<table>
<thead>
<tr>
<th>Table Of Contents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome</td>
<td>1</td>
</tr>
<tr>
<td>News</td>
<td>2</td>
</tr>
<tr>
<td>Curriculum Areas</td>
<td>10</td>
</tr>
<tr>
<td>Project Awards</td>
<td>14</td>
</tr>
<tr>
<td>Financial Information</td>
<td>15</td>
</tr>
<tr>
<td>Student News</td>
<td>16</td>
</tr>
<tr>
<td>Selected Undergraduate Research Projects</td>
<td>18</td>
</tr>
<tr>
<td>Undergraduate Scholarships</td>
<td>19</td>
</tr>
<tr>
<td>Degree Programs</td>
<td>20</td>
</tr>
<tr>
<td>Fellowships</td>
<td>22</td>
</tr>
<tr>
<td>Ph.D. and M.S. Graduates</td>
<td>23</td>
</tr>
<tr>
<td>NAE Members and IEEE Fellows</td>
<td>26</td>
</tr>
<tr>
<td>Guest Speakers</td>
<td>27</td>
</tr>
<tr>
<td>New Faculty</td>
<td>28</td>
</tr>
<tr>
<td>Faculty</td>
<td>29</td>
</tr>
<tr>
<td>College of Engineering Awards</td>
<td>45</td>
</tr>
<tr>
<td>Emeritus</td>
<td>46</td>
</tr>
<tr>
<td>Researchers</td>
<td>47</td>
</tr>
<tr>
<td>Staff</td>
<td>50</td>
</tr>
<tr>
<td>Industrial Board of Advisors</td>
<td>51</td>
</tr>
<tr>
<td>In Remembrance</td>
<td>52</td>
</tr>
</tbody>
</table>
With this report, we would like to share with you the activities and accomplishments of the faculty, researchers, students and staff in the Department of Electrical and Computer Engineering during the last two years. While we continued to be a leader in research and education, we have also made strides in diversity and outreach, recruited excellent faculty including an Ohio Eminent Scholar and developed our undergraduate research activities.

Among the highlights of ECE’s accomplishments is that the graduate program was ranked 19th in the nation by the most recent US News and World Report.

The Department offers an undergraduate degree in Electrical and Computer Engineering (B.S.E.C.E.), with ABET accredited programs in Computer Engineering and Electrical Engineering. The undergraduate enrollment currently is about 800 students. The graduate program offers M.S. and Ph.D. degrees, with a diverse student body of about 300 students. We granted a record number of 38 Ph.D. degrees in 2005-06 and 86 MS degrees in 2004-05. 186 BSECE degrees were granted in 2005-06.

Like many other institutions, we are facing challenges in a changing world as a result of globalization. We continue to react to these challenges by redesigning our M.S. and Ph.D. programs, improving our undergraduate programs and capstone design courses, and proactively recruiting excellent and diverse students while maintaining our high standards and selectivity. In 2006, ECE was named the best minority program in the College of Engineering. Our B.S. and M.S. graduates are recruited by major companies as well as top graduate programs. Many of our Ph.D. graduates are faculty members in reputable electrical and computer engineering programs around the world. We continue to enhance and update our physical facilities and the learning and research environment.

The Department’s 49 faculty members are active in the areas of Communication, Signal Processing, Real-time Computer Systems, Computer Networks, Computer Vision, Control Systems, Electro-Mechanical Systems, Electronic Materials and Devices, High Performance Networking and Computing, Intelligent Transportation, Mixed-Signal VLSI Circuit Design, Power Engineering, Wireless Communication and Electromagnetics. Our annual research funding from external and internal sources is about $16 million. Seventeen of the 49 active faculty are IEEE fellows and one is a member of the NAE.

Many members of our faculty are active and prominent members of their profession and serve on editorial boards of professional journals, organizational committees of major conferences and in leadership roles in professional societies. Four of our faculty have won the prestigious NSF CAREER award since 2003.

Several of our faculty also serve in leadership positions at Ohio State. These include Stan Ahalt, Director of the Ohio Supercomputer Center, Steve Ringel, Director of the Institute for Materials Research and John Volakis, Director of the Electroscience Laboratory.

I hope you will enjoy reading about specific accomplishments as you browse through the pages of this report. I invite you to also visit our web pages at www.ece.osu.edu.

Füsun Özgüner
Professor and Interim Chair
Desert Buckeyes Team Ends Race in Top 10

Autonomous vehicle shows promise in Mojave Desert competition

Sure, there was a starting gate. And a booming announcer. Even a cheering crowd. But this competition sought the crossing of the finish line by a driverless vehicle; one that could navigate itself through treacherous terrain in the Mojave Desert — and leave transportation as we know it in the dust. The race, called the Grand Challenge, was held in October and sponsored by the U.S. Department of Defense. In the end, the College of Engineering’s Desert Buckeyes team drove off with an impressive 10th-place finish.

The Defense Advanced Research Project Agency offered a $2 million prize to the team whose autonomous vehicle successfully navigated the entire 131.6-mile course the fastest within the 10-hour timeframe. The Desert Buckeyes vehicle, called the ION for Intelligent Off-Road Navigator, traveled 29 miles on the Mojave Desert course near Primm, Nev. It negotiated obstacles including a 900-foot climb over a five-mile stretch near the Lucy Gray Mountain Ridge and a series of narrow roads and sharp turns along Roach Dry Lake.

Without having a chance as yet to retrieve the data from the ION, the Desert Buckeyes team did not know what caused it to stop. But members still were pleased with its progress.

“We did better than Princeton, Cornell, Caltech and UCLA. By and large it wasn’t a bad showing,” said Ümit Özgüner, professor of electrical and computer engineering and Desert Buckeyes team leader.

“People understand that Ohio State’s College of Engineering is a good place to go as far as either getting an education in this area or having research done in this direction,” Özgüner said. “So from the prospective student’s or prospective sponsor’s viewpoint, I think we did well.”

The base vehicle for the Desert Buckeyes ION was a Polaris Ranger 6X6 utility vehicle equipped with all-wheel drive and drive-by-wire capability to control the steering, throttle and brakes. The team was comprised of approximately 30 Ohio State engineering students. Various sensors, including multiple digital color cameras, laser remote sensing, sonar, radar, global positioning systems and inertial navigation units were mounted on the vehicle. A new radar system was developed at the college’s Electro-Science Lab. The team’s software ran on multiple computers and the vision system was provided by a group from the University of Karlsruhe in Germany.

The Grand Challenge is a field test of robotic ground vehicles for the purpose of advancing autonomous vehicle technology that could one day save lives on the battlefield. Technology developed for the DARPA Challenge has applications for military operations, search and rescue efforts and even automotive use.

At 4:30 a.m. Saturday, Oct. 8, the teams received their “Route Data Definition Files” — that is, the course parameters — in anticipation of the 6:30 a.m. start. Speed limits on the course ranged from 5 to 45 miles per hour, fighting to handle obstacles such as Jean Lake, Las Vegas Boulevard, three tunnels and Beer Bottle Pass, the toughest challenge of the race with its 1.5-mile mountainous road that could send a wayward autonomous vehicle plunging 100 feet over a sheer cliff to the canyon floor below. The route traversed narrow desert roads, dry lake beds and treacherous mountain passes.

This year’s race with its $2 million prize was won by the Stanford Racing Team, whose vehicle completed the course in six hours, 53 minutes and 58 seconds. The 23 vehicles that qualified for the final race were among 195 teams from 36 states and four foreign countries that filed applications to compete.

“It was extremely nerve-wracking, exciting, frustrating, biting your nails here watching a chart,” Özgüner said. “We were feeling kind of like we were attending a sporting event, but we were just looking at a bar chart. I’ve never been as excited watching a bar chart before.”

In addition to Stanford, three other autonomous vehicles completed the course within the 10-hour time limit: the Gray Insurance Co. team as well as Red Team and Red Team Too, two entries from Carnegie Mellon University and an alliance of individuals, non-profits and for-profits that included students, volunteers and professionals from sponsors such as Boeing Co., Science Applications International Corp. and Caterpillar.

Autumn 2005
Program is Nationally Ranked in Top 20

Ohio State’s Dept. of Electrical and Computer Engineering has jumped to the 19th position in the latest U.S. News & World Report’s rankings of the nation’s top professional Electrical/Electronic/Communications schools, as reported in the 2007 edition of America’s Best Graduate Schools. The department’s advance was five positions over last year’s ranking of 24th (and from 26th to 24th in the previous rankings) and is the result of assessments by department heads in each specialty area nationally. Rankings were out of 168 schools with Electrical/Electronic/Communications engineering programs.

Software System Views Vital Signs Remotely During Surgery

A software system developed by electrical and computer engineering professor Furrukh Khan and a collaborative team of doctors, nurses and staff is gaining international attention through two major case studies and numerous magazine articles. The collaborative team was co-directed by Professor Khan and Dr. Michael Howie, M.D., chairman of the Department of Anesthesiology. Together, they developed OR-Eye, a software system that tracks patient vital signs, medication and status. This software eases the responsibilities of anesthesiologists during surgery and helps The Ohio State University Medical Center accomplish its three-part mission of patient care, education and research. A team of about ten ECE students joined Professor Khan, donning scrubs and spending hours watching anesthesiologists in surgeries at Ohio State Medical Center. The interdisciplinary group of engineers and physicians was recognized by the Columbus Technology Council as an “Outstanding Technology Team,” making them finalists in the council’s TopCAT Awards.

New EBL Available for Business

A new multi-million dollar Nanoscale Patterning Laboratory (http://www.ece.osu.edu/~berger/ebbl.html), led by Professor Paul Berger, opened for general business in January 2006, thanks to OBOR Hayes Investment Funding and significant support by the OSU Office of Research, College of Engineering and College of Math and Physical Sciences. To oversee the daily operation of the new Leica EBPG-5000 electron beam lithography (EBL) system, Ms. Aimee Bross was hired from Triquint’s EBL group, as a Senior Research Associate. Whether nanometer scale direct write patterning, high resolution photomasks, or master molds for nanoimprint lithography is needed, this new facility will meet those needs. It has already demonstrated sub-35 nanometer wide metal lines with better yet to come! The forward thinking that brought this shared-user tool to OSU, and qualified staffing will propel the State of Ohio nanotechnology research community.

ECE Honored for Minority Program

We are happy to announce that ECE won the Best Minority Engineering Program Award this year. Many faculty and staff contributed to the success of our program by mentoring, recruiting and helping with retention of minority students and promoting diversity at all levels. Special thanks go to Professor Jose Cruz for leading the minority program activities in the department.
Solar Cell Research Reaches Space Station

Three years ago, electrical and computer engineering and physics professor Steven Ringel and his team of graduate students readied solar cells that were to be installed onto the International Space Station and monitored. However, the plan was delayed after the Columbia disaster and other factors. The experiment finally came through with the space shuttle Discovery’s July 26-Aug. 9 mission. Ringel’s goal was to create a lightweight, highly efficient energy source that could provide alternatives to the arrays now powering various space missions. His Electronic Materials and Devices Laboratory here at Ohio State grew crystalline cells from gallium arsenide, a compound semiconductor, and related materials and grafted them onto a silicon substrate. MIT professor Eugene Fitzgerald engineered a silicon-germanium alloy that bridged the cells and substrate. Finally, David Wilt, a research scientist at NASA Glenn Research Center in Cleveland collaborated as well, constructing Ringel’s solar cells onto honeycomb platforms. Astronaut Soichi Noguchi then mounted the cells onto the outside of the International Space Station where they will remain for a year. Ringel is now receiving data from the Space Station via wireless listening posts. Once the cells have returned to his lab, he will continue to test the data and their condition. Professor Ringel hopes this experiment will help him develop self-powered sensors and systems, and eventually “electric grid power alternatives.”

Research group completes deployment of hardware for NASA aircraft

Professor Joel Johnson’s research group has completed deployment of hardware they designed and built for NASA’s WB-57 aircraft. The system is a digital backend for improving the radio frequency interference rejection capabilities of microwave radiometers. A good data set was retrieved and is in the process of being analyzed. More information can be found about the aircraft on NASA’s web site at http://jsc-aircraft-ops.jsc.nasa.gov/wb57/.

New Algorithm Increases Accuracy

Professor Aleix Martinez and doctoral student Manli Zhu, working with sponsorship of the National Institutes of Health, have developed a test which rates how well a particular pattern recognition algorithm will work for a given application. They discovered what happens to scientific data when researchers use a less-than-ideal algorithm: They don’t necessarily get the wrong answer, but they do get unnecessary information along with the answer, which adds to the problem. Using Martinez’ algorithm, researchers can run a fast and easy test to find out in advance which algorithms are best in a particular circumstance. This work may impact research in areas as diverse as genetics, economics, climate modeling, and neuroscience.
Stealth radar sees through objects undetected

ElectroScience Engineers have invented a radar system that is virtually undetectable because its signal resembles random noise. The radar could have applications in law enforcement, the military and disaster rescue.

Eric Walton, senior research scientist in Ohio State’s ElectroScience Laboratory, said that with further development the technology could even be used for medical imaging.

He explained why using random noise makes the radar system invisible.

“Almost all radio receivers in the world are designed to eliminate random noise so that they can clearly receive the signal they’re looking for,” Walton said. “Radio receivers could search for this radar signal and they wouldn’t find it. It also won’t interfere with TV, radio or other communication signals.”

The radar scatters a very low-intensity signal across a wide range of frequencies, so a TV or radio tuned to any one frequency would interpret the radar signal as a very weak form of static.

“It doesn’t interfere because it has a bandwidth that is thousands of times broader than the signals it might otherwise interfere with,” Walton said.

Like traditional radar, the “noise” radar detects objects by bouncing a radio signal off them and detecting the rebound. The hardware isn’t expensive, either; altogether, the components cost less than $100. The difference is that the noise radar generates a signal that resembles random noise, and a computer calculates very small differences in the return signal. The calculations happen billions of times every second and the pattern of the signal changes constantly. A receiver couldn’t detect the signal unless it knew exactly what random pattern was being used.

The radar can be tuned to penetrate solid walls - just like the waves that transmit radio and TV signals - so the military could spot enemy soldiers inside a building without the radar signal being detected, Walton said. Traffic police could measure vehicle speed without setting off drivers’ radar detectors. Autonomous vehicles could tell whether a bush conceals a more dangerous obstacle, like a tree stump or a gulley.

The radar is inherently able to distinguish between many types of targets because of its ultra-wide-band characteristics. “Unfortunately, there are thousands of everyday objects that look like humans on radar - even chairs and filing cabinets,” he said. So the shape of a radar image alone can’t be used to identify a human. “What tends to give a human away is that he moves. He breathes, his heart beats, his body makes unintended motions.”

These tiny motions could be used to locate disaster survivors who were pinned under rubble. Other radar systems can’t do that because they are too far-sighted - they can’t see people who are buried only a few yards away. Walton said that the noise radar is inherently able to see objects that are nearby.

“It can see things that are only a couple of inches away with as much clarity as it can see things on the surface of Mars,” he added.

That means that with further development, the radar might image tumors, blood clots and foreign objects in the body. It could even measure bone density. As with all forms of medical imaging, studies would first have to determine the radar’s effect on the body. The university is expected to license the patented radar system.

Ohio State professor receives TopCAT Award

Betty Lise Anderson, professor of electrical and computer engineering, was named TopCAT Outstanding Woman of the Year by TechColumbus for her outstanding achievements in technology. Professor Anderson conducts research in the general areas of photonics and optical engineering.

TopCAT stands for Top Contributors to the Advancement of Technology. Award winners were drawn from more than 300 nominations. The January event was organized by TechColumbus, which was formed in October from the merger of the Columbus Technology Council and the Business Technology Center. It is also linked to SciTech, the developer of The Ohio State University’s research park.

TechColumbus’ mission is to accelerate the development of technology businesses in the region and assist existing companies to use technology to become more competitive.

By: Pam Frost Gorder
Taking Control

Searching for terrorists, planes scramble in different directions, surveying the area from different angles. Trucks and tanks surround the possible locations. Communicating among themselves, the team members figure out exactly where to find the suspects. Sounds like a typical military operation, right? Here’s the catch: None of the vehicles has pilots or drivers on board.

In the College of Engineering, faculty members are cooperating with other researchers at the Air Force Institute of Technology, the University of Cincinnati and the University of Dayton to figure out how such a scenario might work. The team forms the Collaborative Center of Control Science, established at Ohio State in 2001 to develop innovative and practical solutions to control science and technology problems of highest interest to the U.S. Air Force. The university team works closely with the Control Sciences Center of Excellence at the Air Force Research Laboratories Air Vehicle Directorate. Siva Banda, the head of this center, and his team of researchers oversee the work and get actively involved in research with the professors and graduate students.

“To make advances in science and technology, you need a team. Rarely are great advances made by an individual,” said Don Paul, chief scientist for air vehicles in the Air Force and a member of the university Control Science Center’s board of directors. “That in itself is a great accomplishment — to have teams of people working on a technology set both in government and at the universities.”

