



THE UNIVERSITY OF MICHIGAN

EECS News

Fall/Winter 2006
Department of
Electrical Engineering
and Computer Science



Low Power Computing . . .



. . . and Our Wireless Future



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Thank You

Thank to our Donors

AMD Supports VLSI at Michigan



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A Message from the Chair



Fall 2006 marks a new beginning and time of transition for the several hundred new undergraduate and graduate students who have made EECS their academic home. Welcome! You will not forget your time here!

This is also an exciting year of transition for the EECS Department. This last summer our EECS Chair from 2003 to 2006, Dave Munson, became Dean of the College of Engineering here at Michigan. While we will miss

Dave's leadership and his contributions to the EECS Department, we are confident he will have an equally positive impact on all of the College of Engineering. Martha Pollack and myself, who were both EECS Associate Chairs over the last two years, along with Jeff Fessler, our newest Associate Chair coming from our Systems area, are all committed to working with our faculty and staff in making this a year of continued progress for EECS!

Leading up to this year, we completed a year of strategic planning, brought exciting new faculty to Michigan, moved into our new CSE Building (an absolutely wonderful building), got the expansion of our Michigan Nanofabrication Facility solidly started, offered the first of what will ultimately be several hands-on freshman courses, successfully completed ABET accreditation, plus more. This academic year marks the beginning of several new initiatives: the first phase of renovations for the EECS building; a formal peer-advising program; review of our overall advising process; development and restructure of our introductory circuits and signal/systems courses; and course adjustments in several other discipline areas. We have also named our first Director for Undergraduate Programs, Professor Mohammed Islam. Mohammed is working with our staff and faculty to better serve our students in our undergraduate advising office.

Our featured research in this edition of EECS News focuses in on the groundbreaking work of several of our faculty (Trevor Mudge, David Blaauw, and Scott Mahlke) in low-power computing and its impact on the greater "wireless revolution." These researchers are making significant impact in driving down the power requirements of various computational architectures by attacking both fundamental physics issues as well as making them operate in smarter ways. Since the range of applications for wireless technologies seems to be limitless, do not be surprised if one

day your cell phone, car, and even your toaster will incorporate low-powered technologies developed here at Michigan! EECS research impacting our wireless future is quite broad and strong and includes sophisticated wireless sensors, advanced modeling of distributed wireless networks, miniature smart antennas, sophisticated electromagnetic modeling, energy scavenging technologies, plus more! In addition, research going on within the EECS Department is a natural fit with Michigan's University-wide Energy Science, Technology, and Policy initiative designed to leverage the breadth and depth of research to make a significant and broad impact for our nation and the world (www.research.umich.edu/contacts/ovpr/energy/energy-initiative.html). Don't be surprised to see much more coming from Michigan's EECS Department in years to come!

Please also take a look at our article on the exciting K-12 outreach programs initiated and sustained by faculty here in the EECS Department. A nation's success can depend on many things, but a highly educated citizenry is certainly a key factor in that success. It is generally recognized that getting youth interested in engineering and other technical fields needs to start even before high school (and then reinforced as they progress). In this article, you will see the many creative ways we are having a positive impact on students at an early age. On a personal note, I would like to share with you that in talking with even some of our most senior and highly respected faculty, there is real recognition of the national importance of these outreach efforts and a real passion to make a difference.

Finally, I draw your attention to the message from our alumni society president, Steve Schwartz. Steve, with our Alumni Board, understand that the commitment to education of our future "leaders and best" is a process that goes well beyond the classroom. There is simply more to a successful professional life than can be taught in a class and from a book. Taking one bit of advice from alumnus Medhi Hatamian, who is featured in this issue, 'Go after your dreams, do something you love, but above all – never give up.' Our alumni can play an important role in this broader process of enriching the life of our students, and Steve asks for your ideas on behalf of the EECS Alumni Society.

Go Blue!

A handwritten signature in blue ink, appearing to read "B. Gilchrist".

Brian E. Gilchrist
Interim Chair, EECS Department

Creating a Wireless Future: CSE Gets an ARM up on Low Power Mobile Computing

Low power computing is the name of the game in today's mobile computing environment. With nearly every imaginable communication device going portable - speed, cost, and battery life all become critical selling points to would-be buyers of the next iPod or cell phone. The growing popularity of PDA (personal digital assistant) devices that combine into one device the functionality of cell phone, address book, web browser, interactive multimedia communication, email, word processing, speech recognition, 3D graphics, and gaming – adds dramatically to the challenge of running these “mobile supercomputers” on small batteries.

Computer Science and Engineering (CSE) faculty in the Advanced Computer Architecture Laboratory (ACAL) are working with the company ARM (Advanced RISC Machines) Ltd. to reconcile the seemingly contradictory goals of ever-expanding functionality and performance in a wireless device, with cost reduction and extended battery life. And they are succeeding.

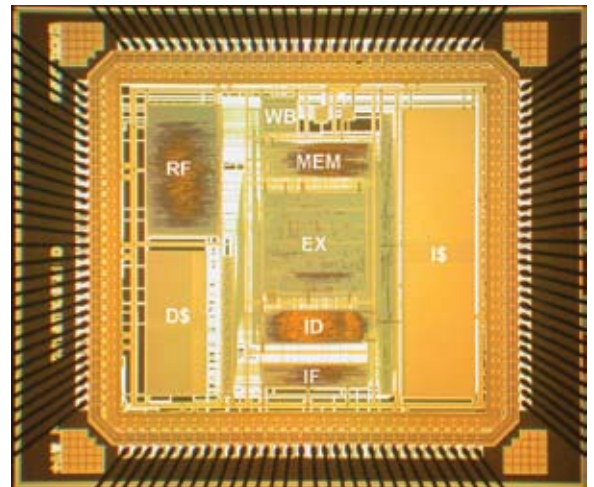
A strong university-industrial partnership

A long-standing relationship between ARM Ltd. and three CSE faculty members - Trevor Mudge, David Blaauw, and Scott Mahlke, has led to a recent five-year contract to develop solutions for a world hungry for mobile computing. ARM specializes in microprocessor intellectual property and is a leader in the embedded processor market; they focus much of their attention on the cell phone industry.

Mudge, the Bredt Professor of Electrical Engineering and Computer Science, has devoted nearly a decade of research to the area of low power computing. His strong relationship with ARM, dating back to his previous sabbatical seven years ago, was further strengthened when one of his students, Krisztián Flautner (BSE, CE '96; MSE and PhD, CSE, '98, and '01), worked for ARM while completing his thesis. Flautner is now director of advanced research at ARM.

The research conducted by Mudge and Flautner seems remarkably simple in concept – when a device, in this case a cell phone, is not in use, make sure it recognizes this and extracts less power from the battery. This work led to a patent, and the ARM product, IEM: Intelligent Energy Manager. Mudge

expects that most cell phones will incorporate this “ancient” technology, now nearly 10 years old, within the year. Several major phone manufacturers have already committed to use this technology.



Razor: the self-correcting computer chip

Razor: self-correcting chips

ARM recently supported another avenue of power-saving research by Mudge and Blaauw that resulted in a new technology called Razor. Prof. Todd Austin was also closely involved with the early history of Razor. This technology allows chips to adjust dynamically to their surroundings, correcting timing errors at the circuit level. Using dynamic voltage scaling (DVS), systems will be able to run at multiple frequency and voltage levels, while dynamically adjusting the variable power requirements for the different applications. This results in a reduction in overall power consumption.

Blaauw's graduate student Shidhartha Das is part of a team that is implementing a prototype of this technology at ARM on one of their commercial chips. Das stated, "In the Razor prototype that was built in ACAL, we managed to achieve, on average, a 50% energy savings at 120MHz over the worst-case, by operating at a 0.1% error rate."

The end result for the consumer will be longer battery life, and lower costs. Costs are lowered because of the self-correcting nature of the chips; chips that were once unusable due to some small malfunctioning part will now automatically self-diag-

nose the problem, and fix it. This has ramifications for future technologies. Blaauw explains, “as we go forward with technology, processes are becoming extremely unpredictable. It may not be possible to design in future technologies very effectively unless you have some of these adaptive technologies. With them, we can make chips much smaller, and much cheaper.”

Programmable application specific architectures

Scott Mahlke combines the goals of efficiency and performance with his work on programmable application-specific architectures. He has been able to retain the efficiency of an ASIC (application-specific integrated circuit) design, in which a chip is designed to do a single application extremely well (as opposed to a general-purpose chip, found in microprocessors), while working into the design some flexibility so the same chip can do a set of similar applications.

Mahlke achieved this goal by automating the instruction set customization process. Rather than have the chip designer identify and create each custom hardware unit, which is quite costly and time-consuming, his system automates this process. “A designer can sit at a keyboard,” explained Mahlke, “and design a special purpose processor for a single application, or set of applications. The program will offer continual feedback on performance and other aspects of the design as changes are made to the processor.”

As with other innovations in this CSE/ARM collaboration, the target for their efforts is mobile communication devices, as well as digital cameras, video, and other high performance, special purpose devices. Mahlke and his students began working with

the ARM Belgium group in 2003, and have already seen prototypes of their work.

