- Sun Microsystems
- The Toro Company
- University of Notre Dame



RESEARCH LABS AND GROUPS

CSE invites you to explore some of our dynamic research activities by visiting www.cse.msu.edu/rgroups.

- BIOMETRICS - Biometrics Research Group
- CCS - MSU CyberSecurity Initiative
- Devolab - Digital Evolution Lab
- EI - Embodied Intelligence Lab
- eLANS - Experimental Lab for Advanced Networks and Systems
- GARAGE - Genetic Algorithms Research and Applications Group
- GEL - Games for Entertainment and Learning
- HAS - High Assurance Systems
- LINKS - Language Processing and Knowledge Discovery Lab
- MATRIX - The Center for Humane Arts, Letters, and Social Sciences Online
- MET - Media and Entertainment Technologies Lab
- PRIP - Pattern Recognition and Image Processing Lab
- SENS - Software Engineering and Network Systems Lab
- WCHSN - Wireless Communications and High Speed Networks Lab



Laura Dillon, Chairperson
Department of Computer Science & Engineering
Michigan State University
3115 Engineering Building • East Lansing, MI 48824-1226
Phone: (517) 353-3148 • Fax: (517) 432-1061
E-mail: cse@egr.msu.edu
Web site: www.cse.msu.edu