Kevin Passino, the professor of electrical and computer engineering who directs the center, said its focus is in three areas: autonomous air vehicles, aerodynamic flow problems and reusable launch vehicles for space.

“The combined Air Force and university team has parallel and complimentary research efforts in each of these efforts,” Passino said. “The center is leading the nation in formulating and solving these challenging problems.”

Paul said the center was started in response to an Air Force study on managing its workforce in the 21st century. That study showed the Air Force could benefit by having half of its staff be permanent members and the other half world-class collaborators. The Air Force intends to use Ohio State’s Collaborative Center of Control Science, set up as a mirror image of the Control Science Center of Excellence at Wright-Patterson Air Force Base, as a model to replicate nationwide, Paul said.

The success of the center, now in its fourth year of $1 million in annual funding from the Air Force Research Laboratories Air Vehicles Directorate and the Air Force Office of Scientific Research, has generated more funding through other sources, such as the Defense Advanced Research Projects Agency, NASA, the Dayton Area Graduate Studies Institute and the National Science Foundation.

“Once you establish yourself as a leader in a particular technological area, other people will come,” Paul said. “That has happened.”

Paul pointed out that the center’s work, and the autonomous vehicle research in particular, is sophisticated technology that could eventually affect not just military operations but also everyday life. Consider autonomous vacuum cleaners already on the commercial market, or a lawn mower that could autonomously maneuver your yard.

“This technology of machine intelligence is extremely powerful technology,” Paul said. “It’s one of the game changers for the future.”

For the complete story, go to http://www.eng.ohio-state.edu/nie/nie772/77204.php

Published Books

Professor Betty Lise Anderson (with Prof. Richard L. Anderson of the University of Vermont): Fundamentals of Semiconductor Devices, McGraw-Hill, 2005. • A solid understanding of the physical processes responsible for the electronic properties of semiconductor materials and devices is emphasized.

Professor Kim Boyer (with Profs. Luciano Silva and Olga Bellon of the Federal University of Parana, Brazil): Robust Range Image Registration: Using Genetic Algorithms and the Surfact Interpenetration Measure, World Scientific, 2005. • The focus is on obtaining highly precise, statistically robust alignments among different views of the same object to avoid modeling distortions.


Professor Randy Moses (with Prof. Petre Stoica of Uppsala University): Spectral Analysis of Signals, Pearson/Prentice-Hall, 2005. • Topics include nonparametric spectrum analysis (both periodogram-based approaches and filter-bank approaches), parametric spectral analysis using rational spectral models (AR, MA, and ARMA models), parametric methods for line spectra, and spatial (array) signal processing.

Professor Kevin Passino: Biomimicry for Optimization, Control, and Automation, Springer, 2005. • The focus lies on verifying correct operation of technologies via a process of mathematical modelling and analysis complimented by computer simulations.
As the rapid growth of the ElectroScience Laboratory continues, it is clear that additional workspace is needed to supplement and replace the outdated building at 1320 Kinnear Road that has served as the ESL's home for over 50 years. The just completed $1M renovation will provide for a temporary transition, but a new building is necessary to provide necessary quality facilities for our students and faculty.

Over the past three years, we have worked with the College of Engineering to propose and fund a 45,000 sq. ft. new facility to be built between the existing parking lot and Kinnear Road. In addition to new university space for offices, computing facilities, a multimedia library, and conference and classrooms, this new building will offer rentable commercial space for corporations that wish to have a close working relationship with ESL and the College of Engineering.

To highlight ESL's 50-year history, its many research innovations, and to honor its many distinguished alumni and faculty, the new building will include a historical display area and a Hall of Fame bridge linking the new facility with the existing building. The detailed design of the new building is currently in progress with construction to begin as soon as sufficient donations are collected.

The estimated cost of the ESL portion of the planned new building is $3.6 million. Although the College of Engineering is contributing more than $1 million, $2.2 million of the total amount will be from generous alumni donations that were essential before planning could proceed. As of this moment, about 50% of this amount has been committed. Additional alumni and corporate sponsors have already expressed interest to providing financial contributions that will guarantee the success of this project and ensure the preeminence of ESL research for decades to come.

Sensor Could Detect Concealed Weapon

Paul Berger, professor of electrical and computer engineering and physics, is head of the team developing a new sensor being patented by Ohio State. This sensor could be used to detect concealed weapons or help pilots see better through rain and fog. Instead of generating a signal to detect objects, Berger’s sensor spots them based on the reflection of natural radiation. Every object – the human body, a gun or an asphalt runway – reflects this ambient radiation differently. Berger says the sensor’s diode is compatible with mainstream silicon. This would allow computer chip makers to manufacture it cheaply and easily integrate it with existing technology. Once the sensor is further developed, it could be used to scan people or luggage or if it were embedded in an airplane nose, it might help pilots see a runway during bad weather. Read more about the sensor at http://researchnews.osu.edu/archive/bakdiode.htm
Group Decision Making in Honey Bee Swarms

For centuries, beekeepers have known that in late spring or early summer a strong colony of honey bees will divide itself by swarming, a process in which the queen and approximately half the worker bees leave their hive to establish a new colony; meanwhile a daughter queen and the balance of the workers remain behind to perpetuate the old colony.

This situation began to change in the 1950s when Martin Lindauer, a German zoologist, published his seminal paper on house hunting by honey bees. This communication behavior allows successful foragers to inform hive mates of the locations of rich food sources through a specific series of movements. A dancing bee runs forward and performs the wiggle run, vibrating her abdomen laterally, and then circles back to her starting point, producing one dance circuit.

In the mid 1990s we decided to look more deeply at this intriguing example of animal democracy. We worked with small swarms of about 4,000 bees and labeled each bee for individual identification, so we could attribute each dance to a particular individual and thus ascertain her contribution to a swarm’s decision making. In a swarm we observed on July 20 to 22, 1997, the entire decision-making process required about 16 hours of dance activity spread over three days. During the first half of the process, the scouts reported all 11 of the potential nest sites that they would consider, and no one site dominated the dancing. During the second half, however, one of the sites gradually began to be advertised much more than the others and ultimately became the chosen site.

Indeed, during the last few hours of the decision making, the site that had emerged as the frontrunner became the object of all the dances. Given the striking way that the dances on a swarm come to represent one site and then the swarm moves to this site, it was tempting to conclude that a swarm’s decision-making process is essentially one of consensus building, rather like the arrival of the “Sense of the Meeting” among Quakers. By this hypothesis, a scout bee “votes” in favor of a site by dancing for it, somehow the scouts act and interact so that gradually their votes come into agreement in favor of a superior site, and somehow the voting pattern of the scouts is steadily monitored so that they know when they’ve reached an agreement and can start acting on their decision. There were, however, two factors that cast doubt on this appealing hypothesis. First, neither Lindauer nor we had seen any sign of scout bees polling their fellow dancers, something that surely they must do to know when they’ve reached an agreement. Second, both Lindauer and we had occasionally seen a swarm launch into flight without a dance consensus, that is, when there were two strong coalitions of dancers advertising two distinct sites. Were these rare cases of takeoffs with dissent simply bizarre anomalies that we could ignore, or were they valuable clues that we should heed? We chose to heed them, because we had long wondered whether the essence of a swarm’s decision making might be sensing a quorum (sufficient number of scouts) at one of the nest sites rather than sensing a consensus (agreement of dancing scouts) at the swarm cluster.

By this quorum-sensing hypothesis, a scout bee “votes” for a site by spending time at it, somehow the scouts act and interact so that their numbers rise faster at superior sites, and somehow the bees at each site monitor their numbers there so that they know whether they’ve reached the threshold number (quorum) and can proceed to initiating the swarm’s move to this site. This hypothesis can explain the cases of liftoff with dissent as instances where a quorum was reached at one site before the competition between dancers from different sites had eliminated the dancing for all but one site.

For the complete story, go to http://www.ece.osu.edu/~passino/PapersToPost/GrpDecMakHoneyBees-AmSci.pdf

The Ohio State University
Many new, well-trained engineers will be needed at electric utility companies due to the aging engineering work-force. OSU is one of a handful of U.S. universities that still retains its emphasis on Electric Power and High Voltage Engineering teaching and research.

In addition, OSU has an excellent High Voltage Laboratory. The problem was that in the present financial situation of state-supported universities in Ohio, OSU was not able to hire a new faculty member to replace a retired high voltage/electric power area professor, Prof. Stephen Sebo.

Therefore, the OSU ECE Department requested the three major electric utility companies in Ohio, American Electric Power (Columbus), Cinergy (Cincinnati) and FirstEnergy (Akron), to consider a grant to the department. The purpose of the grant is to support the hiring of a new faculty member who will be responsible for continuing the teaching and research in two areas within Electric Power Engineering. These are the high voltage area and the power electronics area as well.

The three major utilities have agreed on the critical importance of maintaining a strong academic program (the only one in Ohio) in the high voltage and power electronics components in the power systems area. The ECE Department has outlined a plan whereby the companies would jointly contribute 50% of the hiring costs of a new faculty member who could continue and enhance the teaching and research in this field. The 50% support would be spread over a five-year period (2007-2011) after which OSU would assume the full costs.

The three companies pledged a total support of $400,000 over a five-year period. Specifically, the Cinergy Foundation approved a grant of $50,000 in 2005, the FirstEnergy Foundation also approved $50,000 in 2005, and the AEP Foundation approved a support of $300,000 in 2006.

Several people worked towards this goal at OSU: Deans Williams and Baeslack, Chairs Zheng and Özgüner, Corporate Relations Director McSweeney, and Prof. Emeritus Sebo.

### OSU Licenses Wireless Communications Technology

A new method of space-time coding, co-developed by the iCORE Wireless Communications Laboratory at the University of Alberta and Dr. Hesham El Gamal at The Ohio State University, operates at efficiencies nearly equal to the known theoretical limits. Potential applications for this technology include: high data rate cellular wireless communications, ad-hoc wireless networks with multi-antenna terminals, portable networks with multi-antenna systems, and mobile multi-user networks.

This patent-pending technology was recently acquired by WebSky, Inc. through its previous license holder, Strategic Wireless Solutions, Inc.

### Runtime Reconfiguration Optimizes Cutting Edge, Parallel Processors

Professor Füsun Özgüner and doctoral student Justin Teller are researching methods to reconfigure tightly integrated, multi-core processors at runtime. Recent microprocessor trends show that increasing numbers of processing cores are being integrated into processors. Reconfiguring at runtime allows the processor to “learn” higher performance or lower energy consumption configurations at runtime, overcoming the difficulty of efficiently using the resources of new cutting edge, parallel processors. Runtime reconfiguration can benefit a wide range of applications, from high performance computing to energy-constrained embedded applications. The researchers are collaborating with researchers at the Air Force Research Labs (AFRL) and at OSU to test the concept on different applications. The runtime reconfiguration methods being developed are also being applied to two separate architectures, IBM’s Cell processor and University of Texas at Austin’s TRIPS processor.

### Ringel Named as Director of New IMR

Professor Steven Ringel has been appointed as Director of the new OSU Institute for Materials Research (IMR), a university-wide institute with a mission to promote excellence within the multidisciplinary materials community present at Ohio State. With broad faculty participation, it is expected to provide coordination, leadership and support for the entire materials research community. It was established with a vision of catapulting OSU as one of the world’s premier materials research enterprise universities.
Ohio State is recognized as one of the leading institutions worldwide for research in the Electromagnetics and Electro-optics area. Research in the area covers a broad range of topics, including electromagnetic theory, computational methods, design of antennas and other RF and optical components, and applications in sensing, communications, transportation, medicine, and manufacturing. Coursework begins with the undergraduate electromagnetics sequence, and then expands into a large set of electives at the undergraduate and graduate levels. Examples include courses on antenna design, wave propagation, electromagnetic compatibility, radar systems, and one year sequences on electromagnetic theory and numerical methods. Courses on optics, fiber optics, and lasers are also available, as well as a new offering on integrated optics. Research groups within the area include the ElectroScience Laboratory (ESL) and the Non-linear RF Laboratory. In recent years, research in the area has grown dramatically, including leadership of an Air-Force Sponsored MURI project on the use of novel electronic materials for the design of conformal antenna arrays.

In addition, recent DURIP and NSF MRI awards have allowed expansion of the laboratory’s equipment in the areas of RF device fabrication and RFIC development. Area personnel continue to lead numerous projects in EM and electro-optics applications beyond the examples listed here. The area has also recently grown through the addition of Prof. Ron Reano to the ECE faculty; Prof. Reano’s research interests are in the area of optical and wireless micro/nano devices, as well as bionanotechnology and ultrafast electro-optics. For more information, please visit the ESL website at http://esl.eng.ohio-state.edu or the Non-linear RF Lab website at http://www.ece.osu.edu/~roblin/lsna/.

The Control group at The Ohio State University, one of the largest in the nation, conducts interdisciplinary research in the broad area of systems and control, with application in aerospace systems, systems biology, automotive systems, and intelligent transportation. Research in the area include biologically-inspired decision making, cooperative control of groups of unmanned aerial vehicles, diagnostic and fault tolerant control, robust and adaptive nonlinear control, active flow control, game-theoretical methods in systems and control, large-scale optimization and hybrid systems.

The strong interdisciplinary nature of the activity in the control area is supported by a large number of industrial partnerships, and by participation and close collaborations with various research centers at OSU, including the Center for Automotive Research and Intelligent Transportation (CARIT), and the Gas Dynamics and Turbulence Laboratory. The control group has consolidated in recent years a strong partnership with the Air Force Research Laboratory, through the creation of the AFOSR/AFRL Collaborative Center for Control Sciences (CCCS). Established in 2001, the CCCS has conducted research with the AFRL-Va Control Science Center of Excellence to develop innovative and practical solutions to challenging control science and technology problems of highest interest to the United States Air Force. It has been actively promoting theoretic and applied research on cooperative control of groups of uninhabited air vehicles, aerodynamic flow control, and control of reusable air-breathing hypersonic launch vehicles.

The area offers a very broad range of courses in control, from the most basic undergraduate ones to graduate courses in linear systems, digital control, optimal control, nonlinear systems and control, sliding mode control, decentralized control, stochastic control, robust control, adaptive control, and intelligent control.
Ohio State offers a vibrant and growing program of research and coursework covering a broad range of topics in communications and signal processing. Current research areas include network information theory, medical imaging, sensor networks, channel equalization, communication networks, computer vision, radar signal processing, image understanding, image compression, multimedia signal processing, and high-performance computing for signal processing. Annual research expenditures are approximately $3 million. The group is known for theoretical developments and applications in a number of topics and enjoys significant interdisciplinary research collaborations across the university campus.

Our curriculum is designed to prepare students for both design and research in communications and signal processing. Introductory undergraduate courses in both communications and signal processing are offered. Senior/graduate courses include Image Processing, Time-Varying Signal Processing, Medical Imaging, Neural Networks, Communications Networks and Digital Communications, and a Real-Time Signal Processing Laboratory. Capstone undergraduate design courses in comm/dsp are offered annually; recent topics include broadband audio digital communications and localization in sensor networks.

The graduate curriculum includes a three-quarter foundational course sequence in random processes, detection, and estimation and a wide variety of advanced graduate courses, including Information Theory, Coding Theory, Multi-User Communications, Adaptive Signal Processing, Pattern Recognition, Stochastic Signal Processing, Image Understanding, and Communication Networks.

Research laboratories focusing on communications and signal processing include the Information Processing Systems (IPS) Laboratory, the Signal Analysis and Machine Perception Laboratory (SAMPL), and the Computation Biology and Cognitive Science Laboratory (CBCSL). The area has recently grown through the hiring of Prof. Elif Uysal-Biyikoglu, (Ph.D. Stanford 2003) who hails from a postdoctoral position at MIT. Her research interests are in communication and networking with emphasis on cross-layer designs for multiuser wireless systems.

Solid State Electronics & Photonics

Solid State Electronics and Photonics (SSEP) at Ohio State encompasses a wide range of activities from materials research to active semiconductor devices and photonic systems. The work is highly interdisciplinary, promoting interactions with a myriad of materials-oriented departments and colleges across campus. In fact, the most recent federal rankings released by the National Science Foundation lists OSU as the third highest funded university in materials research, indicative of the high caliber and international reputation of the SSEP group.

Several recent notable achievements by SSEP area members are listed in more detail elsewhere in this report. Other significant highlights recently for the SSEP group include: (i) Prof. Lu established a new course titled “Nanoscale Structures and Devices;” (ii) Prof. Brillson was awarded the Gaede-Langmuir Award by the American Vacuum Society; (iii) Prof. Ringel was elevated to Fellow by the American Association for the Advancement of Science; (iv) Prof. Berger received the “Faculty Advisor of the Year” from the IEEE Columbus Chapter; (iv) Prof. Berger received two US patents, for organic emissive displays and for the formation of quantum dot nanoswitches, (v) Prof. Anderson received two US patents, for optical correlation and optical circulators; and (vi) Prof. Berger and his students invented a new organic polymer tunnel diode—a new electronic component that could one day lead to plastic computer memory and plastic logic circuits on computer chips.
Power

The Power program at The Ohio State University includes high voltage engineering, computer and digital technology in power and drive system applications, electric machine design and controls, and power electronics. The objective of the program is to provide industry with engineers who are versatile and technically competent in both theory and applications of the energy/power area.