SODA for SDR – the next generation

Mahlke and Mudge are applying the principle of instruction set customization to another aspect of wireless mobile communication, software defined radio (SDR). SDR refers to a wireless device, such as a cell phone, which is software reconfigurable. Without the capability of SDR, such devices are limited to specific air interfaces, or radio protocols.

The advantages of SDR include lower development and manufacturing costs, multi-mode operation, and the ability to adapt to future wireless communication innovations, such as cognitive radio. The challenge lies in developing a programmable architecture that can deliver the high performance required of cell phones and multiple function PDAs, with energy efficiency. The goal is supercomputer performance with ultra low power consumption.

Mahlke and Mudge are tackling this problem in a project called SODA (Signal-processing On-Demand Architecture), which is a low-power, fully programmable architecture for SDR. They are working out solutions that achieve both high performance and energy efficiency. Collaborating on this project is Prof. Chaitali Chakrabarti from Arizona State University. ARM is currently creating a prototype of this technology. Yuan Lin, a PhD student working on the project, said, “This research is ongoing. We are currently examining next generation wireless protocols and their performance requirements, refining our SODA architectural designs, and implementing a compiler for SODA.”

The wireless future

Mudge sees endless possibilities in the area of low power communications and computing. “Everything has wireless in it these days,” says Mudge. “The billion cell phones in the world are the next computing platform.”

Read More:

Michigan Software Defined Radio Group
www.eecs.umich.edu/~sdr/

Compilers Creating Custom Processors (CCCP)
<http://cccp.eecs.umich.edu/>

Faculty web pages under www.eecs.umich.edu



Software Defined Radio (SDR): Using SODA to solve the challenge of creating a low-power computer architecture that will meet the processing requirements of different wireless protocols



Trevor N. Mudge, Bredt Professor of Electrical Engineering and Computer Science



David Blaauw, professor of Electrical Engineering and Computer Science



Scott A. Mahlke, associate professor of Electrical Engineering and Computer Science

Our Future Engineers: K-12 Outreach Programs Introduce Opportunities



Middle school girls participate in a WIMS LEGO robotics activity

Lectures and labs are full, and classrooms are bustling with energy. Opportunities for EECS graduates remain strong, and is expected to rise. Trend watchers, however, see engineering growth in the United States slowing down, which will lead to a critical shortage of skilled U.S. graduates able to meet the demand.

Part of the reason for this expected decline is that a smaller percentage of United States citizens are opting to enter the field of engineering. American women in particular are underrepresented in electrical engineering and computer science, even though nationwide women make up the majority of college students in all disciplines.

Leaders in the field of engineering – working in schools, nonprofit organizations and professional associations – have been striving to increase the diversity of American students pursuing an education in engineering. Closer to home, EECS educators are doing their part to enact change and increase interest in math and science, particularly for those students in kindergarten through high school. Through a wide variety of outreach programs, they entertain, educate and engage students while introducing them to engineering – and unlocking a world of possibilities.

Fostering Interest at an Early Age

It was his eldest daughter who initially inspired Dr. David Chesney to become more involved in educational programs for students in kindergarten through high school. “In middle school, she was one of only two girls in a 24-person advanced math class,” he says. He was surprised to find so few girls in these classes and perplexed about what was keeping them away.

Now, Chesney is the EECS K-12 Outreach Coordinator working toward increasing enrollment of students in engineering disciplines, particularly electrical engineering and computer science. He and other EECS faculty and students have shown great success in developing educational approaches that pique student interest in math and science very early on.

Bringing Students to Campus

During the summer, EECS faculty and students participate in a week-long non-residential camp sponsored by the College of Engineering called WISE/GISE (Women in Science and Engineering/Girls in Science and Engineering), that introduces middle school girls to a variety of engineering disciplines. Chesney teaches the computer science component of the camp. He gives the girls opportunities to do interesting activities such as developing a website, creating a computer compiler out of LEGOs, and going on a scavenger hunt inside a computer. Students from Chesney’s Software Engineering Class (EECS 481) developed many of the tools he uses during the camp.

Meanwhile, programs overseen by Professor Leo McAfee, associate director for Education & Outreach for the ERC Center for Wireless Integrated Microsystems (WIMS), introduce students to the disciplines of electrical and computer engineering. A LEGO robotics program is at the heart of the programs offered to pre-college students, and is very popular. “Students simultaneously learn engineering and real-world factors,” says McAfee, “as well as how to adapt to unforeseen problems that may arise.”



Sixth grade students bring home their own wafer after visiting the Michigan Nanofabrication Facility.

McAfee also works extensively with the Detroit Area Pre-College Engineering Program (DAPCEP) to ensure underrepresented minorities – including females – get the exposure they need at an early age to feel confident in math and science. For five Saturdays in the spring, seventh- and eighth-grade students take buses from Detroit to U-M to participate in interactive activities and competitive projects that teach scientific principles and demonstrate biomedical and environmental applications. More than 95% of the participants are African-American.

In another program, middle and high school students are invited to the Michigan Nanotechnology Facility, a world-class cleanroom facility housed within EECS. Sponsored by the National Nanotechnology Infrastructure Network (NNIN), students are introduced to nanotechnology, given tours of the facility, and participate in various cleanroom activities that introduce scientific processes. Each student brings home a patterned, personalized wafer. Other activities are conducted in a classroom setting, such as freezing everyday objects with liquid nitrogen.

In addition to bringing students to campus, programs are in place and are being developed to reach students in their own learning environment.

Taking Technology to the Students

Chesney has devised a mobile computing lab that he takes on the road, and into language arts classes. With it, he teaches students a programming language called Alice, developed at Carnegie Mellon University. Working in pairs, children write a poem and then use Alice to create animation to accompany their poems. “All the kids are interested,” he says. “Everyone – across both genders – is completely geeked up.”

Professor Elliot Soloway has seen firsthand the benefits of bringing technology directly into the classroom. He’s devoted his career to improving children’s learning potential in school through the technology of handheld computers, and has seen



Middle School students created these animated snowpeople in a language arts course using the Alice programming language.

tremendous results based on individual feedback from teachers and students. Now, thanks to a \$700,000 grant from the National Science Foundation, he’s proven its value.

The study compared the students of three 7th grade science teachers over the course of two years. Half used handheld devices, and half used traditional paper and pencil. By the conclusion of the study, it was shown that the handheld groups performed 13 percent better than the paper and pencil groups. “When I see these handhelds, I don’t see technology,” says Soloway. “I see opportunity for all students.” The handheld learning technology was developed by Soloway at U-M, licensed to his company, GoKnow, and then donated to schools for the study.

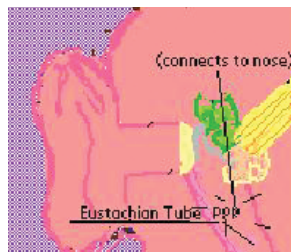
Meanwhile, McAfee would like to see a curriculum developed that will be available to grade school teachers across the country. Peggy Henderson, a former school teacher and WIMS Educational Coordinator, has already begun to envision and plan the program. “We’d really like to get into the elementary schools and make students aware that these interesting things exist,” says McAfee. They plan to develop program modules to help students learn about science, engineering, physics and mathematics.

Working to Reverse the Trend

Industry analysts may predict that fewer engineering degrees will be earned in the future, but EECS faculty and students are working diligently to reverse the trend. They’re encouraged by the results of the numerous outreach activities occurring each year, and are especially encouraged by the response from women and underrepresented minorities.

“We put a strong emphasis on putting females and minorities in the programs,” says Professor McAfee. Out of 600 students participating in WIMS outreach programs last year, 463 were minorities and nearly 54% were female. Even more encouraging is the fact that almost 80% of students who participated in DAPCEP or WIMS programs later enrolled in university engineering programs.

Helping build interest in the engineering field and increasing enrollment is certainly rewarding for the students and faculty who regularly reach out to young students. “But the real payback,” says Chesney, “is to be there in the classroom and inspire the next generation.”



A fifth grade student took first place in the Science category of the 2006 Sketchy Animation Contest with a description of the inner ear.

“All the kids are interested. Everyone is completely geeked up.”

TECH TRANSFER UPDATE

The Department of Electrical Engineering and Computer Science is a leader within the University in licensing new technologies and generating patents. The journey from fundamental research in the lab to products that are packaged and sold in the marketplace often takes years, even decades. Meanwhile, these same faculty continue to lead the way into new areas. This has been the case for the low-power mobile computing research collaboration of faculty in ACAL with the company ARM, Ltd. (read more about this on pp. 4-5). Following is an update on some Tech Transfer activities of faculty within the department, focusing on startup companies founded by EECS faculty.

New Startups

Cyclos Semiconductor

www.cyclos-semi.com

Marios Papaefthymiou, co-founder, Chief Scientist and President



Cyclos is developing technologies for next-generation ultra-low power semiconductors.

Zattoo

<http://www.zattoo.com/>

Sugih Jamin, co-founder and CTO



Zattoo promises to bring high quality TV to your computer screen at no cost, offering the same ease for viewing as a regular TV.

