The Department of Electrical and Computer Engineering is the largest department in WSU’s College of Engineering. We currently have 22 full-time regular faculty positions with an average undergraduate enrollment of approximately 400 students and a graduate enrollment of roughly 280 master’s and 60 doctoral students. Because more than half of our students attend school while working and through co-op programs and internships, key courses are offered in the evening as well as during the day. Our average class size is approximately 24 students for undergraduate courses and 20 students for graduate courses. Full-time faculty members teach introductory as well as the most advanced graduate courses.
Dear Alumni, Friends, and Colleagues:

I am pleased to share the latest news and achievements of the department with you. Our faculty, staff, and students continue to work hard to achieve the best in research, education, and scholarship. In particular, we have witnessed unprecedented levels of growth in research activities in recent years. Our annual research expenditures now exceed $5.9 million, with most external funds coming from highly competitive federal agencies. This works out to more than $280,000 per faculty member.

We have established a world-class clean-room facility and expanded our research in nanotechnology, bio-electronics, and information technology. These activities in cutting-edge research have impacts on all aspects of the department.

We have supported more graduate students by offering them graduate research assistantships and upgraded equipment and instruments in our labs. Many undergraduate students are also actively involved in research with ECE faculty members.

In this issue we report on the construction of the clean room facilities and highlight the research of two most inspiring groups: the Smart Sensors and Integrated Microsystems (SSIM) group led by Professor Greg Auner, and the Infrared Imaging Lab led by Professor Xiaoyan Han.

Greg’s work has attracted millions of dollars of external funding from government and industry, and has had an impact on electronic materials and devices, medical systems, and nanotechnology. Xiaoyan’s work in infrared imaging for non-destructive evaluation of materials was selected by The Better World Report as one of the 25 innovations that changed the world.

You will also read about three ECE alumni, Grace Bochenek, research director of the US Army Tank Automotive Research, Development and Engineering Center (TARDEC); Lushman Grewal, chief financial officer of Singh Development; and Robert Ryan, retired vice president and CFO, Medtronic, Inc., who were inducted into the College of Engineering Hall of Fame at the 2005 Night of the Stars ceremony in November. This is perhaps a record number of inductees for ECE in a single year.

Laxmi Bhuyan, who earned his doctoral degree from our Department and is the current editor-in-chief of the IEEE Transactions on Parallel and Distributed Systems, is also featured with his reflections on his days as a student at Wayne State. Dr. Bhuyan returned to Wayne State as a speaker in the 2006 Forest Brammer lecture series.

In addition, the department faculty has grown with the addition of new faculty members in the last several years. These faculty come from the very best programs in the world and many of them have work experiences in industry or government laboratories.

I hope you will see from the articles in this newsletter that the faculty, staff, and students in the ECE Department are working very hard to make continuous progress on a number of fronts. We urge you to visit us to learn more about the latest activities in the department. We are very grateful for your support.

Yang Zhao
Chair, Electrical and Computer Engineering
SSIM Program

By Leslie Mertz

The world is entering a new age of technology, and the Smart Sensors and Integrated Microsystems (SSIM) program at Wayne State University is blazing the trail. SSIM researchers believe that almost nothing is impossible, and actively seek out complex projects that go beyond the limits of current technology to spur original ideas and shape new avenues of investigation. They are already developing miniature devices that can detect the smallest of quantities, survive the most severe conditions and function at exceptionally fast speeds.

The SSIM program’s multidisciplinary “systems” approach is the basis for its success, and has helped forge the program’s quickly growing national and international reputation. Here, experienced and innovative WSU researchers from many departments work together with dozens of creative and talented scientists from industry, government labs, medical facilities, including the Detroit Medical Center and Henry Ford Health Systems, and other institutions of higher learning. This unusually broad

continued on page 11
DEPARTMENT WELCOMES NEW FACULTY

Congratulations to Abhilash Pandya, a researcher with SSIM, who has been appointed assistant professor in the Department of Electrical and Computer Engineering. Pandya, an expert in software development for advanced visualization technology, earned his PhD in bioengineering from Wayne State in 2004, his master’s in bioengineering from the University of Michigan-Ann Arbor in 1988, and bachelor’s in biochemistry from the University of Michigan-Dearborn. He has been a lead engineer in the SSIM lab since 2002, heading a team of seven engineers working with the Zeus Medical Robotic system to enhance its visualization, diagnostic, and pressure sensor capability for medical, military and space robotics. Prior to his position at WSU he worked for NASA for 10 years.