Research activities at OSU in the power and energy areas are comprehensive, ranging from high voltage fields and corona effects, insulation contamination studies, EMC/EMI, and protection of AC power system to electromechanical components and systems.

Research projects in power electronics, electric machines and mechatronics have focused on super high speed (>50,000 rpm) starter and generating systems and variable frequency power supplies which find wide applications in automotive, deregulated utility, aerospace, and biomedical industries. The power and energy research program at OSU has been strongly supported by local and national industry companies and government labs, such as EPRI, AEP, GM, Ford, Delphi, United States Air Force and NSF.

Coursework in the energy/power area begins with undergraduate energy conversion lecture and electric machine lab courses, and then expands into a large set of electives at the undergraduate and graduate levels. Examples include courses on power electronics design and applications, advanced electric machine modeling and control, high voltage and power system analysis.

Circuits & Electronics

The Mixed Signal Electronic Systems Group (MISES) at Ohio State is one of the leading research entities in the world in the fields of VLSI microelectronic circuits and systems and their applications in areas such as telecommunications and sensors. The MISES activities include programs in analog, digital, mixed-signal ICs, power management, integrated RF and microwave circuits, information electronics, computer aided design, and reverse engineering of ICs with emphasis on higher levels of integration leading to complete systems on chip.

The group is an integration of a number of Laboratories at the ECE Department for chip design and testing, including the Analog VLSI Lab, the Information Electronics Lab, the RF and Microwave Lab, the Design Automation Research Lab, and the MISES VLSI CAD Lab.

Coursework in the area starts with the basic undergraduate sequence in circuits and electronics then goes into a variety of technical electives covering a wide range of timely topics with the goal of helping our students gain the necessary skill sets needed to excel in today’s high tech industry. Examples of the choices our students have include a sequence on analog and mixed signal integrated circuits (ICs), digital ICs, RF-ICs, and microwave circuits. Over the last two years, the group has graduated more than 15 Ph.D. students.

Research in the area has significantly grown over the years and has traditionally been driven by needs in the industry. Faculty in the area work closely with industry on projects allowing students to secure internships while pursuing their programs at Ohio State and to find jobs at leading companies upon graduation. One example is our Texas Instruments Analog Fellowship program, which has supported over a dozen graduate students since 2000 and is still ongoing. Examples of ongoing research projects include: Design-for-yield of multi-band multi-standard RFICs, funded by the Semiconductor Research Corporation; Low phase noise fractional-N synthesizers for broadband wireless communications, funded by Intel; an SBIR project on data converter design for Ultra wide band communication; and cooperative projects with mixed signal design centers at leading government laboratories. The Group has recently joined the Connectio

One NSF University/Industry Center on Wireless Communications.

The Group has state-of-art test facilities for testing analog, digital and mixed signal ICs including a new RFIC Lab funded by an NSF MRI grant. Main stream CAD design tools, such as those provided by Cadence, Agilent ADS and Mentor Graphics, are used by our students and researchers. Access to chip fabrication foundries in the U.S., Europe and the far east are also available to fabricate test chips. More information is available at www.ece.osu.edu/Mises and www.ece.osu.edu/VLSI.
The Computer Networks area covers topics related to communication between interconnected computers and devices. Communication network architectures, protocols, and applications that rely on the availability of communication networks are included in the focus areas of the computer networks area. In addition to development of practical solutions such as protocol development and implementation, members of this area also work on analytical and simulation-based performance evaluation as well as theoretical limits of computer networks.

Courses offered by this area include Communication Networks, Computer Interfacing and Protocols, and Design of Advanced Data Networks. The area has strong collaborations with the Communications/Signal Processing and Computer Systems groups. Principle members of the computer networks area are affiliated with the Information Processing Systems Laboratory and the High Performance Computing and Networking Laboratory. After its formation in 2004, the area has expanded with the addition of Dr. Elif Uysal-Bıyıkoğlu in 2005.

The Computer Vision and Multimedia area aim to design computer systems that can enhance human-computer interactions in home applications and in industry. This may include entertainment applications, e.g. videogames, and automatic robot navigation. More recently, these techniques have also been applied to problems in the biological sciences. Examples are in the classification of DNA sequences, protein analysis, and cognitive science.

The research group has strong collaborations with researchers in signal processing, bio-engineering and -informatics, medicine, and psychology. The following advanced courses are specifically designed to prepare students within this multi-disciplinary area: Digital Image Processing, Medical Imaging, Computer Vision, Pattern Recognition, Introduction to Neural Networks, and Digital Speech Processing Systems.

The Computer Systems area covers the design and applications of computer systems. Together with members of the other computer areas, the faculty members in this area teach undergraduate and advanced courses in computer design, microprocessors, design verification, robotic applications, real-time systems and component-based programming. This area participates in a new Graduate Interdisciplinary Specialization/Minor in Applied Software Engineering together with Computer Science and Engineering. Recent research includes embedded systems, heterogeneous distributed computer systems, real-time and parallel computing, nanocomputer architectures, computation and communication scheduling in wireless sensor networks, component-based systems for biomedical use, biped and quadruped dynamic simulation, and verification paradigm studies of new computer systems. Recently, Professor Ümit Çatalyürek from the Biomedical Informatics Department in the College of Medicine, received a joint appointment in ECE to augment our research capabilities. Research laboratories focusing on computer systems include the High Performance Computing and Networking Laboratory (HPCNL).
<table>
<thead>
<tr>
<th>Title</th>
<th>PI</th>
<th>Sponsor</th>
<th>Total Award</th>
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<tbody>
<tr>
<td>Miniature GPS Antenna Systems</td>
<td>Chi-Chih Chen</td>
<td>Applied EM, Inc.</td>
<td>$349,993; 2 years</td>
</tr>
<tr>
<td>Laboratory for Deep Level Spectroscopy of Wide Bandgap Electronics</td>
<td>Steven A. Ringel</td>
<td>Office of Naval Research</td>
<td>$318,517; 6 months</td>
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<td>Fourier Cell Optical True Time Delay</td>
<td>Betty Lise Anderson</td>
<td>National Reconnaissance Office</td>
<td>$264,623; 1 year</td>
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<td>MRI: Acquisition of Instrumentation for Interdisciplinary Research and Training in Integrated Wireless Communication Systems</td>
<td>Roberto G. Rojas</td>
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<td>Data Compression AF04-101 Phase II</td>
<td>Yuan F. Zheng</td>
<td>RNET Technologies</td>
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<td>Miniature Ultra-Wideband Antenna on Novel Substrates - Phase II</td>
<td>Chi-Chih Chen</td>
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<td>$249,169; 1 year</td>
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<td>Advanced Reflector Analysis and Computer Code</td>
<td>Walter D. Burnside</td>
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<td>Packaging Technology of 28vdc Induction S/G System for On-board Operation</td>
<td>Longya Xu</td>
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<td>DURIP FY06: Fabrication Equipment for Periodic Material Assemblies and Photonic Crystals</td>
<td>John L. Volakis</td>
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<td>Code Improvements for CJR Antenna Coupling</td>
<td>Ronald J. Marhefka</td>
<td>Raytheon Co.</td>
<td>$149,017; 1 year</td>
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<td>Microstrip Bus</td>
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<td>Matrix Broadband Technologies, LLC</td>
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<td>Access for Engineering Excellence</td>
<td>Bradley D. Clymer</td>
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<td>$136,000; 4 years</td>
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<td>Modeling and Control of Fuel Cell Based Distributed Energy Systems</td>
<td>Ali Keyhani</td>
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<td>Development of an Agile Digital Detector for RFI Detection and Mitigation on Spaceborne Radiometers</td>
<td>Joel T. Johnson</td>
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<td>Modeling Rotman Lens Using Domain Decomposition Methods</td>
<td>Jin-Fa Lee</td>
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<td>Novel Approaches to Stochastic Pursuit-Evasion Differential Games with Multiple Players</td>
<td>Jose B. Cruz, Jr</td>
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<td>Collaborative Research: Dynamic Movement in Bipedal Locomotion</td>
<td>David E. Orin</td>
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<td>EM Effects of Radiofrequency Pulses on Electronic Circuits and Systems</td>
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<td>Collaborative Research: CSR- EHS: System-wide Performance Optimization of Complex Integrated Real-time Systems</td>
<td>Chang-Gun Lee</td>
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<td>RFID Studies with YFY</td>
<td>Walter D. Burnside</td>
<td>Yuen Foong Yu Paper MFG CO LTD</td>
<td>$100,000; 1 year</td>
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There are of course, many projects new and old that have been ongoing during the July 1, 2004 thru June 30, 2006 period covered by this report. To provide a view of these large, sustained efforts, we also list those that have had expenditures larger than $400K. (This is not a complete list. Many large projects are supported by different sources. We provide the following as examples of our activity.)

**FINANCIALS**

Many sources support our educational mission. Funding from the University comes directly for teaching and research related activities. These originate with state allocations, tuition, endowments, donations, etc. External funding from State, Government, and Industry projects also support our mission.

<table>
<thead>
<tr>
<th>Title</th>
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<td>Title: Collaborative Center of Control Science</td>
<td>Kevin M. Passino</td>
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<td>Title: Conformal Antenna Analysis and Design Using Novel Electronic Materials</td>
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<td>Title: Design, Fabrication and Installation of Compact Range Antenna/Radar Instrumentation</td>
<td>Walter D. Burnside</td>
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<td>Title: NIRT: Self-aligned and Self-limited Quantum Dot Nanoswitches</td>
<td>Paul R. Berger</td>
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<td>Title: Small-CRPA with Advanced Antenna Electronics for Interference Suppression in GPS Receivers</td>
<td>Inder J. Gupta</td>
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<td>Title: Phase II: An Incident Warning System with Integrated Two-range Communications System</td>
<td>Ümit Özgüner</td>
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<td>Title: Modeling the Nonmanuals of American Sign Language</td>
<td>Aleix M. Martinez</td>
<td>Purdue University</td>
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<td>Title: Model-based Algorithms for Next Generation Air-to-Fuel Ratio Control</td>
<td>Steve Yurkovich</td>
<td>General Motors Corporation</td>
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<th></th>
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<td>11,610,965</td>
<td>12,578,878</td>
<td>$24,189,843</td>
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Reaching Out to the World
A Honduran Service Project Provides Learning Opportunities for Engineering Students

Temperatures were hot and the sun shone brightly every day, but there were no bathing suits or late night dance clubs for 11 Ohio State engineering students who spent their spring break building a computer learning center at a remote orphanage in Honduras.

The students, all members of the newly created Ohio State Engineers for Community Service, decided that during their 2005 spring break, they would perform an engineering project to benefit others in a foreign country. When the opportunity arose to travel to 30 miles outside of Honduras’ capital of Tegucigalpa, the group agreed the project would suit their goals.

Montaña de Luz is a 4-year-old orphanage that houses 21 children who are HIV positive. The children receive high quality health care, medications to control their HIV and a loving, homelike environment.

Under the guidance of ECOS president David Bradway, a senior electrical and computer engineering student, the students spent fall and winter quarters seeking funding sources and donations to make the trip affordable and successful.

“The Montaña de Luz project was a great fit for ECOS,” Bradway said. “It incorporated technical engineering service projects as well as educational training for a group underrepresented in science and engineering. We all learned a lot from each other and from the children.”

The orphanage mainly needed computers that could be programmed with Spanish language educational software. The students secured computer donations from College of Engineering offices that were upgrading their hardware systems as well as software donations from Microsoft and funding obtained from the college and other OSU organizations.

Once in Honduras, the students and the four faculty/staff advisors set about making the computer learning center a reality. Without major complications, the group had set up the computer learning center by midweek. The engineering students also made major enhancements throughout the orphanage compound: performing a complete electrical evaluation of the facility and setting up a comfortable, brightly decorated library with shelves of donated books. Another crew patched cracks in the stucco walls and painted the orphanage administration building.

Each day, the students spent time with the children, playing games of soccer, jumping on the trampoline or coloring eggs for the orphanage Easter egg hunt. The group also visited Zamorano, a Pan-American agricultural college, and talked with administrators there about college life in Honduras and partner opportunities between Ohio State and Zamorano.

The idea for ECOS arose when students enrolled in an engineering ethics class began discussions among themselves as to how to make an impact in the community through engineering. Kevin Passino, professor of electrical and computer engineering, teaches the ethics class and now serves as the ECOS faculty advisor and accompanied the group to Honduras.

“I believe our trip helped the students to clearly see how engineering technologies can positively impact people’s lives,” Passino said. “Their resourcefulness, enthusiasm and ability to bring a group project to successful completion was exciting to watch.”

Roger Dzwonczyk, Gina Langen and John Merrill also serve as ECOS advisors and accompanied the group on the trip. ECOS members who traveled to Honduras were Jake Adams, Mark Andre, David Bradway, Jorge Finke, Dan Heath, Nicole Lammeier, Dan Mautz, Laura O’Rear, John Scott, Patrick Searfos and Theresa Vonder Haar.

Plans are already under way to continue the relationship between Ohio State and Montaña de Luz. Two students are researching the implementation of alternative energy sources for the orphanage by incorporating solar or wind power to provide electricity and a generator for use as a backup energy source along with providing engineering help in upgrading the road leading to the orphanage.

This spring ECOS received a boost toward its goals through a $60,000 grant from the Battelle Endowment for Technology and Human Affairs. The endowment provides funding to support Ohio State faculty projects that address the interactions of science and technology with the needs and aspirations of individuals and societies; the improvement of sensitivity to social needs; a better comprehension of both the capabilities and limitations of science and technology; and a strong emphasis on educational and public service programs.

by Gina M. Langen, College of Engineering
Michael Schuette, M.S. student of Professor Wu Lu, received a National Science Foundation fellowship in a program designed to foster relationships between scientists and K-12 educators. At Ohio State, “Science Fellows Supporting Teachers” partners the graduate students with teachers in the Columbus Public Schools to support science instruction for students in grades three through five. Michael recently presented an informational seminar on the fellowship highlighting its mutual benefits to fellows, teachers, and students.

David P. Bradway, B.S.E.C.E. student, received the Ohio State University Board of Trustees’ Student Recognition Award. Bradway is also a recipient of a National Science Foundation Fellowship and a Goldwater Scholarship and plans to pursue a doctoral degree at Duke University.

Electrical and Computer Engineering graduate student Andrew Armstrong received the Materials Research Society Gold Award for best student presentation at the Fall 2004 Meeting of the Materials Research Society in Boston, MA. His research focuses on advancing wide bandgap semiconductors for high speed and high power electronics through fundamental materials research.

Lauren Achor, B.S.E.C.E. student, was one of nine women honored at the College of Engineering’s annual Women in Engineering Banquet for its 150-plus students by receiving a Top Academic Award sponsored by Rockwell Automation.

Luther Palmer, Ph.D. student, received the Department of Electrical and Computer Engineering Teaching Fellowship. Palmer was selected because of his exemplary teaching abilities as a teaching associate and his plan to pursue a professorship after graduation.

Undergraduate student Simon Curran’s presentation, “Real-Time Computer-Control of a High-Performance, Series-Compliant, Articulated Hopping Leg,” earned him second place at the 2005 Denman Awards. The Denman Undergraduate Research Forum provides a means for undergraduate students to share their research with members and friends of the OSU community, recognizes the significant contributions to research by OSU undergraduates and facilitates exchange between students, faculty, and the public. Simon’s advisors on this project were Dr. David Orin of Electrical and Computer Engineering, and Dr. James Schmiedeler of Mechanical Engineering.

Brian Usner, a 2006 graduate of ESL, received third prize at the 2006 ACES Conference Student Paper Competition held in Florida for his paper entitled, “A Hybrid Volume Surface Integral Equation Method for Periodic Media and Metamaterials.” He was co-advised by Dr. Kubilay Sertel and Professor John Volakis.

Mr. Kezhong Zhao, an ESL student, won first place in the Student Paper Competition at the Annual International Zurich Symposium on Electromagnetic Compatibility held in Singapore for his paper entitled, “An Accelerated Non-conforming DP-FETI Domain Decomposition Method for the Analysis of Large EMC Problems.” His advisor is Professor Jin-Fa Lee.

Ph.D. student Marinos Vouvakis won third place in the best paper award for his paper “A finite element domain decomposition technique for the analysis of large electromagnetic problems,” presented at the IEEE Antennas and Propagation Symposium held in Washington D.C. Professor Jin-Fa Lee is his advisor.