Startups In the News

Arbor Networks

www.arbornetworks.com

Farnam Jahanian, Chairman of the Board, and Robert Malan, Chief Technology Officer, co-founders.

Since its start in 2000 by Professor Farnam Jahanian and Robert Malan (MSE, PhD, CSE '96, '06), Arbor Networks has claimed a major share of the network security market with software that detects network anomalies and defends against a wide range of Internet threats, including worms, data theft, and denial-of-service attacks.



Farnam Jahanian and Rob Malan beside their award-winning network security product, Peakflow®.

In 2005, Arbor ranked ninth on *Inc.com*'s Inc. 500 list of the nation's fastest growing privately held companies. Its more than 150 customers worldwide include AT&T, the Pentagon, Cisco Systems, British Telecom, NTT Communications, and MCI. Its products have received numerous awards for creativity, excellence, and relevance to business needs. With its research and technology office based in Ann Arbor, Arbor Networks boasts major business centers located throughout the world. Just this year, the company was awarded the prestigious Techworld award for Security Product of the Year, and was named one of *Info Security Products Guide*'s "Hot Companies."

GoKnow Learning, Inc.

www.goknow.com

Elliot Soloway, Arthur F. Thurnau Professor, co-founder

GoKnow supports the use of mobile, handheld computers in K-12 classrooms. The company licenses products initially developed at the University of Michigan in the Center for Highly-Interactive Computing in Education. Soloway recently completed a two-year scientifically-based research (SBR) study comparing the science test scores of 7th graders who did, or did not, incorporate handheld computers in the classrooms. It was found that the use of handheld computers did correlate positively to student achievement. (See also the article on K12 education efforts by EECS faculty)

Mobius Microsystems, Inc.

www.mobiusmicro.com

Michael McCorquodale, CTO, and Richard B. Brown, co-founders



Michael McCorquodale, Governor Granholm, Ruba Borno

Mobius Microsystems, which specializes in analog and mixed signal designs, was counted among the 50 companies to watch in Michigan at the second annual Michigan Celebrates Small Business event, April 19, 2006. At the same event, McCorquodale (MS and PhD, EE, '00 and '04) was presented with an award for Innovation of the Year. Mobius recently opened a second office in Sunnyvale, CA.

Other EECS Startup Companies

Startup companies that began with official ties to U-M in which EECS individuals had significant involvement in their initial technology and/or founding include the following:

Clark-MXR, Inc. www.cmxr.com
Ultrafast lasers

Discera www.discera.com
CMOS MEMS resonator technology

Integrated Sensing Systems, Inc. (ISSYS) www.mems-issys.com
MEMS systems for sensing applications

HandyLab www.handylib.com
Clinical diagnostic testing

IntraLase www.intralase.com
LASIK eye surgery

MiTex Solutions
acquired by Brooks Automation, Inc.

NeuroNexus Tech. www.neuronexustech.com
Implantable microscale probe systems

Opteos, Inc. www.opteos.us
RF, microwave, millimeter-wave diagnostics

Picometrix www.picometrix.com
Picosecond optoelectronic components

Quantum Signal, LLC www.quantumsignal.com
Intelligent sensing and data analysis

Sensicore www.sensicore.com
Water quality monitoring

Soar Technology www.soartech.com
Cognitive software

Translume Technologies www.translume.com
Micromachining fused silica glass

Xtera Communications, Inc. www.xtera.com
Optical communication

These startup companies represent just a tip of the iceberg when it comes to faculty involvement with industry. Many of our faculty have past and/or current intellectual involvement with industry outside the scope of startup companies tied to U-M.

FACULTY PROMOTIONS

Peter Chen, professor with tenure
Michael Flynn, assoc. professor with tenure
Yogesh Gianchandani, professor with tenure
Mingyan Liu, assoc. professor with tenure
Scott Mahlke, assoc. professor with tenure
Igor Markov, assoc. professor with tenure
Mahta Moghaddam, assoc. professor with tenure
Amir Mortazawi, professor with tenure

NEW FACULTY

Andrew Ladd

Assistant Professor, CSE Division

B.Sc. in Math and Computer Science, McGill University, Montreal
M.S. and Ph.D. in Computer Science, Rice University

Research Areas: Robotics, in particular, the development of motion planning algorithms for mobile robots with non-trivial dynamics, and location-award computing.



Seth Pettie

Assistant Professor, CSE Division

B.A. in Computer Science, Brandeis University
Ph.D. in Computer Science, The University of Texas at Austin
Postdoctoral researcher, Max Planck Institute für Informatik

Research Areas: Theory, in particular, the design and analysis of graph algorithms, metric embeddings, efficient data structures, alternative models of computation, distributed networks, and parallel computers.



Clayton D. Scott

Assistant Professor, ECE Division

A.B. in Mathematics, Harvard University
M.S. and Ph.D. in Electrical Engineering, Rice University

Research Areas: Signal Processing, in particular, learning theory and pattern recognition, bioinformatics, image and shape analysis, wavelets and multiscale methods.



Stephen R. Forrest

William Gould Dow Collegiate Professor of Electrical Engineering, ECE Division
Vice President for Research, U-M

B.A. Physics, U-C Berkeley
M.Sc. and Ph.D. in Physics, University of Michigan

Research Areas: Organic electronics, photonic integrated circuits, photonic materials.

Professor Forrest was hired by U-M as the Vice President for Research. He began this appointment January 2006.



BRIAN GILCHRIST NAMED INTERIM CHAIR

Professor Brian Gilchrist has been named Interim Chair of the EECS Department, effective July 1 2006. Gilchrist, a member of the Radiation Laboratory, and the Space Physics Research Laboratory in the Atmospheric, Oceanic, and Space Sciences Department, has been Associate Chair for the ECE Division since 2004, shortly after Prof. Munson came to the University as Chair of the EECS Department. Munson has been named Dean of the College of Engineering, effective July 1.

Prof. Gilchrist specializes in sensors and technological applications of plasma electrodynamics, principally for space applications. With an interdisciplinary team of colleagues and students in the college, he is co-leading the development of nanoparticle and MEMS-based space electric propulsion and its spin-off applications. This has resulted in NASA Institute for Advanced Concepts (NIAC) Phase 1 and 2 awards.

Gilchrist considers student involvement to be one of the best parts of his job. He led a team of over 100 students to develop Michigan's first-ever student satellite (called Icarus) for NASA, and is co-faculty lead for a new student space experiment called TSATT (Tethered SATellite Testbed). He has been closely involved with the student Solar Car Team for the past several years, serving as faculty advisor, and is a faculty advisor for the Student Space Systems Fabrication Laboratory (S3FL). Prof. Gilchrist was awarded the Outstanding Student Group Advisor in 2003 by the College of Engineering.

STAFF EXCELLENCE AWARD

Excellence in Staff Service Award Beverly J. Monaghan

B.J. Monaghan received a College of Engineering Excellence in Staff Service Award in recognition of the tremendous work she has done over the

years supporting faculty, students and staff as Research Administrator for the Software Systems Laboratory. B.J. retired from the department September 2, 2006.



FACULTY HONORS AND AWARDS



Scott Mahlke 2006 Influential ISCA Paper Award

Professor Scott Mahlke received the ACM SIGARCH (Special Interest Group on Computer Architecture) / IEEE-CS TCCA (Technical Committee on Computer Architecture) Influential ISCA (International Symposium on Computer Architecture) Paper Award. This award recognizes the paper from the ISCA Proceedings 15 years earlier that has had the most impact on computer architecture.



Khalil Najafi Schlumberger Professor of Engineering

Professor Najafi has been named the Schlumberger Professor of Engineering. Najafi is Deputy Director of the NSF Center for Wireless Integrated Micro-Systems (WIMS), and Director of the NSF National Nanotechnology Infrastructure Network (NNIN).



Kang Shin 2006 Ho-Am Prize in Engineering

Professor Shin received the Ho-Am Prize in Engineering. The Ho-Am Prize is the highest honor bestowed to Korean origin engineers and researchers. It carries a cash prize of more than \$200,000.



Fawwaz T. Ulaby IEEE GRS-S Education Award

Professor Ulaby, the R. Jamison and Betty Williams Professor Electrical Engineering and Computer Science, was awarded the 2006 IEEE Geoscience and Remote Sensing Education Award for his significant educational contributions in the field of remote sensing.



Prof. Dragomir Radev Gosnell Prize for Excellence in Political Methodology

Professor Radev is co-author on a paper that was awarded the Gosnell Prize, given by the Society for Political Methodology for the best work presented at a political science conference in the previous year.

SPOTLIGHT ON OUR GRADUATE STUDENTS



Norman Adams

PhD candidate in EE:Systems

As a child, Norm Adams didn't expect his requisite piano lessons to directly impact his future and his career. But they did. When Adams hit high school, his time tickling the ivories grew into an interest in electronic music and sound synthesis, and how to generate and control both. "Getting into all things high tech was a rebellion against my folks," he says, "because they knew nothing about any of that." In high school, Adams and a friend started an electronics club where they produced circuits and experimented with amateur radios. These days, Adams is combining his interests in music and sound with a career in engineering.