The college welcomes Song Jiang to the Electrical and Computer Engineering Department. Jiang was a post-doctoral fellow at Los Alamos National Laboratory. He received his PhD in Computer Science from the College of William and Mary, and his MS and BS in Computer Science from the University of Science and Technology of China. His research interests include operating systems, file and storage systems, fault tolerance for high-end computing, and distributed systems. In 2003, Jiang received the Steven K. Park Graduate Research Award from the College of William and Mary for his work on developing the LIRS caching algorithm for virtual memory and I/O systems.

Quingching John Liu will also be joining the Electrical and Computer Engineering Department. He earned hi PhD in Electrical Engineering from the University of Southern California. He has two M.S. degrees—one in Electrical Engineering from New Mexico State University and one in Computer Science from Peking University—along with a B.S. in Electronics and Information Systems from Peking University. He has worked at many different places including Oakland University, Hughes Network Systems, Legend Group Corporation and Automatic Control Institution. Liu has published two books and more than 50 journal articles and conference papers.

ROBERT ERLANDSON RECEIVES MERRYFIELD DESIGN AWARD

Robert Erlandson is the winner of the Fred Merryfield Design Award for his demonstrated record of excellence in teaching engineering design. The Accessible Design Resource Center he created is a major repository for educational resources on universal and accessible design. His student design program continues to motivate, challenge, and inspire students to excel as it enters its sixteenth year of operation.

Established in 1981 by CH2M Hill in memory of Fred Merryfield, this award recognizes an engineering educator for excellence in teaching of engineering design and acknowledges other significant contributions related to engineering design teaching. The award recipient receives a $2,500 honorarium, a $500 stipend for travel to the ASEE Annual Conference and a commemorative plaque. In addition, the awardee’s institutional department receives an award of $500.

PROFESSOR SILVERSMITH RETIRES

Professor Donald Silversmith retired in May from the ECE department at WSU after 18 years on the faculty. Silversmith came to WSU in 1988 from the National Science Foundation to be associate dean of engineering for research and graduate studies under former Dean Fred Beaufait. During his years in the Deans’ Office, Silversmith was able to help the college double its research funding from federal agencies and southeastern Michigan industry. He developed new off-site WSU engineering MS programs taught at Ford, General Dynamics, Unisys and US Army TACOM/continued on page 9
Laxmi N Bhuyan, Wayne State alumnus, was invited to speak as a part of the 2006 Forest Brammer lecture series which was hosted by the Department of Electrical and Computer Engineering.

The lecture, presented at St. Andrews Hall in March of 2006, was well attended by engineering students, faculty and guests, and highly applauded.

The talk was entitled “Network processors: A solution to the next generation network challenges.” The talk presented possible future deployment of network processors in many applications such as building firewalls, home computing, multimedia transcoding and wireless and sensor networks.

Bhuyan has been a professor of Computer Science and Engineering at the University of California, Riverside since January 2001. He was a Professor at Texas A&M University (1989-2000) and program director of Computer Science Architecture program at the National Science Foundation (1998-2000).

He has also worked as a consultant to Intel and HP Labs. Bhuyan received his PhD degree in Computer Engineering from Wayne State in 1982.

He currently serves as editor-in-chief of the IEEE Transactions on Parallel and Distributed Systems (TPDS). The founding editor-in-chief for Transaction was Tse Y. Feng, who was a faculty member in the ECE Department in the late 1970s.

Bhuyan is a fellow of IEEE, a Fellow of ACM, a fellow of AAAS (American Association for the Advancement of Science) and a fellow of WIF (World Innovation Foundation). He was also awarded the IEEE Computer Society outstanding contribution award in 1997.

The Brammer lecture Series is named for Forest Brammer who was a full time faculty member until his retirement in 1982. He returned to the department on a part-time basis the same year and served as undergraduate advisor through 1989.

The lecture series was established to honor Brammer who came to Wayne State University in August 1960 as head of the department. The series is in recognition of his many contributions and distinguished services to ECE.
Three Wayne State University electrical engineering graduates were inducted into the Wayne State University College of Engineering Hall of Fame at Night of the Stars, the college’s annual celebration of achievement, in November at the Detroit Science Center.