NSBE Encourages City Youths to Stay in School

OSU members of the student chapter of the National Society of Black Engineers (NSBE) traveled to Boston to help recruit undergraduate students to enter graduate studies at Ohio State. Among the handful of students from the College of Engineering to volunteer in this recruiting effort was Luther Palmer, a Ph.D. student in electrical engineering. The NSBE is also known for its community service projects such as spending Sunday afternoons at a local high school where they tutor students in math and science courses, or spending Martin Luther King Day at a homeless shelter in downtown Columbus playing with children and encouraging them to stay in school.

Engineering Students Receive Spirit Award

ECOS (Engineers for Community Service) was selected as a recipient of the Spirit of Ohio State Award. This award is designed to be conferred to those students/student organizations who embody the “Spirit of Ohio State” and who exude the values of Student Affairs: relationships, mutual respect, integrity, innovation and service. ECOS, in existence for approximately two years, began as a means for Engineering students to contribute their skills and knowledge in service to others. Already, the organization has over 300 students on their current mailing list and have accomplished a number of items, such as an organizational web site, Mission statement and by-laws, travel to Honduras over spring break to perform various service projects, local projects, guest speakers, planning for future projects, etc. See story on opposite page. To learn more about ECOS, please visit their web site at http://ecos.osu.edu/.

ECE’s Professor Kevin Passino is the faculty advisor for ECOS.
The research opportunities for undergraduate students are diverse and extremely challenging. This type of directed research—especially when working with a faculty mentor—is essential in providing undergraduate students with a complete education, and it will prepare students for future graduate studies and/or the corporate world in ways regular curriculum cannot achieve. Below we have listed some of these undergraduate projects.

- “400 MHz-100GHz Multiband Radar,” Rob Olmon (B.S.E.C.E. with distinction Winter 2006), Matt Silverman (B.S.E.C.E. Autumn 2005, M.S. Spring 2006), Steve Horst (B.S.E.C.E. with distinction Spring 2004), Larry Martin (B.S.E.C.E. Winter 2006), C. Keith Blevins (B.S.E.C.E. Spring 2006), Jeff Duly (B.S.E.C.E. Spring 2006, pursuing M.S. degree at OSU), advisor: Walter Burnside. This project was delivered to MIT Lincoln Labs in 2005 and is fully operational in their measurement facility.

- “Identifying geometries of magnetic field perturbers in the human brain by simulating protonic monte carlo walks,” Jonathan Kopechek, B.S.E.C.E. Spring 2006, advisor: Bradley Clymer. This project was funded by OSU College of Engineering and presented at DURF.*


- “Field Effect Transistor-Based Biosensor,” Mark Elias, B.S.E.C.E. with distinction Spring 2005, pursuing M.S. in BioEngineering at OSU, advisor: Len Brillson. This project was funded by the Ohio Space Grant Consortium, and OSU College of Engineering Experiment Station Internship. Mark is currently working with Profs. Steve Lee and Len Brillson on a related project.

- “Quantum Functional Nanoelectronic Circuits for Extending Si CMOS,” Jeffrey Daulton. Presented at DURF* and the International Semiconductor Device Research Symposium 2005, advisor: Paul Berger. Jeff is continuing the project, which is funded by the National Science Foundation.


- “Dynamic Maneuvers in Legged Locomotion,” Simon Curran, B.S.E.C.E. with distinction Summer 2005 and pursuing an M.S. degree at OSU, advisor: David Orin. Received second place at DURF* Spring 2005. Simon is continuing this project, moving from quadruped locomotion to biped locomotion. Another three-year grant from the National Science Foundation has been received.


Advisor: Ümit Özgüner. Investigations done and results obtained in these projects were used by the Desert Buckeyes team in the DARPA Grand Challenge.*

* DURF - Denman Undergraduate Research Forum
Many Electrical and Computer Engineering students at The Ohio State University have been fortunate recipients of scholarships given by generous alumni, faculty and friends of the department. Some of the donors have made their gifts anonymously while others have given in memory of a loved one. Totals of $220,260 in 2004-2005 and $206,500 in 2005-2006 were awarded.

Eugene C. Gee and Mona Fay Gee Memorial Fund, established in 1965 with a bequest from Mona Fay Gee (B.Phil. 1897) in memory of her husband, Eugene C. Gee (M.E. Elec. Eng. 1897), herself, and her father and mother, Dr. David C. Fay and Mrs. Mary A. Fay.


Robert B. Bockstiegel and Viola V. Bockstiegel Memorial Scholarship Fund, established in 1992 by the estate of Viola Bockstiegel.

Lowell C. Hoelle Memorial Scholarship Fund, established in 2000 by gifts from his wife, Mrs. Mary S. Hoelle, and his sons, John L. and Thomas S. Hoelle, in memory of Lowell C. Hoelle (B.S.E.E., 1940).

Hendrix Scholarship, established in 1996 as an anonymous donation to the department.

- **Bockstiegel**
  - Brian Beck
  - Justin Benedict
  - Lianghao Chen
  - Robert Chenkovich
  - Christopher Dyer
  - Ahmed Fasih
  - Jonathan Lee
  - Kyle Phillips
  - Geunmin Ryu
  - Benjamin Sinheimer
  - Thomas Sokol
  - Matthew Stephanson
  - Hong Tang
  - Bei Wang
  - Aaron Williams

- **Lamme**
  - Allen Farel

- **Kan**
  - Ke Sun

- **Hoelle**
  - Jonathan Kopechek
  - Michael Lucas

- **Shaffstall**
  - Paul Birkmeyer
  - Ross Steward
  - Sarah Switzer

- **Byrne Okey**
  - Lauren Achor
  - Lyndsay Benedict
  - Paul Birkmeyer
  - Andrew Duly
  - Allen Farel
  - Galen Hoffman
  - Andrew Milley

- **Gee**
  - Jennifer Rutledge
  - Richard Sands
  - Adam Scharzt
  - Ross Steward
  - Daniel Twaddell

- **Caldwell**
  - Andrew Branmink
  - Dustin Brown
  - David Matthew Daniel
  - Nathan Denning
  - Brian Eckerly
  - Andrew Duly
  - Robert Fiesley
  - Matthew Ferris
  - Nathan Hodge
  - Galen Hoffman
  - Adam Lindsay
  - Robert Olmon
  - Adam Porr
  - Richard Sands
  - Matthew Schmidt

- **Hendrix**
  - Matthew Ackerman
  - Timothy Arnold
  - Robert Brichler
  - Kevin Crawford
  - Simon Curran
  - Jason Dignan
  - Joseph Gourley
  - Guven Kip
  - Eric Kronberg
  - Seoktae Lee
  - Amanuel Lemma
  - Michael Lucia
  - Francis Manuguerra
  - Vincent Prawira
  - Scott Rose
  - Jordon Schultz
  - Sachin Shah
  - Timothy Steinmetz
  - Aleddin Yousef
  - Robert Brewer
  - Amin Mahalati-Shirati
  - Brian Kellogg
  - Ernest Carducci
  - David Adams
  - Kevin Ponziani
  - Patrick Kenny
  - Jeffrey Duly
  - Mark Andrews
  - Nathan Voss
  - Jogender Nagar
  - Jeremy Funk
The Department of Electrical and Computer Engineering offers two undergraduate programs, Electrical Engineering and Computer Engineering, both of which are accredited according to the program requirements established by ABET (Accreditation Board for Engineering and Technology). Completion of either program yields the degree of Bachelor of Science in Electrical and Computer Engineering (B.S.E.C.E.) with the specialization of either Electrical Engineering or Computer Engineering annotated on the official transcript. A combined B.S. and M.S. program is also available to ECE students who qualify. This program allows students to count some technical elective courses for both the B.S. and M.S. degrees, thus reducing the total time to finish the two degrees. In the last two years, five students have participated in this program.

The department is always devising new courses to help our students keep up with changing technology. During this time period students could take new courses in Real-Time and Embedded System Design Technologies, Numerical Methods for Electromagnetics, and Nanofabrication and Nanomanufacturing. Two courses on applied software engineering, jointly taught by Computer Science & Engineering, have been moved from the graduate level down to the undergraduate level because of the growing need for many of our B.S. graduates to know this material.

In the last couple of years the department has been increasing research exposure to its undergraduate students. An honors version of the small group capstone design course allows undergraduates to work with graduate students on a research team. Many students also are engaged in research by completing an undergraduate honors thesis. After performing the research they must document it in a written thesis and then orally defend it in front of faculty advisors.

The department again won the Best Minority Engineering Program Award in the College of Engineering for providing the best effort in advising minority students. Professor Jose Cruz volunteers as a faculty minority advisor and holds periodic pizza meetings for minority students to network and learn of new educational opportunities.
Graduate Programs

In the past 3 years, there has been an intentional effort to shift the graduate program to emphasize studies towards a Ph.D. A more structured policy for the hiring of Graduate Teaching Associates (GTA) was implemented to favor those students who are pursuing the Ph.D. The Ph.D. qualifying exam was also changed to an oral exam that tests the student’s ability to do research rather than the previous written exam which emphasized coursework material. Also, students can now waive the qualifying exam if they demonstrate significant evidence of research such as a journal paper. The effect of these changes has been a shift in the composition of the graduate student population. Our graduate students are now evenly split between those on track for a M.S. and Ph.D. degrees, whereas five years ago there were two M.S. students for every Ph.D. student.

Another new initiative that was introduced two years ago was the Ph.D. Teaching Fellow program. The Teaching Fellow was given the responsibility of an undergraduate course to teach on his or her own, under the mentoring of a senior faculty member. This program targeted Ph.D. students who were interested in pursuing an academic career and had an excellent research record to obtain a position at a top tier university. The hope was to give the students a “leg up” on the competition by providing them with teaching experience that is equivalent to what they would encounter as a first year Assistant Professor. After going through a highly selective process, including an interview with a selection committee, a small number (one or two) of students were awarded the Teaching Fellow. The first one to receive the award was Marinos Vouvakis. Upon graduation he accepted an Assistant Professor position at the University of Massachusetts Amherst, and he commented that the experience of being a Teaching Fellow helped him tremendously during the interview process for the position. In the second year, Luther Palmer and Kambiz Azarian were Teaching Fellows.

With a number of new courses introduced yearly, the graduate program continues to be very healthy and vibrant. In fact, the typical number of Ph.D. graduates in any given year in our department hovers around 20, and in the recent past has never exceeded 25. However, this past year (from Summer 2005 to Spring 2006), we graduated 38 Ph.D. students. This is a phenomenal number when one considers that the top 10 ECE programs in the country graduate approximately 0.6 Ph.D. students per faculty each year. This year our ratio is about 0.8, an accomplishment to be proud of.

The “dark cloud” to report is due to a national trend, and not in our hands to control. The graduate student population which had peaked with the post dot-com economy, is now declining. Furthermore, applications from foreign countries have declined greatly. This may be attributed to difficulties in getting visas, the disenchantment of international students with U.S. foreign policy, and many schools around the world putting significant resources into recruiting the top students within their country as well as internationally. This combined effect has resulted in a large drop in international student applicants. At OSU, we were not immune from these effects and our applicant pool has diminished considerably.

2004-2005
Teaching Hours of ECE Faculty in ECE Courses
(8,321 student credit hours)

<table>
<thead>
<tr>
<th>Rank</th>
<th>students</th>
<th>teaching hours</th>
</tr>
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<tbody>
<tr>
<td>2</td>
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<td>749</td>
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<tr>
<td>3</td>
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<td>M.S.</td>
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2005-2006
Teaching Hours of ECE Faculty in ECE Courses
(8,145 student credit hours)

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<td>TOTAL</td>
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</table>
2004-2005

Christian Austin, AFRL
Phillip D. Barnes, NIH
Ryan Bobka, Harris
Ryan Chilton, DDU
Petro Cociorva, DUF
Bin Gao, UF
Paulo F. Gotardo, Fulbright/Brazil
Kevin Groves, DAGSI
Yaoyao Gu, UF
Daniel E. Hack, OSGC
Julie Jackson, NSF
Hongjun Jia, DUF
Jun Kong, UF
Darren P. Krasny, DDUF
Lifeng Lai, DUF
Seung-Cheol Lee, Ansoft
Wenfei Li, DAGSI
Adam Margetts, OSGC
Jayanta Mukherjee, TI
Sugumar Murugesan, UF
Sukkeun Myoung, Schlesinger
Arul Palanivelu, DUF
Jason Parry, TI
Theodore Pavlic, DDU
John Sandora, Northrup-Grumman
Ryan Schultz, DUF
Sriram Seshadri, Microsoft
Subhojit Som, DUF
Ziyi Sun, DUF
Yan Tsang, DGE
Sergey Tumakha, Litton
Jonathan Ulrey, Northrup-Grumman
Brian Usner, NASA
Marinos Vouvakis, Ansoft
Xuejin Wen, DUF
Brent Woods, DUF
Lu (Cynthia) Xu, Schlesinger
Salih Yarga, UF
Yue Yu, UF
Kun Yuan, UF
Xin Yuan, DAGSI
Kezhong Zhao, Northrup-Grumman
Yongling Zheng, UF

2005-2006

Jacob Adams, DDU
Joshua Ash, MIT Lincoln Laboratory
Seyfettin Bilgin, Litton
Andrew Carlin, NASA
Chinling Chang, Harris
Xian Chen, UF
Ryan Chilton, Northrup-Grumman
Jeffrey Chow, DGE
Ryan Christopher, DGE
Katherine Dykes, UF
Paulo F. Gotardo, Fullbright/Brazil
Yiran Hu, DUF

Julie Jackson, DAGSI
Sanjeev Jindal, DGE
Sangil Jwa, DAGSI
Ozan Koyluoglu, UF
Jeffrey Kula, NASA
Arda Kurt, ITS
Sukkeun Myoung, Schlesinger
Ruben Ortega, DGE
Jason Parker, NSF
Theodore Pavlic, DDU
Tao Peng, UF
Bryan Raines, DGE
Naveen Ramakrishnan, UF
Alexander Ruege, Northrup-Grumman
Jong Hoon Ryu, Schlesinger
Michael Schuette, NSF GK-12
Mohammad Shahmohammadi, UF
David Sigthorsson, DAGSI
Chad Slick, Northrup-Grumman
Ziyi Sun, DUF
Justin Teller, DAGSI
Juan Torres, Fulbright
Matthew Valerio, UF
Dijia Wu, UF
Lu (Cynthia) Xu, Schlesinger
Rong Xu, ITS
Yiguang Xuan, UF
Xin Yuan, DUF
Yuan Zhang, TI
2004-2005

André, Carrie Leigh, "III-V Semiconductors on SiGe Substrates for Multi-Junction Photovoltaics," Advisor: S. Ringel


Comanescu, Mihai, "Novel Flux and Speed Estimation Techniques for Sensorless Control of Induction Motors," Advisor: L. Xu

El-Tayeb, Mohammed Soleiman, "Efficient Data Scheduling for Real-Time Large-Scale Data-Intensive Distributed Applications," Advisor: F. Özgün


Ge, Ye, "QOS Provisioning for IEEE 802.11 Protocols," Advisor: Y. Zheng


Jin, Niu, "High Performance Si-Based Tunneling Structures and Their Applications to Integrated Circuity," Advisor: P. Berger


Lee, Kwan-Ho, "Development of Three Novel UWB Antennas Assisted by FDTD Method," Advisor: R. Lee


Marwali, Mohammad Nanda, "Digital Control of PVM Inverters for High Performance Uninterruptible Power Supplies," Advisor: A. Keyhani

Mital, Rashmi, "Design and Demonstration of a Novel Optical True Time Delay Technique Using Polynomial Cells Based on White Cells," Advisor: B. Anderson


Savla, Anup, "Digital Calibration Algorithms for Nyquist-Rate Analog to Digital Converters," Advisor: M. Ismail


Sun, Jing, "Studies on Graph-Based Coding Systems," Advisor: O. Takeshita

Yoon, Ho Kwon, "Multi-Standard Receiver for Bluetooth and WLAN," Advisor: M. Ismail

Younus, M D Iqbal, "Circuit Design for Low Voltage Wireless Receiver with Improved Image Rejection," Advisor: M. Ismail

2005-2006


Chiu, Chin-Yung, "Broadband CMOS Power Amplifier for IEEE 802.11 a/b/g Wireless LAN Transmitters," Advisor: M. Ismail


Chung, Sung-Yong, "Si/SiGe heterostructures: Materials, Physics, Quantum Devices and Their Integration with Heterostructure Bipolar Transistors," Advisor: P. Berger

Dai, Min, "Control of Power Converters in Distributed Generation Systems," Advisor: A. Keyhani


He, Boyi, "Compatible Discretizations for Maxwell’s Equations," Advisor: F. Teixeira

He, Chao, "Advanced Wavelet Application for Video Compression and Video Object Tracking," Advisor: Y. Zheng