Adams earned his bachelor's degree at the University of Virginia and dual-majored in electrical engineering (EE) and music. He is currently a PhD candidate in EE, and master's degree candidate in performing arts technology, while his wife recently defended her dissertation in the Department of Atmospheric, Oceanic and Space Sciences. "That's the nice thing about the University of Michigan," says Adams, "there are a lot of programs in many fields. At any other school, one of us would have had to compromise."

Adams is advised by Professor Greg Wakefield, who played a large part in drawing Adams to U-M. "I heard good things about him," says Adams, "and knew that his research was interdisciplinary and broad." Adams' own research is concentrated on designing an architecture for a binaural display that naturally supports realistic acoustical environments. "When you put headphones on, it sounds as if you have headphones on," he explains. "The sound seems to come from your head rather than hearing drums from one place and guitars from another." He wants to process sound so when it

reaches a set of eardrums, the perception of spatial location seems correct.

This year, Adams received the Rackham PreDoc Fellowship. In April, he also received the EECS Graduate Student Instructor Award and a scholarship from the Armed Forces Communications and Electronics Association.

Adams is keeping all options open for the future. Whether he pursues research, teaching or a career in industry, his plans will continue to be interdisciplinary. "There aren't many schools that would have allowed me to combine my interests in engineering, music and sound as closely as Michigan has," said Adams.



Ruba Borno

PhD candidate in EE

Growing up as the daughter of two engineers, Ruba Borno always knew she wanted to be an engineer. Now, as a mentor to many, she enthusiastically tries to introduce more young people to the field of engineering. "It's nice to show people the multi-faceted world of engineering," she says. "I love being part of something that's greater than me alone."

Borno was born in Kuwait and raised in Charlotte, North Carolina. She received her bachelor's degree in electrical engineering from the University of North Carolina at Charlotte, and her master's degree from U-M in 2003. She is currently working toward her doctoral degree in electrical engineering under the guidance of faculty advisor Michel M. Maharbiz.

While still a master's student, she conducted research as a senior engineer at Mobius Microsystems in Detroit. The research at Mobius was directly applicable to a product that was entering the market, but her current Ph.D. work is quite different. "It's very fundamental," she says, "and introduces concepts that haven't been looked at by anyone." The idea, she explains, is to scavenge

energy from the evaporation that occurs naturally in plants and convert it to electrical power. Other energy scavenging techniques, such as solar, generate more power, but can't work in an environment that isn't sunny. "Ours can work even at nighttime," says Borno, "when evaporation still occurs." The research is still relatively new, she says, but it's groundbreaking. "We hope to be the first to use evaporation to generate electrical power."

Borno shares her love of engineering with future and current engineers alike as president of the student leadership council for the NSF ERC for Wireless Integrated MicroSystems (WIMS), and as a research mentor for engineering undergraduates. She counts mentoring as one of her most rewarding experiences. Currently, she works with an exceptional undergraduate student and enjoys seeing him so engaged in the work. "I get to see this student's eyes really light up," she says.

One of her main goals as president of the student leadership council has been to publicize research coming out of the WIMS center. Borno and the other council members have begun the effort by working with science writers at the university to generate press releases. "Our research is well respected within the academic community," Borno says, "but we hope to make it so the general public also recognizes Michigan and the WIMS center as premier developers of top tier research." So far, the council's efforts have landed WIMS research in media outlets such as Fortune and Business-Week.

While Borno expects to receive her Ph.D. in 2007, she hasn't finalized plans beyond that. She will definitely continue in research, and would consider teaching at the university level. One thing is certain - she will soon make a move to Northern California. Mobius is headquartered in Silicon Valley, and Borno recently married the company's CTO, Michael McCorquodale (see Tech Transfer update on page 8).



Michael Moffitt

PhD candidate in Computer Science and Engineering

Michael Moffitt began designing software systems as a high school student in Minnesota. As sole proprietor of his own company, he developed and sold a suite of scheduling tools to school districts throughout the country. "That was an extremely valuable experience," he says. "It's early opportunities like those that are essential for young

students to develop the ability to initiate and lead independent projects."

Moffitt's interest in software and scheduling hasn't waned in the years since he left Minnesota to begin his studies at the University of Michigan, where he was "drawn to the world-class caliber of its EECS department." After receiving a bachelor's degree in computer science in 2003, he earned dual master's degrees in Computer Science and Engineering and in Industrial Operations and Engineering. Currently, he is a Ph.D. candidate in Computer Science and Engineering.

In 2004, Moffitt began working alongside advisor Martha E. Pollack in the Artificial Intelligence Laboratory. "I joined her group after learning that her students were exploring topics related to scheduling," he says. They both share a common interest in constraint-based temporal reasoning, an area that focuses on complex interactions between the ordering and duration of activities and events. He recently received a Best Student Paper Award for work he presented at the 16th International Conference on Automated Planning & Scheduling, one of roughly a dozen papers that he has authored or co-authored in his discipline.

"I'm fortunate to have entered a field where there remains a lot of potential and room for growth, especially for interdisciplinary collaboration," says Moffitt. In fact, the problems he has recently tackled are the same ones that are drawing the attention of several prominent members of the community.

Moffitt expects teaching to be a strong component in future plans, and he credits Dr. Dave Chesney for fostering his passion for teaching. "He is a superb instructor with a strong interest in engineering education." Since his first foray into teaching - as an undergraduate teaching assistant for Dr. Chesney - Moffitt has become a U-M teaching fellow and has led a variety of teaching-related seminars and workshops.

An accomplished trombonist, Moffitt makes time for music, especially jazz and classical. "Music is an important part of my life," he says. Previously, he has performed with the Michigan Marching Band, Campus Symphony Orchestra, and a handful of other ensembles. Several times he even directed the U-M hockey band, but he won't be doing that again soon. "I've since decided to stick to playing music rather than directing it," he explains, "as I was partly responsible for the band receiving a penalty."

Jeff Siddiqui

From Frisbee Field to Cleanroom



An avid athlete, Jeff Siddiqui craves time outdoors. He needs fresh air and loves any athletic challenge. How then, does this graduate student find himself majoring in a field that will leave him locked in a dust-free cleanroom for hours on end? "There's a little discrepancy in my personality," he explains.

That discrepancy is what drives Siddiqui to be both an athlete and a scholar. He has a bachelor's degree from Cornell University, and is presently a doctoral candidate in electrical engineering. Early in his academic career, the Groton, MA native decided to turn in his tennis racket for a "real" summer job in college. The only one left was with a company that had a small cleanroom. At 19, he found himself designing prototypes, talking to vendors, and buying parts. "Nanofabrication facilities don't even have windows," said Siddiqui, "but the work is worth it." After college, he found himself very employable, and took a job with Raytheon Company as a research and development engineer. He has worked for them ever since. In fact, they provided his Master's degree fellowship here at Michigan.

With Professor Jamie Phillips as his advisor, Siddiqui is conducting research on a new zinc oxide semiconductor. "It's the same stuff life guards use on their nose, but we grow it in a polycrystalline form which can be used as a semiconductor," he explains. He's already published a paper and given a conference talk on the research.

Siddiqui plays just as hard as he works. He played competitive tennis from middle school through college and helped Cornell's club soccer team to a national top ten finish. Looking for a new challenge at U-M, he tried Ultimate Frisbee, a team sport that combines the endurance of soccer and the passing skills of football. He was hooked immediately. "It's a glorious sport," says Siddiqui, who is playing his second year with MagnUM, the U-M intercollegiate men's team. In 2006, the team was named runner-up in the Great Lakes Regional and later earned ninth place in Ultimate Frisbee's national championships.

Whether it's research or recreation, Siddiqui somehow carves out time for his passions, though it often requires some creative scheduling. During the spring Frisbee season, his team practices late at night several times each week and regularly travels to tournaments around the country on weekends.

Finding time for his class team to communicate with each other for a recent course, Global Product Development, was particularly challenging, as his teammates lived in Germany and Korea. In this course, teams of two students from each country work together via videoconferencing to create a product and develop a marketing scheme. "I think the technology for starting companies at this time in history is here in EECS," said Siddiqui. "I can think of 5-6 products that I could legitimately develop to start a business right now."

Fittingly, Siddiqui recently left Ann Arbor for a week-long back packing trip in the Canadian Rockies. In the near future he anticipates being back at Raytheon in Andover, MA. Whether he joins the Boston Marathon, or takes up sailing, he'll be in his element – at work in a nanofabrication facility.

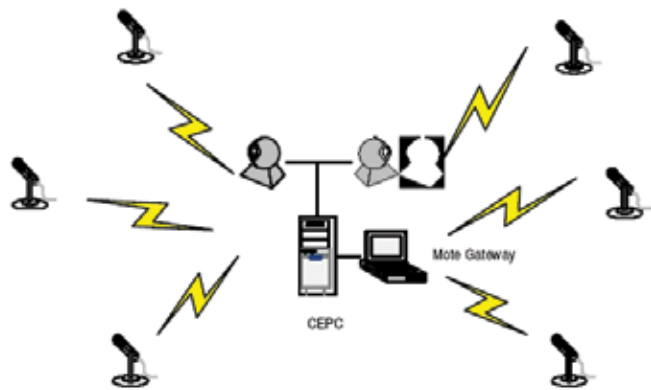
"I think the technology for starting companies is here in EECS."