Grace Bochenek, executive officer at the US Army Tank Automotive Research, Development and Engineering Center in Warren, was among those who joined the prestigious group of more than 100 Engineering alumni.

In her current position, Bochenek provides scientific and technical leadership and expertise for the Army’s tactical wheeled vehicle fleet and force projection commodities, which include managing a budget of $4.7 million, more than 400 personnel and 240 Army products. She is also actively involved in NATO efforts, most notably NATO Applied Vehicle Technology Panel.

Bochenek was executive director of research and technical director for TARDEC from 2002 to December 2004. In that position, she led programs to align all ground-based systems, science and technology research objectives to meeting the Army’s future war fighting needs, including vehicle survivability, robotics, vehicle electronics, hybrid electric alternative power and energy sources.

Bochenek received her bachelor’s degree in electrical engineering from WSU in 1986. She holds a master’s in engineering from the University of Michigan, and a PhD from the University of Central Florida.

Lushman Singh Grewal, founding partner and chief financial officer at Singh Development Co., Ltd., was also selected to the Hall of Fame. Grewal, of West Bloomfield, graduated from WSU with a master’s in electrical and computer engineering in 1969.

Singh Development is one of the largest real estate builder/developers in southeast Michigan, with a diversified residential and commercial portfolio. The company is widely recognized for its upscale apartment communities, single-family subdivisions and homes, senior living residences, premier office buildings and prime industrial parks.

Robert Ryan, of Minneapolis, Minn, a former senior vice president and chief financial officer at Medtronic Inc., was also inducted into the Hall of Fame. Ryan, a 1966 WSU graduate in electrical engineering, was senior vice president and chief financial officer at Medtronic from 1993 until his retirement last year. He led the financial function during a period when the company experienced significant growth and was responsible for treasury, tax, controllership, internal audit, investor relations, and corporate development.

In addition to his bachelor’s from Wayne State, Ryan holds an MBA from Harvard University and a master’s in electrical engineering from Cornell University. He currently is a board member of the UnitedHealth Group, Hewlett-Packard, General Mills and Black and Decker. He is also a trustee of Cornell University, a member of the Visiting Committee of the Harvard Business School, and a trustee of the Hazelden Foundation.
Laxmi Bhuyan has received awards such as the Halliburton Professorship at Texas A&M University, and Senior Fellow of the Texas Engineering Experiment Station. He has also been named as an ISI Highly Cited Researcher in Computer Science. In 1997, he was awarded the IEEE Computer Society Outstanding Contribution Award.

Bhuyan has written more than 150 research papers in various journals and refereed conference proceedings. Most importantly, he is a Wayne State College of Engineering alumnus.

After receiving his undergraduate degrees in India, Bhuyan came to the United States to pursue his PhD degree in Computer Engineering from Wayne State. He chose Wayne State because he already knew people who were doing the type of work he had an interest in, such as network computing and interconnected architecture.

In 1982, Bhuyan received his doctorate in Computer Engineering. However, because of difficulties with relocating his family, he lived in Canada for about a year. In 1983, his family was finally able to join him.

Bhuyan decided to teach computer engineering. Teaching was a road he always wanted to follow. “Teaching is a great profession you can enjoy when you do it well,” says Bhuyan.

After moving around for a bit, Bhuyan and his family settled in California where he joined the University of California, Riverside, as a professor of Computer Science and Engineering.

In addition to teaching, Dr. Bhuyan currently serves as the editor-in-chief of the IEEE Transactions on Parallel and Distributed Systems (TPDS). He is also a Fellow of the IEEE, a Fellow of the ACM, a Fellow of the American Association for the Advancement of Science (AAAS), and a Fellow of the World Innovation Foundation (WIF).

While Bhuyan enjoys teaching computer architecture and other engineering courses at the University of California, Riverside, his favorite part of California is what waits for him outside of the office. “I love to see the snow on the mountains anytime of the year,” says Bhuyan. “Where else can you snow ski in the morning and surf in the afternoon?”