Hue, Yik-Kiong, "Analysis of Electromagnetic Well-Lowering Tools," Advisor: F. Teixeira


Kwon, Ojin, "Nonohmic Integration of III-V Optoelectronics on Si," Advisor: S. Ringel

Lee, Sunyoung, "Distributed Effect in Power Transistors and the Optimization of the Layouts of ALGAN/GAN HFETs," Advisor: P. Roblin


Liu, Jingbo "Modeling, Analysis and Design of Integrated Starter Generator System Based on Field Oriented Controlled Induction Machines," Advisor: L. Xu


Ma, Qi, "Model Based Control And Efficient Calibration For Crank-To-Run Transition In ST Engines," Advisor: S. Yurkovich

Marashdeh, Qassim, "Advances in Electrical Capacitance Tomography," Advisor: F. Teixeira

Margetts, Adam Robert, "Joint Scale-Lag Diversity in Mobile Wideband Communications," Advisor: P. Schniter


Park, Seok-Bae, "Compact High Performance Analog CMOS Baseband Design Solutions for Multistandard Wireless Transceivers," Advisor: M. Ismail

Seo, Seung Mo, "A Fast IE-FFT Algorithm for Solving Electromagnetic Radiation," Advisor: J. Lee


Su, Yong, "Mathematical Modeling with Application in High-Performance Coding," Advisor: Y. Zheng


Tang, Zhijun, "Information-Theoretic Management of Mobile Sensor Agents," Advisor: Ü. Özgüner


Usner, Brian, "Generalized Hybrid Methods For Modeling Complex Electromagnetic Structures," Advisor: J. Volaklis


Walker, Dennis Eugene, "The Role of Effects on Schottky and Ohmic Contact Characteristics for Gan and AlGan/Gan High-Electron Mobility Transistors," Advisor: L. Brillson


Hack, Daniel E., “A Cortical Measure of the Perceptual Center of Gravity,” Advisor: A. Krishnamurthy


Kramer, Bradley Allen, “Miniaturization of a Spiral Antenna Using High Contrast Dielectrics,” Advisor: J. Volakis


Nagarajan, Ramprasad, “MPLS Relowering for Next Generation Networks,” Advisor: E. Ekici

Parker, Chakka Khiannah, “An Examination of Layout Induced Voltage Threshold Mismatch and Effects on Latched Comparator Circuit Performance,” Advisor: S. Bibyk


Rankin, Matthew L., “The Effect of Sampling Rate on STAP Based RFI Suppression Systems,” Advisor: P. Pathak

Ryan, Kevin W., “CMOS Sensor Data Acquisition Using VIRTEX-II Pro and ROCNETIO,” Advisor: J. DeGroat


Sharma, Gaurav, “Parallelization of a Simulink Based High Fidelity Radar Model and simMPI: An MPI-BLOCKSET for Simulink,” Advisor: A. Krishnamurthy

Shi, Jingpu, “Pitch-Synchronous Acoustic To Articulatory Transformation,” Advisor: A. Krishnamurthy


Sood, Saurabh, “Applications of Graph Spectral Clustering to Audio and Image Segmentation,” Advisor: A. Krishnamurthy

Subramanian, Sudhir, “OE-Track: A Service Oriented Architecture (SOA) Based Design for a Reliable, Near Realtime Patient and Equipment Tracking in Hospitals,” Advisor: F. Khan

Teh, Hee-Lim, “Channel Model and Pilot Symbol Assisted QPSK Modulation for Dedicated Short Range Communication in an Open Area,” Advisor: O. Takeshita


Wang, Yun, “Estimating Wave Velocities on Congested Freeways,” Advisor: B. Coifman


Zarikian, Garo Awadis, “Harmonic Disturbance Rejection in Feedback Linearization Control of a Two Degrees of Freedom Helicopter,” Advisor: A. Serrani

2005-2006


Al-Homs, Mustafa, “High Speed ADC Design Targeting the UWB System Using TSMC 0.18mM Technology Process,” Advisor: M. Ismail

Austin, Christian, “Interferometric Synthetic Aperture Radar Height Estimation with Multiple Scattering Centers in a Resolution Cell,” Advisor: R. Moses


Cociorva, Petru Iulian, “Preconditioners for Sparse Linear Inversion,” Advisor: L. Poter

Daniels, Christina Ilene, “Design Tool Bridges Between MATLAB and Hardware CAD Tools,” Advisor: S. Bibyk


Groves, Kevin, “Modelling, Simulation, and Control Design of an Air-Breathing Hypersonic Vehicle,” Advisor: A. Serrani


Hamisici, Onur, “Feature Extraction: The Role of Subclass Divisions and Spherical Representations,” Advisor: A. Martinez


Keener, Matthew Todd, “BIOFET: Electrical Sensing of Protein Binding,” Advisor: L. Brillson


Lee, Hwa Ok, “Cylindrical FDTD Analysis of LWD Tools through Anisotropic Dipping Layered Earth Media,” Advisor: F. Teixeira


Niamsuwan, Noppasin, “Simple Pulse Blanking Technique and Implementation in Digital Radiometer,” Advisor: J. Johnson

Prescott, Jeffrey, “Automated Registration and 3-D Reconstruction of a Large Number of Histological Images,” Advisor: B. Clymer


Sandra, John, “Design of the ElectoScience Lab’s 0.4-100 Ghz Compact Range Radar,” Advisor: W. Burnside


Sighorsson, David, “Steady State Optimization for Constrained Tracking in Over-Actuated Linear Systems,” Advisor: A. Serrani

Silverman, Matthew, “Using Scripting and Verilog AMS to Improve Design and Testbench Reuse,” Advisor: S. Bibyk


Tammanna, Gkoutham Ahblish, “Wavelet Based Methods for SAR Raw Data Compression and Image De-Noiseing,” Advisor: Y. Zheng


Tsang, Yan Kim, “Performance of Densely Packed Antenna Arrays in Adaptive Mode,” Advisor: J. Johnson


Yu, Yue, “Low-Power Low-Phase-Noise Voltage-Controlled Oscillator Design,” Advisor: S. Bibyk

Master Degrees: non-Thesis

2004-2005

Bansal, Diwakar, Advisor: S. Yurkovich
Barma, Mustaki Mustansir, Advisor: F. Khan
Becker, Michael, Advisor: B. Clymer
Chandrasekhar, Vishakh, Advisor: J. DeGroat
Cho, Ik-Sang, Advisor: S. Bibyk
Del Rio, Carlles Luis, Advisor: B. Clymer
El Riachy, Wissam, Advisor: E. Ekici
Gupta, Sunil Kumar, Advisor: S. Bibyk
Hameed, Shameem Shahul, Advisor: C. Klein
Hausy, Dennis, Advisor: R. Lee
Hughes, Gary R., Advisor: G. Valco
Iroz, Kutay, Advisor: U. Özgüner
Joseph, Neena Anna, Advisor: L. Potter
Kamal, Richa, Advisor: S. Bibyk
Kannappan, Karthik, Advisor: C. Klein
Kalyanaraman, Indu, Advisor: E. Ekici
Kim, Naeyeon, Advisor: F. Teixeira
Krishnamoorthy, Muralidhar, Advisor: E. Ekici
Kula, Jeffrey S., Advisor: J. Volakis
Lin, Po-Chih, Advisor: M. Ismail
Liu, Jonathan Sang-Yaw, Advisor: P. Schniter
Liu, Shin-I, Advisor: G. Valco
Liu, Jing, Advisor: J. DeGroat
Martino, Nicholas A., Advisor: C. Klein
Mumcu, Golkan, Advisor: J. Volakis
Oommen, Alexander, Advisor: C. Klein
Palaniivelu, Arul D. M., Advisor: H. El-Gamal
Radigan, Jeffrey, Advisor: J. DeGroat
Raghunathan, Smiti, Advisor: E. Ekici
Ramachandran, Arun Kumar, Advisor: J. DeGroat
Ramakrishnan, Senthil Nathan, Advisor: S. Bibyk
Showalter, Chester David, Advisor: B. Clymer
Soda, Mark, Advisor: U. Özgüner
Sun, Chao, Advisor: J. DeGroat
Tomita, Minoru, Advisor: K. Passino
Varadachari, Sukumar, V., Advisor: C. Klein
Wang, Ching Hong, Advisor: S. Bibyk
Wang, Dennis, Advisor: F. Teixeira
Wu, Hon Leung, Advisor: A. Krishnamurthy
Zhang, Yongbin, Advisor: A. Martinez

2005-2006

Afzal, Shumaila, Advisor: P. Berger
Alhetairshi, Mishaal A., Advisor: S. Yurkovich
Chen, Shih-Chi Kenny, Advisor: K. Böyer
Foerster, Robert C, Advisor: C. Lee
Hwang, Seonggyong, Advisor: V. Utkin
Jackson, Daniel, Advisor: P. Pathak
Lertwiriyaprapa, Titipong, Advisor: P. Pathak
Meisner, David Joseph, Advisor: S. Ringel
Micaletti, David Michael, Advisor: S. Bibyk
Rabb, David Joel, Advisor: B. Anderson
Ruiz, Jorge Johnathan, Advisor: P. Schniter
Siddiq, Ali, Advisor: J. DeGroat
Thimmiri Mohammed, N., Advisor: J. DeGroat
Torres, Juan Pablo, Advisor: R. Lee
Unger, Gregory Michael, Advisor: J. Volakis
Weber, Justin, Advisor: B. Anderson
Zheng, Yongling, Advisor: U. Özgüner
National Academy of Engineering

Founded in 1964, only about 2,000 peer-elected members and foreign associates, senior professionals in business, academia, and government who are among the world’s most accomplished engineers make up the prestigious NAE. The members provide the leadership and expertise for numerous projects focused on the relationships between engineering, technology, and the quality of life. Three of The Ohio State University’s Department of Electrical and Computer Engineering professors are part of this elite membership:

<table>
<thead>
<tr>
<th>Jose Cruz, Professor</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Fenton, Professor Emeritus</td>
<td>2003</td>
</tr>
<tr>
<td>Robert Kouyoumjian, Professor Emeritus</td>
<td>1995</td>
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</table>

IEEE Fellows

Distinguished as an IEEE Fellow is one of the greatest honors that can be presented by the Institute of Electrical and Electronics Engineers to an individual in recognition of technical, educational, and leadership achievements in academia or industry. The Ohio State University’s Department of Electrical and Computer Engineering is proud of the following present and former faculty members who hold this prestigious distinction:

| Kim Boyer, Professor          | 2004 |
| Len Brillson, Professor       | 2001 |
| Robert Burkholder, Research Scientist | 2005 |
| Walter “Dennie” Burnside, Professor Emer. | 1985 |
| Ralph Compton, Jr., Professor Emer. | 1984 |
| Jose Cruz, Professor          | 1968 |
| Robert Fenton, Professor Emer. | 1986 |
| Jiti Gupta, Research Scientist | 2000 |
| Hooshang Hemami, Professor    | 1999 |
| Mohammed Ismail El-Naggar, Professor | 1997 |
| Ali Keyhani, Professor        | 1998 |
| Hsien Ko, Professor Emer.     | 1971 |
| Robert Kouyoumjian, Professor Emer. | 1976 |
| Aharon Ksienksi, Professor Emer. | 1977 |
| Jin-Fa Lee, Professor         | 2005 |
| Curt Levis, Professor Emer.   | 1996 |
| Ronald Marhefka, Senior Research Scientist | 1992 |
| Benjamin Munk, Professor Emer. | 1989 |
| Edward Newman, Professor      | 1989 |
| David Orin, Professor         | 1993 |
| Kevin Passino, Professor      | 2004 |
| Prabhakar Pathak, Professor   | 1986 |
| Leon Peters, Jr., Professor Emer. | 1981 |
| Roberto Rojas, Professor      | 2001 |
| Roger Rudduck, Professor Emer. | 1990 |
| Stephen Sebo, Professor Emer. | 1993 |
| Vadim Utkin, Professor        | 2004 |
| John Volakis, Professor       | 1996 |
| Eric Walton, Senior Research Scientist, Emer. | 1995 |
| Longya Xu, Professor          | 2004 |
| Jonathan Young, Senior Research Scientist, Emer. | 1995 |
| Steve Yurkovich, Professor    | 2001 |
| Yuan Zheng, Professor         | 1997 |
ECE Distinguished Seminar Series

- Cross-Layer Design for Multihop Wireless Networks, Prof. Ness B. Shroff, Purdue University (co-sponsored by CSE)
- Computer Vision Techniques for Analysis of Human Gesture, Prof. Stan Sclaroff, Boston University
- Creating Provably Stable Biped Robot Walking and Running: Theory and Experiment, Prof. Eric R. Westervelt, Mechanical Engineering, OSU
- SiGe Heterostructure Devices: Overview and Outlook, Dr. Steven J. Koester, IBM TJ Watson Research Center
- Automotive Telematics and Networking - Opportunities and Challenges, Prof. Wai Chen, Telcordia Technologies
- The State-of-the-Art in Electron Beam Lithography and Future Challenges, Dr. Timothy Groves, Leica Microsystems Lithography
- Hacking with Megawatts: Threats to Power Grid Security via Networked Control, Prof. Chris DeMarco, University of Wisconsin-Madison
- Antenna and Algorithm Design in MIMO Communication Systems: Exploiting the Spatial Selectivity of Wireless Channels, Prof. Robert W. Heath Jr., University of Texas, Austin
- Loopy Belief Propagation: Convergence and Approximations, Prof. Alexander Ihler, University of California, Irvine

ECE Colloquia and Seminars

- Software System Stability, Prof. Lui Sha, University of Illinois, Urbana-Champaign
- Tensor Voting Review, Applications to Computer Vision and Machine Learning, Prof. Gerard Medioni, University of Southern California
- Genetic Algorithms (GA) and Particle Swarm Optimization (PSO) in Engineering Electromagnetics, Prof. Yahya Rahmat-Samii, University of California, Los Angeles
- Energy Conservation in Adaptive Filtering, Prof. Ali H. Sayed, University of California, Los Angeles
- Low Order Transient Modeling Tools for Feedback Design in Flow Control, Prof. Gilead Tadmor, Northwestern University
- Hybrid Dynamical Systems and Nonlinear Feedback Control, Prof. Andrew R. Teel, University of California, Santa Barbara
- Impact of GPS Modernization and Galileo on Aviation, Prof. Per Enge, Stanford University
- Training, Feedback, and Information Exchange in Wireless Systems, Prof. Michael Honig, University of Illinois, Urbana-Champaign
- Collective Motion in Engineered and Natural Multi-Agent Systems, Prof. Naomi Ehrich Leonard, Princeton University
- Symmetric Function Computation in Sensor Networks, Prof. R. Srikant, University of Illinois, Urbana-Champaign
- Power Electronics and the Growing Energy Revolution: The How of Alternative and Sustainable Energy, Prof. Philip Krein, University of Illinois, Urbana-Champaign
- Metamaterials, Shrinking Circuit Elements, and Nanooptics, Prof. Nader Engheta, University of Pennsylvania

IPS Seminar Series

- Cross-Layer Design for Multihop Wireless Networks, Prof. Ness B. Shroff, Purdue University (co-sponsored by CSE)
- Computer Vision Techniques for Analysis of Human Gesture, Prof. Stan Sclaroff, Boston University
- Creating Provably Stable Biped Robot Walking and Running: Theory and Experiment, Prof. Eric R. Westervelt, Mechanical Engineering, OSU
- SiGe Heterostructure Devices: Overview and Outlook, Dr. Steven J. Koester, IBM TJ Watson Research Center
- Automotive Telematics and Networking - Opportunities and Challenges, Prof. Wai Chen, Telcordia Technologies
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- Hacking with Megawatts: Threats to Power Grid Security via Networked Control, Prof. Chris DeMarco, University of Wisconsin-Madison
- Antenna and Algorithm Design in MIMO Communication Systems: Exploiting the Spatial Selectivity of Wireless Channels, Prof. Robert W. Heath Jr., University of Texas, Austin
- Loopy Belief Propagation: Convergence and Approximations, Prof. Alexander Ihler, University of California, Irvine

Center for Control Seminar Series

- Research Activities and Challenges at GE Global Research Center, Dr. Yu Zhang, General Electric Global Research Center
- Phantom Track Generation using Multiple Electronic Combat Air Vehicles (ECAV), Prof. Suhuda Jayasuriya, Texas A&M University
- Averaging Through Dither in Non-smooth Feedback Systems, Prof. Francesco Vasca, Universita del Sannio in Benevento, Italy
- Low Order Transient Modeling Tools for Feedback Design in Flow Control, Prof. Gilead Tadmor, Northwestern University
- Hybrid Dynamical Systems and Nonlinear Feedback Control, Prof. Andrew R. Teel, University of California Santa Barbara
- Negotiation based Multiple Agent Search, Prof. Debasis Ghose, Indian Institute of Science
- Closed-loop Flow Control Work at Syracuse University, Prof. Mark Glauzer, Syracuse University
- Limit Sets, Steady-State, Observers and Output Regulation of Nonlinear Systems, Prof. Alberto Isidori, Washington University in St. Louis
- Modeling and Nonlinear Control of Mini UAVs, Prof. Rogelio Lozano, Universite de Technologie de Compiegne
- Reduced Order Modeling for Feedback Flow Control, Prof. Dietmar Remper, Illinois Institute of Technology, Chicago, IL

IEEE EDS/LEOS Distinguished Seminar Series

- Nanoscale Transistors: The Ultimate MOSFET and Beyond, Prof. Mark Lundstrom, Purdue University
- Nanotechnology Opportunities in the Silicon CMOS World, Dr. Tak H. Ning, IBM Thomas J. Watson Research Center
- Innovations in Light-Emitting Diodes for Solid-State and Smart Lighting Applications, Prof. E. Fred Schubert, Rensselaer Polytechnic Institute
Ümit Çatalyürek joined OSU's faculty this year as an assistant professor with a split appointment between the Department of Electrical and Computer Engineering and the Department of Biomedical Informatics in the College of Medicine and Public Health. He obtained his Ph.D. in 2000 from Bilkent University in Turkey. His research and areas of particular interest include graph and hypergraph partitioning, workload and data decomposition for irregular domains, scheduling, parallel graph and hypergraph algorithms, high-performance runtime systems for component architectures and data-intensive computing, parallel algorithms for scientific and engineering applications, combinatorial scientific computing and biomedical informatics.