STUDENT HONORS AND AWARDS

CSE graduate students win First IEEE Programming Challenge

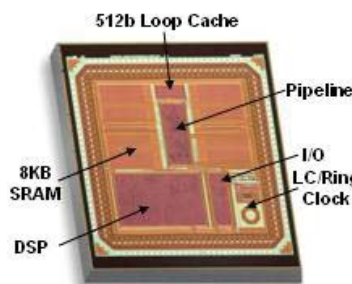
Kai-Hui Chang and **David Papa** took first prize (along with a team from Berkeley) in the first IEEE Programming Challenge at the 2006 International Workshop on Logic and Synthesis (IWLS). Participants were expected to implement logic optimization algorithms on the industrial electronic design automation (EDA) database OpenAccess. Major results of their work include a 100x runtime improvement over pre-existing software for logic simulation and equivalence checking, as well as new interfaces and metrics for incremental logic verification. The software will be included in the next release of the open-source Open Access (OA) Gear package from Cadence Berkeley Labs, and is described in the paper "Fast Simulation and Equivalence Checking Using OAGear," co-authored by their advisors Igor Markov and Valeria Bertacco.



CSE Students and Staff Take First Place in Windows for CE Shared Source Contest

CSE graduate students **Zhigang Chen** and **Xin Hu**, and CSE research programmer **Scott Gifford**, took first place in the newly-created Windows for CE Shared Source contest, a national competition sponsored by Microsoft and WindowsForDevices.com. Calling their project, "Smart Cameras for Smart Conference Rooms," the team used location sensing technology along with Berkeley motes (wireless sound sensors) to detect motion and sound in a large conference room. Cameras automatically follow what is happening in the meeting, and then stream the video over the internet.

2006 DAC/ISSCC Student Design Contest



Eric Marsman and **Robert M. Senger**, PhD students in electrical engineering, tied for second place in the Operational Category of the 2006 DAC/ISSCC Student Design Contest. Their project, "A DSP Enabled Microsystem for Cochlear Implants with Hybrid LC Clocking (SDC-ST1859)," is part of research conducted in the NSF ERC for Wireless Integrated Microsystems.

Intel Foundation Ph.D. Fellowship Awarded to Three Students

Ruba Borno, EE, works with Prof. Michel Maharbiz in the development of micro and nanotechnology mechanisms to address the demands for ultra low-power remote sensor networks.

Ashlesha Joshi, CSE, works with Prof. Peter Chen in the areas of operating systems, virtual machines, and security.

Jorge Pernillo, EE, works with Prof. Michael Flynn in the area of CMOS mixed-signal circuits for biochip applications.

AFCEA Fellowship

Norman H. Adams, PhD student in EE:Systems, received a 2006 AFCE (Armed Forces Communications and Electronics Association) Fellowship in support of his thesis, "The Binaural Display of Reverberant Space using MIMO State-Space Systems." His advisor is Prof. Greg Wakefield.

Lincoln Laboratory Fellowship

DaHan Liao, an EE PhD student in the Radiation Laboratory, works with Prof. Kamal Sarabandi on electromagnetic wave propagation problems.

MTT-S Undergrad/Pre-graduate Scholarship

Mustafa Rangwala, EE, received one of ten scholarships awarded nationally by the Microwave Theory and Techniques Society (MTT-S) for his project, "Developing a W-Band Radar for Helicopter Assisted Landing."

IEEE MTT-S Graduate Fellowship Award

Koen van Caekenberghe, EE, PhD student

ASEE Teaching Award



Jing Wang, PhD candidate in electrical engineering, received a 2006 Student Chapter of the American Society for Engineering Education (ASEE) Outstanding Student Instructor Award.

BEST PAPER AWARDS

Michael Moffitt, graduate student in CSE, received the Best Student Paper award at the 16th International Conference on Automated Planning & Scheduling (ICAPS 2006), for the paper, "Optimal Rectangle Packing: A Meta-CSP Approach," co-authored by Professor Martha Pollack.

Eric R. Tkaczyk, graduate student in EE, received a Best Student Paper Award at the 2006 Biomedical Optics Symposium (BiOS). His paper, "Increasing two-photon fluorescence signals by coherent control," was co-authored by Augustin Mignot, Jing Yong Ye, Istvan Majoros, James R. Baker, and Professor Theodore B. Norris.

Harmander Deogun, graduate student in EE, received a best paper award at the 2006 International Symposium on Quality Electronic Design. His paper, "Power Gating with Multiple Sleep Modes," is co-authored by EECS alumnus Kanak Agarwal (PhD EE '04), Professor Dennis Sylvester, and Kevin Nowka of IBM.

Christopher Deline, graduate student in EE, received a best paper award at the 2006 American Society for Engineering Education (ASEE) Annual Conference. His paper, "The Student Space Systems Fabrication Laboratory: An Approach to Space Systems Engineering Education," is co-authored by Thomas Liu, Rafael Ramos, Steven Sandoval, Ashley Smetana, and Professors Brian Gilchrist, Peter Washabaugh, and Nilton Renno.

Alumni Society President's Message

In James Surowiecki's book, *The Wisdom of Crowds*, he relates the story of an event that took place in London at the International Exhibition of 1894. At the exhibition, a contest was held where people were invited to guess the weight of an ox. Almost eight-hundred different people inspected the ox, reflected on its weight, and wrote their estimate down on slips of paper for submission in a prize drawing. The contestants ranged from experts (butchers and farmers) to average country and city people attending the fair. To look at an ox and guess its weight is one thing, but this contest had an added twist: the goal was to guess the weight of the ox after it had been "slaughtered and dressed." A different challenge entirely.

Being EECS graduates, we may see this as an exercise of information theory. We see signal, in the form of well-founded opinions, and noise, in the form of spurious or ill-informed estimates. We might imagine some statistical distribution around a mean and say, on average, that's the 'ox weight.'



Being Michigan EECS graduates, we'd be right on the money – for in fact the ox 'meat' weighed 1,198 pounds. The average guess was 1,197 pounds – more accurate than the guess of any one individual. (Being Michigan grads, we might also reflect that this anecdote is highly unscientific, and it may be no surprise that we had to dig back more than 100 years in history to find an event so astounding!)

Nevertheless, the truth is that there is 'wisdom' to be found in crowds. The two key ingredients are diversity, and independence. Think back to your time at Michigan and you'll likely recall a healthy dose of each to be found in the Michigan student body.

I propose we harness this latent wisdom and use it to serve ourselves and our fellow alumni. The EECS Alumni Society is on the lookout for exciting and novel ways to follow our charter of "enhancing the relationship between the EECS Department and the alumni, and promoting excellence of the Department and its graduates."

With that thought in mind, I invite all readers to submit one project, event, or initiative you would like the alumni society to pursue. We'll collect these thoughts and present the results in the next newsletter. The suggestions that seem to capture our collective voice will not only be pursued, but will be appropriately credited in the spring issue of this magazine.

So go ahead - think of your years at Michigan, the friends you had, the ones you stayed in contact with, and the ones you'd like to meet again. Channel this diverse crowd we call EECS alumni, and share your best idea.

You can send your submissions to:
Steve Schwartz
stevschw@umich.edu

Stay true and go blue!

A handwritten signature in black ink, appearing to read "Steve Schwartz".

Steve Schwartz
President
EECS Dept. Alumni Society



Mehdi Hatamian
Vice President of Engineering for
DSP Microelectronics Technology
Broadcom Corporation

B.S., EE, Sharif University of
Technology, Tehran, Iran
M.S. and Ph.D., EE, University of
Michigan

FOCUS ON OUR ALUMNI: DR. MEHDI HATAMIAN

At work as VP of Engineering for DSP Microelectronics Technology for Broadcom Corporation, Dr. Mehdi Hatamian oversees an office of highly select engineers that have a remarkable track record for generating patents, and sending their ideas into production. "My group does state-of-the-art research," said Hatamian, "which is risky, but we train ourselves to always consider how an idea can be ultimately developed into a product." Mehdi himself has 53 patents with several more pending, and enjoys seeing his ideas make it to the marketplace. One such idea developed at Broadcom was the efficient implementation of signal processing circuits for gigabit transceivers. Now standard in networking electronics throughout the world, Hatamian was part of the team at Broadcom that produced the very first gigabit transceiver to hit the market. He was elected IEEE Fellow for his contribution to the design of high-performance digital signal processors.

While still a student at U-M, Dr. Hatamian worked for NASA's Space Shuttle program, developing hardware and software designs to support in-flight biomedical experiments. Upon graduation, he joined Bell Laboratories, where he was a member of the Visual Communications Research and the VLSI Systems Research departments from 1982-1991. He left Bell Labs to co-found Silicon Design Experts, Inc. in 1991, where he learned every aspect of being an entrepreneur, especially how to turn your creative ideas into something that is marketable, how to work with customers, and the importance of honoring contracts.