As fond as he is of California, Bhuyan was impressed by the changes on Wayne State’s campus throughout the years. He describes the campus as much more beautiful than what he remembers of the early 1980s. There are also many new buildings spread around campus. “This campus has a totally different look from when I was here. It is much cleaner,” notes Bhuyan. “The campus, as a whole, feels more secure and much like a college campus.”

So can we try to seduce Bhuyan into joining our faculty at the College of Engineering? “I like California very much and will probably retire there,” says Bhuyan with a smile. “I have a great family and great friends. Life has been very good.”
TARDEC. During his tenure as associate dean, WSU engineering MS degree productivity rose to the level of one of the top ten universities in the USA. Silversmith returned to the ECE faculty when Beaufait left to go to City University of New York in 1996.

Silversmith went on sabbatical in 2000, doing MEMS research at NASA Goddard Space Flight Center in Greenbelt, MD, and since has served both as the first IEEE Diplomacy Fellow and subsequently as a Foster Fellow at the US Department of State in Washington, DC. Currently, he serves as a Program Manager for Sensor and Detector Materials at the Air Force Office of Scientific Research in Arlington, VA. In this role, he manages intramural and extramural research activities at the Air Force Research Laboratory and at universities throughout the United States. “My Air Force position is probably the very best job I have ever had,” Silversmith states. “Nevertheless, I have extremely fond memories of all my years at WSU and Detroit, and I’ll miss my colleagues and students.”

**DR. LIN CO-CHAIR OF WODES 06 SCIENTIFIC PROGRAM COMMITTEE**

Feng Lin, professor ECE Department was co-chair of the Scientific Program Committee of the 8th International Workshop on Discrete Event Systems (WODES 06), from June 10 to 12. The conference provided researchers from different fields—control theoreticians and control engineers, software engineers and computer scientists, operations research specialists—an opportunity to exchange information and new ideas, and to discuss new developments in the field of DES theory and application.

**ECE PROFESSORS ORGANIZE INTERNATIONAL CONFERENCE**

The North American Fuzzy Information Processing Society (NAFIPS) 2005 Annual Conference was held at Ann Arbor Four Points Sheraton, from June 22 to 25, 2005. The organizing committee consisted of the following from the ECE Department: Harpreet Singh, chair, organizing committee; Hao Ying, program chair; and Nabil Sarhan, program committee.

**SHARAD SHARMA NAMED OUTSTANDING GRADUATE**

Sharad Sharma was named Outstanding Graduate at the Professional Student Leadership Awards for the year 2005-2006 to recognize his year-long achievements at Wayne State and in the Detroit community. The award was presented at the Campus Life Leadership Awards Banquet April 3. Wayne State gives Leadership Awards that recognize the year-long achievements of students, faculty, staff and student organizations which positively impact student life and growth.

**PROFESSOR XU CO-CHAIRS EUC 2006 CONFERENCE**

Professor Cheng-Zhong Xu was the co-chair of the 2006 IFIP Embedded and Ubiquitous Conference (EUC’06), August 1 to 4, in Seoul, Korea. The conference provided a forum for engineers and scientists in academia, industry, and government to address issues in all aspects of embedded and ubiquitous computing. The conference received more than 500 submissions and accepted about 100 papers in its proceedings published by Springer Verlag. The conference attracted more than 250 participants. It was well received by the research community and local embedded systems industry.

**JESSIN JOHN DEMONSTRATES LEADERSHIP AND SCHOLARSHIP**

Electrical and Computer Engineering student Jessin John has demonstrated strong leadership qualities as an officer in the IEEE Student Chapter and president of the REACH Christian Club. As member of Tau Beta Pi, he has also achieved a high scholastic level. John is currently a student in WSU’s MD/PhD program.
Han’s Innovation Changes World

In 2006 Better World Reports published “Technology Transfer Stories: 25 Innovations that Changed the World” which selected high-tech achievements, including the Google search engine. One innovation included is the infrared imaging technology developed by Xiaoyan Han, associate professor of ECE at Wayne State.

Non-Destructive Evaluation (NDE) technology has been recognized as an important tool in manufacturing processes, maintenance to detect flaws or prevent failures in systems in service, or even to save lives—if, say, a fatal defect in an airplane is detected before it flies. Effective, fast and wide-region NDE techniques are important and essential in various areas.