Ronald Reano, assistant professor of electrical and computer engineering, joined the ECE department faculty in the Autumn of 2004. He grew up in a small suburb of Los Angeles and studied physics as an undergraduate student at UCLA. He then enlisted in the United States Air Force where he was stationed in Albuquerque, NM at Kirtland Air Force Base. During his 4-½ year tenure he worked as an Aircraft Systems Reliability Analyst in the Operational Test and Evaluation Center where he researched failure rates in aircraft systems and subsystems. To enhance his working knowledge at the center, Reano began taking courses in electrical engineering after which he received a second undergraduate degree. It was this educational experience that led him to realize that electrical engineering is what he wanted to study further and went on to earn his M.A. and Ph.D. in 2000 and 2004, respectively, from the University of Michigan, Ann Arbor. His Ph.D. research included lasers, electro-optics semiconductors, coupled-electrothermal problems, and MEMS devices, while his post-doc work included nanotechnology for biomaterials. Ron comes to OSU hoping to bring together a multi-disciplinary group of faculty researchers in the areas of electromagnetics, optics, and solid state.

Elif Uysal-Bıyıkoğlu joined OSU as an assistant professor in August 2005 after a two year visiting position at MIT. As a graduate student, she was introduced to information theory and wireless communication. After writing her master’s thesis on maximum diversity in frequency hopping she became interested in the junction of information theory and network theory which was an area that had seen very little attention but is very important for wireless networks. After obtaining her master’s degree in EECS from MIT she moved to Stanford and began work on her Ph.D. Her thesis consisted of several novel problem formulations on energy-efficiently transmitting data on point-to-point and multiuser channels, their optimal solutions and good heuristics suitable for implementation. In 2003, after four years at Stanford, she returned to MIT and continued looking at scheduling problems that occur in wireless networks, but this time, with a different focus: maximizing throughput for a given total power constraint in the multi-antenna downlink. At OSU, Uysal-Bıyıkoğlu is a member of the Information Processing Systems (IPS) Lab. Her current research program has the theme of scheduling, multiplexing and routing data in wireless networks using tools of network theory and information theory. She is also interested in system integration and protocol design of large, low-energy networks.
Principle Areas of Teaching and Research: Concentrated on neural networks, high performance computing, signal/image/video processing, and object identification. He has an active research program through his collaborations with the Army Research Laboratory (ARL), Wright Patterson Air Force Base, and the Defense Advanced Research Projects Agency (DARPA), in addition to funding received from the National Science Foundation, National Institutes of Health, and industrial partnerships.

Service: Academic lead in the area of Signal and Image Processing (SIP) for the Department of Defense (DoD) High Performance Computing Modernization Program’s User Productivity Enhancement and Technology Transfer (HPCMP PET) initiative. Dr. Ahalt is one of the co-founders of the Information Processing Systems (IPS) Laboratory in ECE, OSU.

Awards and Honors: 1997 OSU Lumley Research Award; 1999 OSU College of Engineering Research Award; one of three keynote speakers at Super-Computing 2004, Pittsburgh, PA; and under Dr. Ahalt’s direction Ohio inaugurated the Third Frontier Network on November 30, 2004. The TFN is now carrying all of Higher Ed traffic in Ohio, and has not had a service interruption since it was inaugurated. In fall of 2006 the TFN will also carry all of the K-12 traffic in Ohio.

Selected Publications*:

Betty Lise Anderson
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Phone: 614.292.1323
Office: 200 Caldwell Laboratory
141 ElectroScience Laboratory

Betty Lise Anderson earned her MS and Ph.D. from the University of Vermont (`87, `90) and her BSEE from Syracuse University in 1978. Before graduate school she worked in industry for nine years, including Tektronix, GTE Labs, and Draper Labs. She has been at OSU since 1990.

Principle Areas of Teaching and Research: Photonics, including RF photonics, optical computing, coherence, and biosensors; optical true time delay for steering phased array antennas. In addition to photonics, she teaches courses in semiconductor physics.


Selected Publications*:

Selected Publications*:
Steven B. Bibyk

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Phone: 614.292.1300
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Dr. Bibyk is from Cleveland Ohio, obtained a combination BS/MS in 1980, and a Ph.D. in 1983, all in Electrical Engineering and Applied Physics from Case Western Reserve University. He joined Ohio State in 1984, where he teaches courses in circuit and project design. He served as a visiting Research Scientist in the Space Electronics Division at the NASA Glenn Research Center and the Ohio Aerospace Institute, and was a Member of the Technical Staff at Sandia National Laboratories in Albuquerque, NM.


Service: Associate Editor – Analog Integrated Circuits and Signal Processing – Springer; member of the IEEE, a life member of APS, Tau Beta Pi, andEta Kappa Nu.

Selected Publications*:


Kim L. Boyer

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Office: 468 Dreeese Laboratory

Kim Boyer joined OSU in 1986. He co-founded the IEEE-CS Workshop on Perceptual Organization, and served as co-Chair for Computer Vision and Robotics for ICPR 2002. He has over 100 publications, including five books.

Principle Areas of Teaching and Research: Image processing and computer vision; communications, digital design.

Awards and Honors: Fellow, IEEE; Fellow, International Association for Pattern Recognition; Jefferson Science Fellow, US Department of State; IEEE-CS Distinguished Speaker; Best Paper, CVPR 1993.

Service: Chair, IEEE-CS PAMI Technical Committee; US Delegate, IAPR Governing Board; Assoc. Ed.: Comp. Vision & Image Understanding; Machine Vision & Appl.

Selected Publications*:


Leonard J. Brillson

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Phone: 614.292.8015
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Leonard J. Brillson holds a joint appointment between the Department of Electrical Engineering, the Department of Physics, and the Center for Materials Research leading an interdisciplinary research effort in Electronic Materials. Prior to Ohio State University, he was a director of Xerox Corporation’s Materials Research Laboratory and had responsibility for Xerox’s long-range physical science and technology programs at the company’s research headquarters in Rochester, N.Y. Dr. Brillson has more than 270 professional publications including technical articles, invited reviews, monographs and books.

Areas of Interest: Research group focuses on the structure and properties of electronic materials interfaces, emphasizing compound semiconductors for high speed microelectronic and optoelectronic device structures, wide band gap semiconductors for sensor and display applications, and thin film dielectrics for insulating gate structures. He has presented more than ninety invited lectures at national or international scientific conferences.

Awards and Honors: Ohio State Engineering’s Lumley Research Award, Xerox Corporation’s Outstanding Achievement Award, Surface Science Magazine’s Excellence Award, and Citation Classic recognition by the Institute for Scientific Information. He has served for over a decade as Associate Editor of the Journal of Electronic Materials; and holds two patents with a third pending.

Service: He is a Fellow of the Institute of Electrical and Electronics Engineers, a Fellow of the American Academy for the Advancement of Science, a Fellow of the AVS, a Fellow of the American Physical Society, and a former Governing Board member of the American Institute of Physics. He has served on the board of editors for numerous technical journals.

Selected Publications*:

Research Interests: Graph and hypergraph partitioning, workload and data decomposition for irregular domains, scheduling, parallel graph and hypergraph algorithms, high-performance runtime systems for component architectures and data-intensive computing, parallel algorithms for scientific applications.


Selected Publications*:
Dr. Cruz joined OSU in 1992 as Dean of Engineering. He is the author or coauthor of 6 books and more than 225 articles and papers.

**Principle Areas of Teaching and Research Area:**
- Systems and Control
- Communication and computation algorithms, modeling of networks and protocols

**Awards and Honors:**
- Member, National Academy of Engineering (NAE), elected 1980; Corresponding Member, National Academy of Science and Technology (NAST, Philippines), elected 2003; Recipient, Richard E. Bellman Control Heritage Award, American Automatic Control Council (AACC), 1994; Fellow, Institute of Electrical and Electronics Engineers (IEEE), elected 1968; Fellow, American Association for the Advancement of Science (AAAS), elected 1989; Recipient, Curtis W. McGraw Research Award, American Society for Engineering Education (ASEE), 1972; Recipient, IEEE Richard M. Emberson Award, 1989; Fellow, American Society for Engineering Education (ASEE), 2004; University of Illinois College of Engineering Alumni Award for a Distinguished Career in Engineering, 2003; Recipient, Clara M. and Peter L. Scott Faculty Award for Excellence in Engineering Education, College of Engineering, The Ohio State University, 2005

**Service:**
- American Association for the Advancement of Science: Engineering Section Member-at-Large, 1991-1995; Secretary, 1998-2003; Chair-Elect, 2003-2004; Chair, 2004-2005; Retiring Chair, 2005-2006; AAAS Council member, 2005-2006.

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**Joanne E. DeGroat**

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**Principle Areas of Teaching and Research:**
- Hardware Description Languages, HDL Verification, Digital System Design, VLSI, Computer Architecture, Freshman Engineering courses, C Programming; Embedded Systems, RF VLSI, FPGA systems

**Awards and Honors:**
- Outstanding Scientist of the 21st Century; Empire Who’s Who of Executives and Professionals

**Service:**
- 2001, 2002 Freshman Programs Committee; 2003 Chair, Freshman Programs Committee; 2004, 2005 Freshman Programs Committee 2006 Chair, Freshman Programs Committee 2000 to present - ABET Computer Engineering Program Evaluator

**Selected Publications:**

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**Eylem Ekici**

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**Office:** 320 Dreese Laboratory

**Areas of Interest:**
- Communication and computer networks, wireless systems, sensor-based communication and computation algorithms, modeling of networks and protocols

**Service:**

**Selected Publications:**
Dr. El-Gamal has been with the ECE Department since January 2001. Prior to that he served as a Project Manager in the Middle East Regional Office of Alcatel Telecom, a Research Assistant in ECE at the University of Maryland at College Park, MD, and with the Advanced Development Group at Hughes Network Systems (HNS) in Germantown, MD, as a Senior Member of the Technical Staff. He has held visiting appointments at UCLA and Eurecom Institute. He also holds 5 U.S. patents and has eight more patent applications pending.

**Areas of interest:** Information Theory; Coding Theory, Wireless Communication; and DNA Self Assembly.

**Awards and Honors:** Recipient of the HNS Annual Achievement Award (2000), the OSU College of Engineering Lumley Research Award (2003), the OSU Electrical Engineering Department Farmer Young Faculty Development Fund (2003-2008), and the National Science Foundation CAREER Young Faculty Development Fund (2003), the Achievement Award (2000), the OSU College of Engineering Awards and Honors: Recipient of the HNS Annual Achievement Award (2000), the OSU College of Engineering Lumley Research Award (2003), the OSU Electrical Engineering Department Farmer Young Faculty Development Fund (2003-2008), and the National Science Foundation CAREER Young Faculty Development Fund (2003), the Achievement Award (2000), the OSU College of Engineering Lumley Research Award (1986 and 1994; Fred H. Pumphrey/EXK Distinguished Teaching Award, 2005.

**Recent Publications**:

**Research Interests:** Control, animation and dynamics of human, movement, robots, biorobotic systems, robots and marionettes.

**Selected Publications**:

Mohammed Ismail
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Mohammed Ismail received his BSEE and MSEE from Cairo University, Egypt and Ph.D. in EE from University of Manitoba, Canada. He has over 25 years of experience of R&D in the fields of analog, RFIC and mixed signal integrated circuits for communications applications. He is the founding director of the Analog VLSI Lab at Ohio State and has, over the last 20 years, advised the thesis work of over 40 Ph.D. and 80 MS students. He held several positions in both industry and academia and served as a corporate consultant to many companies in the U.S., Europe and the Far East. He publishes extensively and has been awarded 11 patents. His last book (2004) is entitled “CMOS PLLs and VCOs for 4G Wireless” by Springer.

**Service:** Founder of the “International Journal of Analog Integrated Circuits and Signal Processing,” Springer, and serves as the journal’s Editor-In-Chief; served as Associate Editor for many IEEE Transactions and on the Board of Governors of the IEEE Circuits and Systems Society; the founding editor of “The Chip,” a column in The “IEEE Circuits and Devices Magazine;” Fellow of IEEE.

**Research Interests:** Main interest lies in cross-disciplinary research spanning the fields of integrated circuits, communication systems and DSP, and targeting development of chip sets for high volume low cost wireless devices. Current interests include digitally programmable RF CMOS radios for 3G and 4G wireless handsets, software radios, low voltage, low power RF front ends, data converters and PLLs, digital system calibration for first-pass-silicon, power management techniques and statistical design and optimization techniques for high yield.

**Awards and Honors:** Fellow of IEEE; IEEE-USA Committee on Aerospace Technology Policy; Semiconductor Research Corporation Inventor Recognition Awards; Presidential Young Investigator Award; Nokia/Fulbright Scholar; Ohio State Lumely Research Awards (1992, 1997 and 2002).

**Selected Publications**:
Donald G. Kasten received the B.S.E.E degree from the University of Missouri – Rolla and the M.S.E.E and Ph.D. degrees from the University of Missouri – Columbia. He joined the Department of Electrical Engineering at OSU in 1976 after receiving the Ph.D. Prior to the Ph.D. he worked as a Relay Engineer with Central Illinois Public Service Company for 4 years. He also did graduate work at the University of Southern California for a year and worked part time with Southern California Edison Company as a Relay Engineer. He is a registered professional engineer in Ohio and Illinois and a senior member of IEEE.

Research Interests: Partial discharge in low pressure environments, substation and tower grounding using an electrolytic tank, electric and magnetic fields around FACTS devices.

Selected Publications*:


Professor
Ph.D. 1996
Massachusetts Institute of Technology

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Principle Areas of Teaching and Research:

Service: Faculty advisor - Gamma Chapter of Eta Kappa Nu, professional engineering refresher course instructor.

Selected Publications*:


Professor
Ph.D. 1996
Massachusetts Institute of Technology

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Principle Areas of Research and Teaching:
Power Systems and Control of Electric Machines; Research activities focus on the design and modeling of electric machine, finite element analysis, control and design of Power electronic systems, DSP-based virtual test bed for design and control of power electronic systems, electro-mechanical systems, automotive systems and modeling, parameter estimation and failure detection systems. These activities have involved a substantial amount of experimental research on modeling and parameter estimation of electric machine and the development of DSP based virtual testbed for design of unipolar resonant power converter systems.

Selected Publications*:


Selected Publications*:


Furruk S. Khan
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Prof. Khan is an associate professor in the department of ECE. He also holds joint positions in the department of CSE and the department of Anesthesiology in the College of Medicine.

Principle Areas of Teaching and Research: Applied Software Engineering and Enterprise Mission Critical Distributed Computing; currently interested in enhancing Web Services with emerging WS-* industry standards for designing secure and reliable healthcare systems; also performed extensive research in theoretical and computational Physics; co-founder of a four course Applied Software Engineering sequence shared jointly between ECE and CSE departments; lectured extensively on enterprise distributed computing and security in the USA, Europe and Asia. His projects have been funded by the National Science Foundation, Naval Research Laboratory, Office of Naval Research, Air Force, Wright Patterson Air Force Base, Cray Research, Lucent Technologies, and Microsoft Research

Awards and Honors: Fred H. Pumphrey Distinguished Teaching Award (1991, 1992, 1993 and 1994), and the Charles E. MacQuigg Outstanding Teaching Award (1992). He and his team were finalists for the TOPCat award for the best technology team in central Ohio. His team is also a partner in Microsoft’s Technical Adoption Program - the only university team invited to this program.