With his next move to Broadcom, Mehdi fit right in with a company that has its hand in every aspect of communication. Broadcom is his priority and passion. "I officially started working at Broadcom on Aug. 15, 1996 at 8:15AM and since then every single minute of it has been filled with thrills, excitement, feelings of accomplishments, and the joy that comes from working with some of the brightest engineers in the world," says Mehdi. "Ten years ago it was a small group of relentless people with big dreams and extremely strong will and determination to be the best; now it is an extremely successful and reputable semiconductor company with nearly 5000 employees across the

world involved in every aspect of communication you can imagine and more. It is very likely that you have a few Broadcom chips in your household (in your cable modem, for example), your set-top box, in your cell phone, your laptop computer, your wireless network router, or in your iPod to mention a few," said Mehdi. "They are found in anything having to do with communicating electronically with people."

Some of these chips are found on the walls of Broadcom's co-founder, chairman, and CTO, Dr. Henry Samueli, in a gift artistically fashioned into a clock by Dr. Hatamian, who collects thousands of scrap wafers and chips from semiconductor fabrication facilities around the world to create unique designs of his own imagination. His next design will be found in the lobby of a new Broadcom facility in Irvine, CA.



This 400 lb. clock was created by Dr. Hatamian on the occasion of Henry Samueli's birthday. It is found in the Broadcom chairman's office.

Biomedical engineering remains a strong interest of Hatamian's from his graduate years. In fact, he recently began teaching himself microbiology and genomics. He is involved in the field of medicine through his non-technical involvement with medical companies, and is a board member of one such company, Panacea Pharmaceuticals. "This company has an extremely bright future, and has the chance of producing a cancer drug that is going to be truly effective, even revolutionary in what it can do," said Hatamian.

Mehdi has played a role in several startup companies, finding individuals with good ideas, and then helping turn those ideas into reality. He is particularly gratified when these companies begin to thrive and produce their own unique products, such as "smart test tubes," large-scale injection molding machinery, even the better dog leash.

When asked what advice he would offer today's students, Dr. Hatamian was clear. "Go after your dreams," he stressed. "Do something you love, so that it becomes part of your life." He has seen lots of people with good ideas, but noticed that many lack the drive and tenacity to turn their ideas into reality. "If you really want something, find a way to get it done," said Mehdi. "You must be sincere, believe in it, and not get disappointed if you don't get immediate results. But above all - never give up."

*"Go after your
dreams.*

Never give up."

1950s

Robert E. Frese (BSE, MSE, PhD, EE '51, '52, and



'59; also BSE, Math '51) is serving his second year on the board of directors of Sulphur Springs Valley Electric Cooperative, Inc. This utility, located in southeastern Arizona, provides residential, commercial, industrial and irrigation electricity throughout an area

larger than the states of Connecticut and Rhode Island combined. Dr. Frese retired in 1989 from Voice of America, where he served at the highest level of the federal Senior Executive Service as the Director of Engineering and Technical Operations. In this position he managed the planning, engineering and implementation of Voice of America's \$1.3 billion worldwide modernization program while maintaining current operations. Dr. Frese resides in Sierra Vista, Arizona.

George Friess (BSE and MSE, EE '57, '59) retired as Chairman of Shaw Electric Company in 2005, where he previously retired as an employee in 1995. He is a partner in both Shaw Construction and Management Co., and Shaw West Co. Shaw Electric has done the electrical wiring for many U-M projects, including the Undergraduate Library, Randall Physics Research, Weill School of Business Administration, as well as current construction projects. Friess is a former board member of the U-M Alumni Association and the CoE Alumni Society, and is helping to make the Class of '57 Eng. Scholarship Fund successful (in fact, they are on target to begin awarding scholarships by the 50th Reunion in 2007). He also serves as President of the Alumni Association of Lambda Chi Alpha Fraternity, U-M Chapter. George and his wife, Maiga ('59 Nursing), are blessed with two new grandsons, making a total of five grandchildren. All three of their children graduated from U-M, two with engineering degrees.

Zack W. Zordell (BSE, EE '50) and his wife Jean moved from Iowa to Hot Springs Village(HSV) Arkansas in 1998, primarily for warmer weather and an opportunity to play golf 12 months of the year. HSV is a gated community of 23,000 acres, 13,000 population, 9 golf courses, 700 duplicate bridge players, 8 lakes, and many trees. They enjoyed Michigania the last 3 summers - this past year with 2 children and 4 grandchildren. Zack is

the managing editor for the breakfast Lions club annual residence Guidebook, and reports, "we are enjoying our retirement at 80 years young."

Walter F. Wegst (BSE, EE '56) has recently been appointed to the Department of Energy's Site Specific Advisory Board for DOE/NV. This board is a citizen advisory board that provides community input to the DOE Environmental Management operations at the Nevada Test Site (NTS). The current projects of the Environmental Management section of DOE/NV include clean up of legacy wastes from the days of nuclear weapon testing, disposing of low level waste received from DOE sites across the country, and providing the necessary environmental reviews for any new projects that are started at the NTS.

1970s

Jim Benya (BSE EE, '73 and BS, CS '73) devoted his career to architectural lighting design, and was recently recognized as a Fellow of the International Association of Lighting Designers. His work is best known for creating appealing lighting environments that provide the minimum amount of light necessary with the lowest energy expenditure. While he took to the artistic side of lighting naturally, the Arab oil embargo and subsequent concerns over escalating energy use have made his technical and engineering approach highly marketable. After moving to San Francisco in 1984, he became an independent designer and consultant to architects, interior designers, and building owners, and expanded his work to incorporate more natural lighting with his own vision for an overall lighting scheme. Benya primarily designs lighting for commercial, institutional and industrial projects, although he also includes in his portfolio a number of residences ranging from Habitat for Humanity to well-known clients like Clint Eastwood and Larry Ellison. Benya sold his San Francisco based firm, Luminae, in 1995 so that he could take a more hands-on approach to lighting design. He has since designed the lighting for new buildings at Dartmouth College, MIT, and the University of Oregon, and has developed lighting standards for Yosemite National Park. See an article about Jim in the February 2006 issue of *Spectrum* at: <http://www.spectrum.ieee.org/feb06/2832>.



Photographer: David Stuart

1980s

Glenn N. Galler (BA, CCS '82) works for IBM in the Silicon Valley Laboratory in San Jose, CA. He is a Senior Programmer with primary responsibility for measuring code coverage in the testing of large database and transactional software products. In 1989, he completed his M.S. degree in Computer Engineering from Santa Clara University. In his 24 years with IBM, his work has focused on IBM's largest and most sophisticated customers. From 1992 through 1997, he had an international assignment in London, England, where he was the Program Manager for Beta Customers in Europe, the Middle East, and South Africa. He is the Campus Recruiting Manager for the University of Michigan, a position he's held for the past nine years, responsible for recruiting Bachelors and Masters candidates in the School of Engineering.



Bob Himlin
Photographer: Ken Jacques

Bob Himlin (BSE and MSE, EE '83 and '84) works for ViaSat, Inc. as a software specialist working on the broadband over satellite system offered in the U.S. by Wildblue Communications. For fun, he dabbles in a little professional musical theater, most recently appearing in Moonlight Stage Productions' "The Most Happy Fella" in Vista, CA. This summer he appeared in the role of Sky Masterson in "Guys and Dolls" at the outdoor amphitheater at Kit Carson Park in Escondido, CA. In addition, Bob and his daughter ran the Carlsbad 5000 this year. Billed as the World's fastest 5K, Bob finished in a respectable 21:19.

Eric Johnson (BSE EE '89) and his wife, Wendy Rosen, welcomed their second child, Molly Eva, on August 3, 2005. Molly joins her big brother Sam, 3. Eric works for Freescale Semiconductor as an electrical engineer. The family lives in Tempe, AZ.

Bill Mangione-Smith (BSE, EE '87; MSE and PhD, CSE '92) works for Intellectual Ventures doing Intellectual Property development and evaluation, particularly in the area of computer and communications technology.

Shrenik M. Mehta (MSE, CICE '84) is the director of Frontend Technologies and the OpenSPARC program. As Director for Frontend Technologies, he is responsible for the tools and methodology in the areas of Simulation/Hardware Acceleration, Formal Verification, Testability & Debug tools, Implementation and Verification IP used in the development and validation of ASICs, Processors and Systems. As OpenSPARC Program Director, Shrenik has been driving the details from the infancy of the project to the public release of the deliverables and looks forward to building a larger OpenSPARC community. During his 15+ years at Sun, Shrenik has been involved with SPARC and Java hardware designs. Prior to Sun, Shrenik worked as a Design Manager at Nexgen Microsystems, and for AMD. He holds eight U.S. patents and one patent in Taiwan. Shrenik enjoys outdoor activities, especially hiking, skiing, running, and camping, and is currently spending his spare time learning piano.

John C. Phillips (BSE, EE '84) has been named managing principal of Fish & Richardson's San Diego office. A member of Fish & Richardson since 1994, Phillips' practice emphasizes intellectual property counseling and patent prosecution with special expertise in Internet-related technologies, computer software, communications and electronics.