Han is leading a team focused on research and development of Sonic Infrared Imaging. This novel technique implements the concept of combining infrared sensing and imaging with pulsed sonic/ultrasonic excitation. It is used to detect structural defects—both surface and subsurface. Examples include cracks in metal/metal ally, ceramic, or delaminations/disbonds in composite materials.

Han’s research has been funded mainly by the US Air Force, FAA and NSF. She is a NSF Career awardee and also won the WSU 2005-2006 Career Development Chair Award. Han has been collaborating with other colleagues in universities, industries, including aerospace, power generator and automotive and national laboratories. She is co-holder of seven US patents on this technology.

News and Notes from page 9

RECENT ECE PHD GRADUATES JOIN TENURE-TRACK IN OTHER SCHOOLS

Haifying Shen, who defended her dissertation last March, joined the University of Arkansas in July as a tenure-track assistant professor in the Department of Computer Science and Engineering. Her dissertation is entitled “Toward Scalable and Efficient Peer-to-Peer Networks.”

Jianbin Wei, who defended his dissertation in July, joined South Dakota School of Mines as a tenure-track assistant professor in the Department of Computer Science. His dissertation is entitled “Stress-Resilient Internet Services.”

EMMETT LEITH, HOLOGRAPHIC INNOVATOR DIES AT 78

Holographic Innovator and WSU electrical engineering alumnus Emmett Leith was planning to retire Dec. 31 after 52 years at the University of Michigan. But Leith, a professor of electrical engineering and computer science, died Dec. 23 after falling ill the day before at his home in Canton. He was 78.

“He’s known as the person who made practical holography possible,” said Gary Adams, who worked for Leith at the U-M Institute of Science and technology lab.

Leith was born in Detroit and earned his college degrees from Wayne State: a bachelor’s in liberal arts and sciences in 1950, a master’s in physics in 1952, and a PhD in electrical engineering in 1978.

PROFESSOR XU AUTHORS NEW BOOK

Chengzhong Xu, associate professor, ECE Department has written a book entitled Scalable and Secure Internet Services and Architecture, from the Chapman and Hall/CRC, Taylor and Francis Group.
collaboration allows the program to perform stages of project development from the fundamentals to application, or, as SSIM researchers like to say, “from atoms to man.”

The development of novel materials is a critical component of the research at the SSIM program. For years, semiconductors, integrated circuits, sensors and other electronic devices have been made from silicon, a marvelously versatile compound that ushered in the electronics era.

As the need for ever-smaller and broader-use micro-machines and sensors grows, however, scientists recognize that silicon has its limits. An all-silicon device, for example, fails in the high temperatures of automobile and other engines, and faces rejection when used as an implant in the human body.

In a revolutionary approach, researchers are developing a wide variety of new materials to overcome these previously insurmountable hurdles. These span the gamut from organics and wide bandgap semiconductors and magnetic materials. Researchers have pioneered processes that permit the integration of these materials with silicon to combine the benefits of both technologies.

For its students, the SSIM program offers multidisciplinary, undergraduate and graduate curricula that combine lectures with hands-on laboratory work, and provide unparalleled opportunities to participate on cutting-edge research teams that are designing and making the products of tomorrow.

Already, industry has taken notice of the caliber of the SSIM program and its students.

**DR. JATINDER SINGH BEDI PASSED AWAY**

Jatinder Singh Bedi, associate professor of computer and electrical engineering, passed away Dec. 26, 2005 after a long illness. He was 62. Dr. Bedi was an innovative researcher of fuzzy neural control methods and Wayne State professor since 1983, when he was invited to teach computer engineering. He was appointed Associate Professor in 1986, and awarded tenure in 1991.
Alumni — We want to hear from you!

We’re interested in sharing news about our alumni in this newsletter. Please fill out the following and send it to us by mail, fax or e-mail.

Name ________________________________
Graduation Date _________________________ Phone ________________________________
Degree ________________________________ E-mail ________________________________
Current Mailing Address ________________________________
City ____________________________ State _______ Zip ____________________________
Current Position and Employer ________________________________
Current News or Story Ideas (attach pages as needed) ________________________________

Send information to: Megan Cyrulewski, Development Officer, College of Engineering
Wayne State University, 5050 Anthony Wayne Drive, Detroit, MI 48202
Phone: 313-577-5840    Fax: 313-577-8171    E-mail: AK5510@wayne.edu