Selected Publications*:

Charles A. Klein
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Professor Klein received his BS in Electrical Engineering with Computer Science in 1971, his MSEE in 1972 and his Ph.D. in 1975 at the University of Illinois at Urbana-Champaign. After graduating he worked at Ford Aerospace in 1975 and 1976 in Palio Alto, CA solving computational electromagnetic problem for satellite design. He started as a faculty member at OSU in 1977 and is currently a full professor. Professor Klein is also the Associate Chair of the ECE Department. He has performed funded research for NSF, DARPA, and the CRAY Corporation.

Research Interests: Computer Engineering, Robotics, Networking

Service: Senior member of IEEE

Selected Publications*:

Ashok Krishnamurthy
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Phone: 614.292.5604
Office: 616 Dreese Laboratory

Ashok Krishnamurthy is Director of Research and Scientific Development at The Ohio Supercomputer Center and an Associate Professor with the Department of Electrical and Computer Engineering at The Ohio State University. He has a B.Tech. from the Indian Institute of Technology, Madras and M.S. and Ph.D. degrees from the University of Florida, all in Electrical Engineering.

Research Interests: Signal and Image Processing; Applications of High Performance Computers in Modeling, Simulation and Testing; Computational Auditory Models and applications to speech and music perception.

Selected Publications*:
Chang-Gun Lee
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Office: 664 Dreese Laboratory

Chang-Gun joined the faculty in 2002. Previously, he was a Research Scientist in the Department of Computer Science, University of Illinois at Urbana-Champaign from 2000 to 2002 and a Research Engineer in the Advanced Telecomm. Research Lab., LG Information & Communications, Ltd. from 1998 to 2000. He is a member of the IEEE Computer Society.

**Principle Areas of Teaching and Research:** Embedded real-time systems, QoS management, wireless sensor networks, network measurement infrastructure

**Awards and Honors:** Best Student Paper Award RTSS 2004; Nominee for the Best Paper Award RTSS 2003


**Selected Publications:**

Jin-Fa Lee
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223 ElectroScience Laboratory

Jin-Fa Lee received the B.S. degree from National Taiwan University, in 1982 and the M.S. and Ph.D. degrees from Carnegie-Mellon University in 1986 and 1989, respectively, in electrical engineering. From 1988 to 1990, he was an ANSOFT Corp., where he developed several CAD/CAE finite element programs for modeling three-dimensional microwave and millimeter-wave circuits. From 1990 to 1991, he was a post-doctoral fellow at the University of Illinois at Urbana-Champaign. From 1991 to 2000, he was with the Dept. of Electrical and Computer Engineering, Worcester Polytechnic Institute. He joined The Ohio State University in 2001 where he is currently a Prof. in the Department of Electrical and Computer Engineering. Professor Lee is an IEEE Fellow.

**Principle Areas of Teaching and Research:** Electromagnetic field theories, antennas, numerical methods and their applications to computational electromagnetics, analyses of numerical methods, fast finite element methods, fast integral equation methods, hybrid methods, three-dimensional mesh generation, and domain decomposition methods.

**Awards and Honors:** Lumley Research Award, Ohio State University; 2006; Best Student Paper IEEE APS/URSI symposium 2003, 2005; Student paper finalist, SIAM Copper Mountain Conference, 2004; Best Student paper, Zurich EMC, 2006; Best poster paper award, CEFCC 2006; Student paper finalists, IEEE APS/URSI Symposium 2006.

**Selected Publications:**

Robert Lee
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Robert Lee received his BSEE in 1983 from Lehigh University in Bethlehem, PA and his MSEE and Ph.D. in 1988 and 1990, respectively, from the University of Arizona, Tucson. From 1983 to 1984, he worked for Microwave Semiconductor Corp. in Somerset, NJ as a Microwave Engineer. From 1984 to 1986, he was a Member of the Technical Staff at Hughes Aircraft Company in Tucson, AZ. From 1986 to 1990, he was a research assistant at the University of Arizona. In addition, during the summers of 1987 through 1989, he worked at Sandia National Laboratories in Albuquerque, NM. Since 1990, he has been at The Ohio State University where he is currently a professor of electrical and computer engineering.

**Principle Areas of Teaching and Research:** Electromagnetics; development and application of finite element and finite difference methods to electromagnetics-related applications. He has published over 70 journal papers in this area.


**Selected Publications:**
Wu Lu received his Ph.D. degree in physical electronics and optoelectronics from Southeast University, China, in 1994. Before he joined Ohio State as an assistant professor, he was a Postdoctoral Research Engineer at Electronics and Telecommunication Research Institute (ETRI), Korea (1995 to 1998), a Research Fellow at Microelectronics Center, Nanyang Technological University, Singapore, (1996 to 1998), and a Research Associate at the Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign (1998 to 2001). He has authored and co-authored over 120 technical papers in referred journals and conferences. He is a senior member of IEEE and a member of OSA and AAAS.


Aleix Martinez is an Assistant Professor in the Department of Electrical and Computer Engineering at The Ohio State University (OSU). He is also affiliated with the Department of Biomedical Engineering and the Center for Cognitive Science, and is the founding director of the Computational Biology and Cognitive Science Laboratory at OSU. Prior to joining OSU, he was a Postdoctoral Research Engineer at Purdue University and the Sony Computer Science Laboratory. He co-organized the 1st IEEE Workshop on Computer Vision and Pattern Recognition for Human-Computer Interaction (2003), served as a co-chair for the 2nd IEEE Workshop on Face Processing in Video (2005), and is a co-organizer and –chair of the 2nd IEEE Workshop on Vision for Human Computer Interaction (2006). In 2003, he was a co-guest editor of the special issue on face recognition in the journal Computer Vision and Image Understanding. He is the author of one of the most used and cited databases of face images, the AR-face database.

**Areas of Interest**: Computational cognitive science, machine learning & pattern recognition, computer vision, bioinformatics.


**Principal Areas of Teaching and Research**: High speed electronic devices; high power and high frequency transistors; solid state chemical and biological sensors; nanofabrication and bionano-technology.

**Awards and Honors**: 2005 Lumley Research Award, College of Engineering, The Ohio State University; Best Paper Award of 2005 International Conference on Electron, Ion, Photon Beams and Nanofabrication (EIPBN) (with Michael Schuette).

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Randolph L. Moses E-mail: moses@ece.osu.edu

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**Principal Areas of Teaching and Research**: Statistical signal processing; sensor array processing; signal detection and estimation; applications to radar signal processing and sensor networks.


Edward Newman
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253 ElectroScience Laboratory

Principle Areas of Teaching and Research: Electromagnetic theory, computational electromagnetics, antennas, electromagnetic compatibility, and radar.


Service: Secretary, Vice Chair, and Chair of Columbus, OH Sections of IEEE Antennas and Propagation Society; Treasurer of 2003 IEEE Antennas and Propagation Society and URSI International Symposium.

Selected Publications*:

David E. Orin
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David E. Orin joined the faculty in 1981 after five years at Case Western Reserve University. His research in robotics has been supported by NSF, Sandia National Laboratories, DARPA, NASA, Cray Research, NRL, and Los Alamos National Laboratory. He has published over 125 journal and conference papers.

Principal Areas of Teaching and Research: Computer engineering, robotics, biped locomotion, quadruped galloping, walking machines, dynamic maneuvers in legged locomotion, dynamic simulation, evolutionary robotics, graphical simulation.

Awards and Distinctions: Fellow of the IEEE; Distinguished Service Award, IEEE Robotics and Automation Society, 2004; Charles E. MacQuigg Award for Outstanding Teaching, College of Engineering, OSU, 2003;Eta Kappa Nu Professor of the Year Award, EE Department, OSU (1998-9).


Selected Publications*:

Hitay Özbay
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Office: 404 Dreese Laboratory

Hitay Özbay received the B.S. degree in 1985 (Middle East Tech. Univ., Ankara, Turkey), the M.Eng degree in 1987 (McGill Univ., Montreal, Canada), and the Ph.D. in 1989 (Univ. of Minnesota, Minneapolis, USA). He was with the Univ. of Rhode Island from 1989 to 1990. Since 1991 he has been with OSU. Dr. Özbay published over 100 refereed technical papers (appeared in journals and conference proceedings) and wrote two books. He was an Associate Editor of IEEE Transactions on Automatic Control (1997-1999), and a member of the Board of Governors of the IEEE Control Systems Society (1999).

Principle Areas of Teaching and Research: Robust control, systems with time delays, control applications in computer networks.

Selected Publications*:
Füsün Özgüner
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Füsün Özgüner held positions at the I.B.M. T.J. Watson Research Center, Istanbul Technical University and University of Toronto before joining The Ohio State University in 1981. She has advised 15 Ph.D. students and more than 40 M.S. students at Ohio State, published over 130 refereed articles in journals and conference proceedings and edited a book. She is currently the Interim Department Chair.

Principle Areas of Teaching and Research: Heterogeneous distributed computing, real-time, fault-tolerant and parallel computing, wireless networks, sensor networks, nanoprocessor architectures.

Awards and Honors: College of Engineering, Lumley Research Award 2002.


Ümit Özgüner
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Office: 412 Dreese Laboratory

Ümit Özgüner has held research and teaching positions at I.B.M. T.J. Watson Research Center, University of Toronto and Istanbul Technical University. He has been with OSU since 1981 where he holds the TRC Inc. Chair on Intelligent Transportation Systems. The team he coordinated participated in the US DOT 1997 Automated Highway System Technology Demonstration in San Diego, where they demonstrated 3 fully automated cars. Recently, he led a group, the Desert Buckeyes, developing an autonomous off-road vehicle to participate successfully in both the 2004 and 2005 DARPA Grand Challenges to autonomously cross the desert.

Research Interests: Intelligent Transportation Systems, decentralization and autonomy issues in large, mobile systems and applied automotive control.


Kevin M. Passino
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Office: 416 Dreese Laboratory

Kevin M. Passino joined OSU in 1990 and has published 5 books and over 85 journal papers.

Principle Areas of Teaching and Research: Feedback, dynamics, and control in complex biological and technological systems; systems biology and bioinspired design; collective and distributed decision making with sensing and inter-agent communication constraints; swarms and coordinated multiagent motion; distributed task/agent allocation for multiagent systems; cooperative search and choice; solitary and social foraging in optimization and evolutionary game-theoretic frameworks; applications to autonomous air vehicles, honey bees, gray jays, and multizone temperature control.

Awards and Honors: Fellow of the IEEE, Distinguished Member Award from IEEE Control Systems Society, Director of OSU Collaborative Center of Control Science.

Service: Faculty Advisor, Engineers for Community Service student organization, Distinguished Lecturer of IEEE Control Systems Society.


Prabhakar Pathak
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Selected Publications:


Lee C. Potter
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Lee Potter received the Ph.D. in Electrical Engineering from the University of Illinois, Urbana, and bachelor degree in EE and mathematics summa cum laude from Vanderbilt University.

Research Interests: Statistical signal processing, inverse problems, and array processing, with applications to synthetic aperture radar, medical imaging, and networked sensor systems.

Selected Publications:

Ronald M. Reano
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Ronald Reano joined OSU as an assistant professor of Electrical Engineering in Jan. 2005. He received his Ph.D. and M.S. degrees in Electrical Engineering from the Univ. of Michigan, Ann Arbor, in 2004, and in 2000 respectively, the B.S. in Electrical Engineering from the University of New Mexico in 1996, and the B.S. in Physics from the University of California, LA in 1991. From 1992-1996 he served as an Aircraft Systems Reliability Analyst (U.S. Air Force Active Duty), Systems Analysis Division, Headquarters Air Force Operational Test and Evaluation Center, Kirtland Air Force Base, NM. He did postdoctoral work in 2004-2005 with Professor Stella W. Pang in the area of nanotechnology for biomaterials at the Solid State Electronics Laboratory, University of Michigan.

Research interests: Integration of electromagnetic, optics, and nanotechnology for innovation in communications and sensor systems.

Selected publications:
Steven A. Ringel  
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Patrick Roblin  
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Robert Rojas  
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**Research Interests:** Electronic materials and nanostructures for energy, electronic and optoelectronic device applications; space and terrestrial photovoltaics; metamorphic semiconductors; heterogeneous materials integration; substrate engineering; device integration schemes; molecular beam epitaxy; nitride based wide bandgap semiconductors; defects in semiconductors; space and terrestrial photovoltaics; infrared bandgap and ultra-high speed materials and devices; interdisciplinary education in materials-allied fields.

**Awards and Honors:** Fellow of AAAS, 3-time Lumley Research Award Winner at OSU (2005, 2000, 1996), Stanley F. Harrison Faculty Award for Excellence in Engineering Education (1999), advisor to 5 best student papers at international conferences, NSF National Young Investigator Award (1994).

**Service:** Conference Chair, 2006 Ohio Nanotechnology Summit; International Organizing Committee for World Conference of Photovoltaic Energy Conversion and International Conference on Materials for Advanced Technologies; Member of Editorial Board of Solid State Electronics; Member, AVS Executive Committee for Electronic Materials and Processing Division.

**Selected Publications:**


**Research Interests:** Microwave/RF circuit and device curriculum; developed the educational microwave lab in the ECE department; design, characterization and modeling of non-linear RF circuits and devices; electro-thermal measurement and modeling of semiconductor devices (e.g., LDMOSFETs, pHEMT, GaN HEMT); characterization of memory effects (traps, self-heating) using pulsed-IV pulsed-RF large signal measurements with a large signal network analyzer (LSNA); design of power RF amplifiers and RFICs circuits (oscillator and mixers); linearization and behavioral modeling of multi-carrier and wideband RF power amplifiers.

**Service:** Dr. Roblin has served as Chairman, Vice-Chairman and Treasurer of the Columbus, OH chapter of the IEEE Antennas and Propagation and Microwave Theory and Techniques Societies. He has served as chair, session organizer and in steering committees of various technical conferences.

**Awards and Honors:** 1988 R.W.P. King Prize Paper Award, the 1990 Browder J. Thompson Memorial Prize Award, both given by IEEE; the 1989 and 1993 Lumley Research Awards, given by the College of Engineering at The Ohio State University.

**Selected Publications:**


**Research Interests:** Include the analysis and design of conformal arrays, active integrated arrays, reconfigurable and electrically small antennas as well as nonreciprocal and nonlinear microwave circuits.

**Selected Publications:**

Philip Schniter
E-mail: schniter@ece.osu.edu
Phone: 614.247.6488
Office: 760 Dreese Laboratory

Philip Schniter received the B.S. and M.S. degrees in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign in 1992 and 1993, respectively. From 1993 to 1996, he was employed by Tektronix Inc., in Beaverton, OR as a systems engineer. In 2000, he received the Ph.D. degree in Electrical Engineering from Cornell University in Ithaca, NY. Subsequently, he joined the Department of Electrical and Computer Engineering at The Ohio State University in Columbus, OH, where he is now an Associate Professor. He currently serves as an Associate Editor for IEEE Signal Processing Letters and sits on the IEEE Signal Processing for Communications Technical Committee.

Research Interests: Signal processing, wireless communication, sensor networks, adaptive filtering.

Awards and Honors: Schlumberger Fellowship and an Intel Foundation Fellowship; the 1999 Prize Paper Award from the IEEE Energy Development and Power Generation Committee for work relating to his M.S. thesis; National Science Foundation CAREER Award, 2003; The OSU College of Engineering Lumeny Research Award, 2005; senior member of the IEEE.

Selected Publications*:


Andrea Serrani
E-mail: serrani@ece.osu.edu
Phone: 614.292.4976
Office: 412 Dreese Laboratory

Andrea Serrani received the B.Eng. degree cum laude in Electrical Engineering and the Ph.D. degree in Artificial Intelligence Systems from the University of Ancona, Italy in 1993 and 1997, respectively. From 1994 to 1999, he was a Fulbright Fellow at the Department of Systems Science and Mathematics, Washington University in St. Louis, where he obtained the Doctor of Science degree in Systems Science and Mathematics in 2000. From 2000 to 2002 he held a research associate position at the Department of Electronics and Automation at the University of Ancona, Italy. Since 2002, he has been an Assistant Professor with the Department of Electrical and Computer Engineering at The Ohio State University. He currently serves as a subject editor for the International Journal of Robust and Nonlinear Control and as an Associate Editor for the IEEE Control Systems Conference Editorial Board.

Research Interests: Nonlinear control and systems theory, tracking and regulation theory, adaptive control, guidance and control of aerospace vehicles, aerodynamic flow control.


Selected Publications*:


Oscar Y. Takeshita
E-mail: teixeira@ece.osu.edu
Phone: 614.688.4369
Office: 712 Dreese Laboratory


Selected Publications*:

Selected Publications*:

Andrea Serrani received the B.Eng. degree cum laude in Electrical Engineering and the Ph.D. degree in Artificial Intelligence Systems from the University of Ancona, Italy in 1993 and 1997, respectively. From 1994 to 1999, he was a Fulbright Fellow at the Department of Systems Science and Mathematics, Washington University in St. Louis, where he obtained the Doctor of Science degree in Systems Science and Mathematics in 2000. From 2000 to 2002 he held a research associate position at the Department of Electronics and Automation at the University of Ancona, Italy. Since 2002, he has been an Assistant Professor with the Department of Electrical and Computer Engineering at The Ohio State University. He currently serves as a subject editor for the International Journal of Robust and Nonlinear Control and as an Associate Editor for the IEEE Control Systems Conference Editorial Board.