John C. Phillips

Claudio Spiguel (MSE and PhD, CCS '80 and '82) has retired after many years as an Executive VP of Zeneca Pharmaceuticals Group, with responsibility for the Global Information Management of the company. Prior to that, he was VP of Commercial Information Management for AstraZeneca, Inc. He was also Executive in Residence and Professor of MIS at the Alfred Lerner College of Business and Economics of the University of Delaware. He tells us, "These days my wife Cristina (U-M PhD, Natural Resources '90) and I spend about half of our year in the U.S., with three of our children who are professionally established there: Andre (U-M BS '96, U of Chicago MD '06) who lives in Chicago, Ana Claudia (U-M BA '97, Penn Law JD '03), who lives in Miami, and Artur (U-M BS '99) who lives in New York. As you can see, all three are also Wolverines. The other half of our year we spend in our native Brazil, where my main hobby is horseback riding through the coffee plantations around the small country town where our families originated." He is seen riding his horse Sugar.



Claudio Spiguel

1990s

Taneal Bhandari (BS, CS '99) joined Compuware Corporation after graduation, where his responsibilities included QA testing, web programming/design, technical support, shell script programming, configuring servers, and training incoming team members. He started a web development company, SATaB Designs, while also working for Compuware Corporation for two and a half years before devoting himself full time to his company. After finishing up a web project for the U-M School of Nursing, and after his wife graduated from U-M Medical School, they moved to Atlanta, GA, in May 2004. Taneal has started several new companies since his move to Atlanta. One of them is Sotari LLC, which is primarily a real estate investment company. The other is a company that he started with his real-estate investor friend, called Owners Financing Real Estate LLC (OFRE). Taneal is responsible for everything IT related. OFRE.com is a listing service for customers who wish to hold the mortgage or lease with the option to buy. Their plan is to make www.ofre.com the definitive online repository for owner financed real estate. They're aiming to launch their company soon.

Eric Durant (MS and PhD, EE '99 and '02) is the Program Director of the Computer Engineering program at Milwaukee School of Engineering, where he has been an Assistant Professor in the EECS Department since March, 2002.

Jason Heltzer (BS, CS '96) is a Principal with the venture capital firm OCA Ventures in Chicago. Jason aspires to invest in a startup founded by fellow EECS graduates, so send him your business plans! Jason and his wife Wendy are proud parents of their son Gideon, who was born in December 2005.

Whitney Kew (MSE, EE '94) bought a townhouse and moved back to his hometown of San Diego, CA, where he works as a Senior Software Engineer for Rain Bird Corporation writing central control software. He plays tennis, and is an electronic musician. Kew has composed 6 songs for what will be his first CD, which can be heard online at <http://home.san.rr.com/kew/>, as well as two Depeche Mode covers that you can listen to at <http://www.myspace.com/kewmusic>.

Allen J. Oh (BSE EE '93) and his wife Tiffany are thrilled to announce the birth of their daughter, Mikyla ("Kylie") Renée Oh, on February 12, 2006, born in Robbinsdale, Minnesota. Kylie weighed 5 lbs., 13 oz. and was 20 inches long. She joins



Mikyla and Madison Oh

her big sister, Madison, who recently celebrated her fourth birthday.

Andrea E. Taylor (BS, CS '94) is an IT Software Quality Assurance Specialist - working in the Information Technology organization for CNA Insurance, a major insurance company in downtown Chicago. She bought a town-

house almost 2 years ago and currently lives in Hoffman Estates, Illinois (part of Northwest suburbs of Chicago).

Jimmy Pangestoe (BS, CS '99) works for Pfizer Inc. within its Data Warehouse/Business Intelligence group in San Diego. He is the "Testing Team Lead," and makes sure that all testing processes and works are successfully carried out for new systems or requests before they get implemented in production.



Eric Durant

Carl T. Wahl (BSE, CE '99) is in his third year of service with the United States Peace Corps in the Republic of Zambia. He served from April 2004 to December 2005 in Kelongwa Village, Kasempa District, Northwestern Province as a Community Health Extension volunteer. From January to April 2005, he was the technical coordinator for the training of the 2006 class of Health volunteers. Since April, he has served as Volunteer Leader for Central and Copperbelt provinces, with a base of operations in Serenje. Carl welcomes any questions about the Peace Corps, or Zambia, and says: Tuyenga BLUE! (Kikaonde) Tuleya BLUE! (iChiBemba) GO BLUE! (ichiZungu/English)



Whitney Kew

2000s

Michael Cho is currently at UC Berkeley conducting research in carbon nanotubes fabrication. He is also working on an internet project he hopes to turn into a startup, that he calls a cross between Facebook + YouTube. It's a place where the school population can share videos (eg. school projects, student films, student group performances, protests, etc.). You can see what he's doing at www.umichtube.com.

Dhruv Gupta (BSE, CS '03) is an associate at PricewaterhouseCoopers in Cincinnati, OH.



Jason Hemak

Jason Hemak (BSE, CS '04) moved to Cincinnati, OH after graduation to take a role with GE - Aviation in the Information Management Leadership Program. For the last six months, he has been living in Brussels, Belgium working for GE Corporate. He will be returning to Cincinnati soon to start a new IT project management role within Aviation's engineering division.

Hyun-Jeong Kim (BS, CS '03) works for LGE as a software engineer in Korea developing cell phones. She recently was able to return to visit North Campus and Central Campus. She recalled, "I was so happy at that time. Go blue!"

Julie Anne Mayfield (BS, CS '01) left research and development at Dreamworks Animation to pursue effects animation and development. *Over the Hedge* (May 2006) was her first movie credited in effects, and she is working on her next movie, *Flushed Away*, to be released November 2006. She was recently married in Malibu to Thierry Brame, and says, "*Flushed Away* is my last movie as Julie Anne Mayfield, with many more coming credited as Julie Anne Brame."



Jeffrey Schox

Jeffrey Schox (MSE, EE:Systems '04) is a Registered Patent Attorney and the founding member of Schox PLC, a small patent law firm devoted to inventors and entrepreneurs. Drawing on his experience of over ten years in the patent law field and the filing of over 150 patent applications, Jeffrey strategically advises his clients and advances their patent portfolios. Jeffrey also teaches the course "Patent Law and Strategy" at Stanford University.



Erin Wakefield, Valdehee Padgaonkar, and Chris Hopkins

Erin Wakefield (BSE, CE '05) is currently living in Hillsboro, OR, and has been working for Intel for over a year as a Validation Engineer in Post-Silicon debug. She is very active in volunteering with animal rescue groups, snowboarding, and does pilates and yoga. Erin returned to Ann Arbor to recruit last February and will continue to do so in the future. She is pictured with fellow alum Valdehee Padgaonkar, and friend Chris Hopkins on a visit to Seattle.

Michael Xia (BSE, CE '05) works for Accenture as a reporting analyst, and lives in the DC area.

IN MEMORIAM

Class of 1930-39

George W. Billn, '32, Apr. 11, 2005
Philip Nicholas Vassil, '34, Jan. 5, 2002
Cheuk Wa Leung, '36 and '37, Oct. 19, 2005
Harlan B. Ritze, '37, Jun. 16, 2001
Bernard M. Gaines, '38, Apr. 19, 2005

Class of 1940-49

E. Guerrant Menard, '40, Feb. 19, 2006
Arthur C. Rissberger, Jr., '40, Dec. 25, 2005
William J. Tull, '42, Sep. 27, 2005
Grant D. Whipple, '42, May 11, 2006
Owen Adolph Lentz, '43, Oct. 1, 2005
Bruce Smith Stuart, '43, May 18, 2006
James M. Lafferty, '46, Mar. 26, 2006
Joseph C. Lando, '46, Jun. 24, 2005
William H. Billington, '48, Dec. 30, 2005
Marvin G. Schaeffer, '46 and '48, May 20, 2006
Thomas R. Corn, '49, May 26, 2002
Byron Lee Mays, '49, Jul. 21, 2006
Sidney W. Silverman, '49, May 3, 2005

Class of 1950-59

Lyle G. Thompson, '47 and '50, Feb. 24, 2006
Lloyd E. Weberg, '50, Nov. 22, 2005
Robert N. Clark, '50 and '51, Jan. 27, 2006
Wendell L. Erickson, '51, Oct. 18, 2005
Robert W. Olthuis, '47 and '51, May 15, 2006
Leon Sperling, '56, Aug. 28, 2005
Otha L. Snubblefield, '57, Nov. 26, 2005
James K. Coeling, '58, Mar. 6, 2006
Gary R. Miner, '59, Jun. 2, 2006

Class of 1960-69

William Alan White, '63, Aug. 26, 2005
Robert N. Lambeck, '68, Jan. 7, 2004
Jay Myron Kaplan, '69, Mar. 22, 2005

Class of 1970-79

Kenneth A. Werner, '72, Jan. 13, 2005
Mark A. Myers, '71 and '74, Dec. 14, 2005

Class of 1980-89

Jong W. Lee, '86, Sep. 6, 2004

Class of 1990-00

Thomas George Xydis, '87 and '92, Aug. 9, 2006

Class of 2000-

Stephen T. Phillips, '03, Dec. 26, 2005

A TRIBUTE TO BERNARD A. GALLER (1928 - 2006)

by George B. Leeman[†]

On September 4, 2006, the University of Michigan lost one of its great stars with the death of Bernard Galler.

Bernie was a giant in the computer science field. He was an architect of the Michigan Algorithm Decoder (MAD) language which played a seminal role in the history of computer languages. He made penetrating contributions to the theory of algorithms. In the classic *The Art of Computer Programming, Volume 1, Fundamental Algorithms*, author Donald Knuth refers to the Fischer-Galler equivalence relation algorithm as “elegant.” He was President of the Association for Computing Machinery (ACM), President of the Software Patent Institute (SPI), and the founding editor of the journal *The Annals of the History of Computing*.

During my graduate work at U-M, I took Bernie’s Math/CS 473 course, which had legendary status. His lectures were polished and always well-attended. At a time when everyone else was writing on blackboards, he used prepared transparencies and covered material at blinding speed. The course explored intersections of mathematics with computer science and gave exposure to several languages, including Fortran, Assembler, and even Snobol. For me this wonderful course single-handedly began a lifetime interest in computer science.

After leaving Michigan, I began a 33-year career at the IBM Thomas J. Watson Research Center. For fifteen years I made regular trips to Ann Arbor to talk to students and faculty in Computer Science & Engineering and Mathematics about available work at IBM. Bernie would always recommend ahead of time students and faculty I should see. He would provide detailed comments to substantiate the excellence of a candidate’s technical work. He knew many people in industry, and his favorite technique was to send an e-mail praising a student to me, someone at General Electric, and someone at General Motors simultaneously. The three competitors acted quickly, to the student’s great benefit. Thanks to the cooperation of Bernie and other faculty, the recruiting efforts led to offers of summer and permanent work in IBM Research and Development labs to more than 120 U-M students and faculty members.

Bernie was a man with many varied interests. He was an accomplished violinist and co-founded the Ypsilanti Youth Orchestra. He was also active in Rotary International.

Bernard Galler possessed many qualities, including technical brilliance, leadership, drive, and personal warmth. He will be missed by all, and many of us feel privileged to have been touched by his mystique.

Bernard A. Galler

B.S., Math, U. Chicago, 1947
B.S., M.S., Math, UCLA, 1949
PhD, Math, U. Chicago, 1955



As a pioneer in the field of computer science, Professor Galler helped shape the discipline at the University of Michigan. In the early 1960’s, he was active in the development of the new Communication Sciences Program, and in 1966, he became associate director of the Computing Center. His association with the Computing Center continued through 1991, during a period of tremendous growth and change in the areas of computer science and computing services. He became a charter member of the new Department of Computer and Communication Sciences (CCS) in 1966, and served as chair of the department from 1973-75.

The CCS Department was one of the first of its kind in the country, and Professor Galler was influential in the development of the software and mathematics curricula for computer science. He participated in significant computing developments at U-M, including development of the Michigan Algorithm Decoder (MAD) that was used for several years by the University of Michigan and other universities, and Computer Registration Involving Student Participation (CRISP), which allowed students to register for courses without waiting in long lines. Students registered with CRISP for more than fifteen years.

Professor Galler served as an officer of the Association for Computing Machinery (ACM) from its earliest days, including the presidency from 1968-70. In 1980, the ACM awarded him its Distinguished Service Award for his contributions to the field.

He was a natural historian, and ensured the history of computer science was recorded and remembered by founding the *Annals of the History of Computing* in 1979. Prof. Galler retired from the University of Michigan in 1994. He left his personal papers with the U-M Bentley Historical Library.

[†]Dr. Leeman received a Ph.D. in mathematics from the University of Michigan in 1972.

Thank You

THANKS TO OUR DONORS

We gratefully thank the following companies and individuals for their support of the Department through gifts of money and equipment during the past year. These gifts have furthered the educational mission of the Department in a variety of ways, including: scholarships, fellowships, and awards to students; outstanding speakers featured at a variety of seminar series; faculty research; donated equipment and software that has been used for courses and research; outreach to the K-12 community, and our new CSE building and the Michigan Nanofabrication Facility expansion.

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Focus on our Industrial Friends: Advanced Micro Devices Supports VLSI at Michigan

Advanced Micro Devices (AMD) has added some excitement among students of the VLSI program at U-M. Students of VLSI Design I and VLSI Design II now compete for prize money thanks to the support of AMD, while research hums thanks to a VLSI server pool that is accommodating 60 new Opteron 285 dual core processors.

1st AMD/Michigan Student Design Contest Initiated

AMD established the AMD/Michigan Student Design Contest this past year to foster competition and reward excellence among students in the undergraduate and graduate VLSI Design courses. First place in VLSI Design I, taught by Prof. Dennis Sylvester, went to a team of four undergraduate computer engineering majors: Thomas Richards, Malav Parikh, Aulihan Teng, and David Fick. Their project, "16-bit ray tracing processor," described a 5-stage pipeline microprocessor running at 348MHz in 0.25µm CMOS, and included a Wallace Tree fixed point multiplier, Kogge-Stone adder, and banked memories. Teng, who became a graduate student at U-M this Fall, said "It was an amazing course that gave us a chance to create everything from scratch. The contest helped push us to our full potential in creating a processor that we are all extremely proud of."

AMD engineers Srikanth Balaji and Keith Burwinkel were present to help judge the final projects. Balaji, who took the course himself as a student just four years ago, said, "The level of complexity and material coming out of the projects has considerably increased over the past few years. The students have presented outstanding concepts and ideas and are pushing the limits of innovation with the resources they have."

Burwinkel praised the work of all competitors, and added, "They all did an amazing job and the level of work completed was not only tremendous, but showed the level of dedication and effort that companies like AMD are looking for. These students set a high bar, but the caliber of students coming out of Michigan will only ensure the quality of projects in the future."

First place in VLSI Design II, taught by Prof. David Blaauw, went to four electrical engineering graduate students: Beth Isaksen, Phil Nevius, Sanjay Newton, and Vashist Vasanthakumar. Their project, "A Dual-Core Alpha Processor with Core-Level Voltage and Frequency Scaling," is a dual-core



From left: Thomas Richards, Malav Parikh, Aulihan Teng, David Fick

processor using a subset of the Alpha ISA with a shared level-two cache (using the MESI protocol) and core-level voltage and frequency scaling. A close second place went to electrical engineering graduate students Urmila Kamat and Kevin Klein, and undergraduate student Colin Sprinkle, for their project, "A Low Power Adiabatic MIPS Processor."

AMD engineers Anwar Kashem and Ryan Helfand assisted in the judging. The second place team was not typical, having only three members, with one being an undergraduate student. Fellow teammate Kamat praised Sprinkle's contribution, calling him the "undeclared team leader, whose knowledge of VLSI design and programming was one of the main reasons behind the success of our project." While the project was challenging, Kamat added, "the contest provided the additional impetus to perform better."

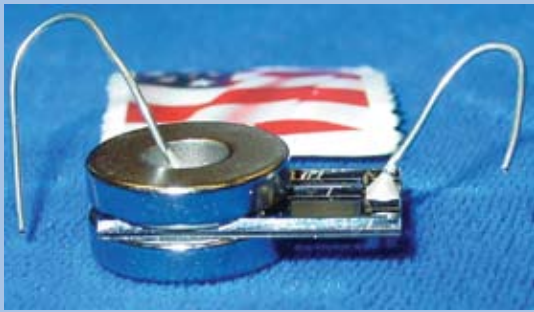
AMD Provides Computing Boost

AMD has given an additional boost to the VLSI program through its recent donation of \$30K and 60 Opteron 285 dual core processors, which are supported by 10 servers, to create a first-class VLSI server pool to support VLSI design. Prof. Blaauw stated, "The servers are great! The students tell us that we can do simulations in 30 minutes that used to take nearly a day. One team has already used them to tape out the first chip."

"AMD expects that this partnership with Michigan VLSI will continue long into the future and strengthen every year," said Balaji. "Go Blue!"

"These students set a high bar."





**Tiny wireless Geiger counter
detects radiation**

A postage stamp-sized Geiger counter placed unobtrusively in stadiums, subways, malls and other large public spaces could detect radiation and determine whether it's a harmful source, like a dirty bomb. The hope is the small device will eventually replace the bulky, individually operated units now in use.

Professor Yogesh Gianchandani is leading the effort to develop the device. "The tiny Geiger counter is wireless," said Gianchandani, "so that many can be used in a network to blanket large spaces and communicate information to a central monitoring source."

Just a few years ago, Gianchandani's group made a silicon micromachined, wristwatch-sized version of the device that helped to differentiate between harmful and non-harmful sources of radiation. In a collaboration with Professor Ranjit Ghapurey (now at University of Texas, Austin) they developed a breakthrough technique for wireless transmissions from the device. More recently, permanent magnets were incorporated onto a preliminary version of the device, which increased the signal strength so that it's well within the range for broadband wireless communication. "We can cover a wide area with these small devices so you don't have to have one person going around scanning everything," said Christine Eun, a graduate student currently working on the project.

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