Research Interests: Nonlinear control and systems theory, tracking and regulation theory, adaptive control, guidance and control of aerospace vehicles, aerodynamic flow control.


Selected Publications*:


Principle Areas of Teaching and Research:
Prof. Takeshita’s research in Error Control Coding aims at Reliable digital communications for high voice/image quality; Enhance data rate for broadband Internet, Reduction of power consumption, increasing talking time in cell phones and efficient implementability, reducing VLSI chip size and cost.

His areas of interests are error control coding, communication systems and information theory. Primary focus involves turbo-codes, low density parity check (LDPC) codes, iterative decoding, space-time codes, and soft decision decoding of BCH and Reed-Solomon codes. He also conducts much experimental work with software defined radios and is a member of the IEEE Information Theory Society and the IEEE Communications Society.

Selected Publications*:


The Ohio State University
Fernando L. Teixeira
E-mail: teixeira@ece.osu.edu
Phone: 614.247.6499 (DL) 614.292.6993 (ESL)
Office: 312 Dreese Laboratory
217 ElectroScience Laboratory

Fernando L. Teixeira received his Ph.D. from the University of Illinois in 1999 and was postdoctoral research associate at the MIT during 1999-2000. He joined the faculty at OSU in 2000, where he is also affiliated with the ElectroScience Laboratory. He has edited one book, and has published over 60 journal papers and 80 conference articles.

**Principle Areas of Teaching and Research:**
Computational electromagnetics, RF and optical devices, ultrawideband inverse scattering, remote sensing.

**Awards and Honors:** Raj Mittra Outstanding Research Award, University of Illinois, 1999; Lumley Research Award, The Ohio State University, 2003; NSF CAREER Award, 2004; Young Scientist Award, XXVII URSI General Assembly, 2002; Triennial USNC-URSI Booker Fellowship, International Union of Radio Science, 2005.

**Service:** Guest Editor, Progress in Electromagnetics Research Series; Chairman, IEEE Joint AP/MTT Columbus Chapter.


Vadim Utkin
E-mail: utkin@ece.osu.edu
Phone: 456 Dreese Laboratory

Prof. V. Utkin was with the Institute of Control Sciences since 1960, as Head of the Discontinuous Control Systems Laboratory in 1973-1994. Currently he is a professor of The Ohio State University. Prof. Utkin is one of the originators of the concepts of Variable Structure Systems and Sliding Mode Control. In 1975-1978 he was in charge of an international project between his Institute and “Energoinvest,” Sarajevo on the sliding mode control of induction motors. D.C., induction and synchronous drives with sliding mode control have been applied for metal-cutting machine tools, process control and electric cars.

**Research Interests:** Control of infinite-dimensional plants including flexible manipulators, sliding modes in discrete time systems and microprocessor implementation of sliding mode control, control of electric drives and alternators, robotics and automotive control. As Ford Chair Professor he has been a PI of several projects with automotive companies.

**Awards and Honors:** Honorary Doctor of University of Sarajevo; Lenin Prize (highest scientific award in the former USSR), 1972; Oldenburger medal of ASME, 2003; Humboldt award of German government, 2005; IEEE Fellow.

**Service:** Visiting positions at universities in the USA, Japan, Italy and Germany; IPC chairman of 1990 IFAC Congress in Tallinn; current Associate Editor of “International Journal of Control;” Chairman of Technical Committee of IEEE on Variable Structure and Sliding Mode Control; member of Administrative Committee of IEEE CSS.


Sliding Mode Control of Infinite-Dimensional Systems, Nauka, Moscow, 1990 (with Yu.V. Orlov).


Elif Uysal-Bıyıkoğlu
E-mail: elif@ece.osu.edu
Phone: 304 Dreese Laboratory

Elif Uysal-Bıyıkoğlu received the Ph.D. degree in Electrical Engineering from Stanford University, California in 2003, the M.S. degree in Electrical Engineering and Computer Science from MIT in 1999, and the B.S. degree in Electrical and Electronics Engineering from ODTU, Ankara, Turkey, as Valedictorian, in 1997. During her graduate studies she was Research Assistant to Prof. Robert G. Gallager at MIT, and to Profs. Abbas El-Gamal and Balaji Prabhakar at Stanford. Her Ph.D. thesis presented a novel formulation for energy-efficient packet scheduling in wireless communication networks.

**Research Interests:** Networking and communication, particularly in combining the methods network theories and communication theory to find inter-layer design principles and algorithms for wireless networks.

**Service:** Postdoctoral lecturer at MIT from 2003-2005; member of the Research Laboratory for Electronics at MIT; Assistant Professor of ECE at OSU since Sept. 2005; referee to many International journals and conferences, and served on the Technical Programme Committee of WO'06, InfoCom '07, and is a session organizer for the 40th Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, 2006.


George Valco
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Phone: 614.292.5110
Office: 373 Dreese Laboratory

George Valco joined the Department in 1986. He received his Ph.D. in Electrical Engineering from the University of Cincinnati in 1986, his M.S. in Electrical Engineering and Applied Physics from Case Western Reserve University in 1981 and B.S. in Electrical Engineering from Case Western Reserve University in 1979.

Principle Areas of Teaching and Research:
Semiconductor device processing and electronic materials. Has performed research on silicon nanochannel devices for drug delivery, pulsed laser deposition (PLD) of YBa2Cu3O7-x high temperature superconducting thin films for microwave applications, PLD of Pb(ZrxTi1-x)O3 films on silicon for application in microwave filters, silicon solar cells, electronic properties of chemical vapor deposited diamond thin films, and two-dimensional fiber optic arrays.

Service: Prof. Valco teaches classes in the areas of semiconductor devices and their fabrication, core circuits courses and capstone design courses. He has been the chair of the Department’s Undergraduate Studies Committee, and also serves on the College Committee for Academic Affairs and the University’s Council on Academic Affairs.

Selected Publications*:

John Volakis
E-mail: volakis@ece.osu.edu
Phone: 614.292.5846
Office: 360 Dreese Laboratory
220A ElectroScience Laboratory

John L. Volakis was born in Chios, Greece and immigrated to the United States when he was 18 years old. He obtained his Ph.D. from the Ohio State University in 1982. From 1982-1984 he was with Rockwell International (now Boeing Phantom Works). During 1984-2003 he served on the faculty at the University of Michigan rising to the rank of full Professor in 1994. While at Michigan, he served as the Director of the Radiation Laboratory from 1998-2000. Since January 2003, he is the Roy and Lois Chope Chair Professor of Engineering, and also serves as the Director of the ElectroScience Laboratory. Prof. Volakis has graduated mentored 45 Ph.D. students/post-doctoral students.

Research Interests: Primary research deals with antennas, radar scattering, computational methods, electromagnetic compatibility and interference, design of new RF materials, multi-physics engineering and bioelectromagnetics. Dr. Volakis is listed by ISI among the top 250 most referenced authors in Computer Science/Engineering (2004, 2005).


Selected Publications*:

Longya Xu
E-mail: xu@ece.osu.edu
Phone: 614.292.6119
Office: 217 Caldwell Laboratory

Longya Xu is the Director of Power Electronics and Electric Machine Laboratory in the Department. His research activities have been supported by many major industry companies and the government including: GM, Ford, Delphi, Cleveland Clinic Foundation, Boeing, Whirlpool, Smiths Aerospace, Caterpillar, NSF, DOE, NIH. He has been an author on more than 120 technical publications in IEEE Transactions and conference proceedings. From 1992 to present, he has graduated 16 Ph.D. and 20 MS students.

Areas of Teaching and Research: Power electronic converter analysis and synthesis, optimal design of electric machine for special applications, sensorless and vector control of variable speed generating/drive systems; advanced DSP application in real time motion control; super high speed (40k-100k rpm) systems, renewable and distributed generating systems, finite element analysis of magnetic field.


Selected Publications*:

Stephen Yurkovich
E-mail: yurkovich@ece.osu.edu
Phone: 614.292.2586
Office: 408 Dreese Laboratory

Stephen Yurkovich is Director of the Honda Partnership Program at Ohio State, a program with endowments totaling more than $15M. His research has been supported by GM, GEAC, Air Products, and Caterpillar Tractor, as well as the NSF, USAF, NASA, DoE and other government agencies. He has been an author on more than 170 technical publications in journals, edited volumes, and conference proceedings, and has authored and co-authored several books.

Areas of Teaching and Research: Control systems; system identification and modeling; automotive electronics and control systems; control and optimization of advanced propulsion systems

Awards and Honors: IEEE Fellow; IEEE Columbus Section “Fellow of the Year” 2001; IEEE Control Systems Society “Distinguished Member Award”, 2000; IEEE Millennium Medal Winner, 2000; Invited Plenary speaker at several international conferences.


Selected Publications:

Yuan F. Zheng
E-mail: zheng@ece.osu.edu
Phone: 614.292.8039
Office: 205 Dreese Laboratory

Yuan F. Zheng has been with The Ohio State University since August 1989, where he is currently Winbigler Professor. He was the Chairman of the Department of Electrical and Computer Engineering from 1993 to 2004.

Principle Areas of Teaching and Research: Computer organization and digital circuits and systems; wavelet transform for image and video processing, and object classification and tracking, and robotics including robotics for biological applications, multiple robots coordination, legged walking robots, and personal robotics.

Awards and Honors: Presidential Young Investigator Award from Ronald Reagan in 1986, Research Awards from the College of Engineering of The Ohio State University in 1993 and 1997, respectively; best student paper award a few times, and the Fred Diamond Award for best technical paper from the Air Force Research Laboratory in 2006; IEEE Fellow.

Selected Publications:

College of Engineering Awards

The Clara M. and Peter L. Scott Faculty Award is made to a senior faculty member in engineering or architecture who has distinguished himself or herself nationally or internationally.
- 2005 Jose B. Cruz, Jr.

The Lumley Engineering Research Awards recognize a select group of researchers in the College of Engineering who have shown exceptional activity and success in pursuing new knowledge of a fundamental or applied nature.
- 2005 Kim Boyer
- Inder Gupta
- Umit Özgüner
- Steven Ringel
- Philip Schniter
- 2006 Paul Berger
- Len Brillson
- Jin-Fa Lee
- Wu Lu

The Charles E. MacQuigg Awards for Outstanding Teaching is presented annually to faculty members who have demonstrated, in superior manner, their interest in and willingness to help students, their interest in improvement of the high reputation of the College of Engineering, and their outstanding teaching ability.
- 2005 Bradley Clymer

The Stanley E. Harrison Faculty Award is made to a faculty member in engineering or architecture who is in the early or mid-part of his or her career and who has distinguished himself or herself through a contribution to the College or society.
- 2006 Joel Johnson

* For complete list of publications see individual faculty pages at www.ece.osu.edu
Emeritus Professors

Frank Battocletti  Hsien Ko
Robert Blake  Robert Kouyoumjian
Kenneth Breeding  Aharon Ksienki
(d. 2006)  Robert Lackey
Walter Burnside  Curt Levis
Richard Campbell  Ronald Long
Stuart Collins, Jr.  Robert Mayhan
Ralph Compton, Jr.  Robert McGhee
Wendell Cornetet, Jr.  Benedikt Munk
John D. Cowan, Jr.  Karl Olson
Edward Damon  William Peake
Dean Davis  Leon Peters, Jr.
Robert DeVore  Roger Rudduck
Robert Fenton  Stephen Sebo
Robert Garbacz  Marlin Thurston
James Gottling  Carlton Walter
Hsiung Hsu  Claude Warren
Jogikal Jagadeesh  Herman Weed
Carlin Weimer

Emeritus Researchers

Eric K. Walton
Jonathan D. Young

Adjunct Faculty

Robert Burkholder......................ECE (ESL)
Michael Carf............................ECE (ESL)
Chi-Chih Chen.........................ECE (ESL)
Inder Gupta............................ECE (ESL)
Keith Redmill..............................ECE
Teh Hong Lee............................ECE (ESL)
Tomy Sebastian.........................Delphi Automotive
Kubilay Sertel............................ECE (ESL)

Courtesy Faculty

Hojjat Adeli....................Civil, Environmental
Engineering & Geodetic Science
Chris Hammel........................Physics
Giorgio Rizzoni....................Mechanical Engineering
Thomas Waite....................Evolution, Ecology &
Organismal Biology
Jay Zweier.............Molecular & Cellular Biochem

Walter ‘Dennie’ Burnside

Professor Emeritus

Dennie Burnside earned his BSEE and MSEE in 1968 and his Ph.D. in 1972 all from The Ohio State University. He has worked at the Electro-Science Laboratory since that time and was its director from 1995 to 2002. He has been a full professor and a Fellow of the IEEE since 1985.

Dr. Burnside’s research interests lie in antenna development, analysis, and scattering measurements. He has previously investigated wedge diffraction and geometrical optics theory with regard to parallel-plate waveguides. He has studied various array antenna problems including their radiation, impedance and scattering properties. He has analyzed the radiation patterns of on-aircraft antennas. He has utilized a combination of GTD and MoM to examine these areas. More recently, he has been concerned with the design and development of a state-of-the-art compact range and instrumentation system.

Benjamin Munk

Professor Emeritus

Ben Munk received his MSEE in 1954 from the Technical University of Denmark and his Ph.D. in 1968 from The Ohio State University.

Dr. Munk’s research interests include designing radome materials with both excellent electrical properties and good mechanical rigidity. He specializes in electromagnetic scattering in such areas as periodic surfaces, phased arrays, special absorbers, hybrid and metallic radomes, as well as Dicroic Surfaces.

Stuart A. Collins, Jr.

Professor Emeritus

Stuart Collins, Jr. earned his BS from St. Lawrence University in 1953 and his Ph.D. from MIT, both in Physics. He came to OSU in 1964 and has been in the ElectroScience Laboratory since that time. He has been a full professor since 1972.

Dr. Collins’s research interests center around the electromagnetic theory of optics and optical devices. His research areas include optical resonators with focusing elements, atmospheric propagation of light in a turbulent atmosphere, and optical computing. Recently he has worked on the application of optical computing techniques to the generation of true time delays for phased array radars and the shaping of laser beams for welding applications. He is also interested in extending lens design techniques to the simple tracing of skew rays in tilted and decentered optical systems.
Robert E. Fenton
Professor Emeritus

Dr. Fenton joined the Ohio State faculty in 1960. Although he officially retired in 1995, he continues to teach. His technical interests have been focused principally on the communication and control aspects of automated highway systems. During his tenure Dr. Fenton performed pioneering research that led to demonstrated high speed maneuvers (to 80 mph) such as automatic steering, automatic lane changing, and automatic car following. These studies formed a basis for more advanced work at Ohio State and elsewhere.

Some of Dr. Fenton’s honors include the election into the National Academy of Engineering (2003), IEEE 3rd Millennium Medal (2000), the Stuart F. Meyer Award (1998), election as IEEE Fellow (1986), and the Avant Garde Award (1982).

Robert Garbacz
Professor Emeritus

Robert Garbacz received his B.S.E.E. degree from The University of Buffalo in 1955 and his M.S.E.E. and Ph.D. degrees from The Ohio State University in 1957 and 1968, respectively. From 1955 to 1968 he performed research at the OSU Antenna Laboratory (now named the ElectroScience Laboratory), primarily in electromagnetic scattering theory. From 1968 to 1981 he divided his time between research and teaching, and from 1981 to 1995, between teaching and administrative duties, particularly guiding the Electrical Engineering graduate program. In the last year before formal retirement in 1995 he served as the department’s Associate Chairman. Since 1995 Prof. Garbacz has volunteered his time to teach one electromagnetics course each quarter to Junior-level students.

Robert Mayhan
Professor Emeritus

Bob Mayhan earned his BSEE, MSEE, and Ph.D. degrees from Purdue University in 1960, 1962, and 1965, respectively. He worked at Avco Corporation’s Space Systems Division in Wilmington, MA before coming to The Ohio State University in 1967. He has also been an Adjunct Professor at the University of Dayton since 2001. He is a registered Professional Engineer in the state of Ohio.

Dr. Mayhan has had a broad range of research interests including methods for alleviating the communication blackout problem encountered by reentering space vehicles, guidance methods for vehicles on an automated highway, and techniques for the automatic control of the resistance welding process. In an administrative capacity, he served as Acting Chair in 1989 and Associate Chair from 1990 to 1995.

Stephen Sebo
Professor Emeritus

Dr. Sebo joined The Ohio State University in 1968 and remains active in teaching, research and professional service in the electric power and high voltage areas as a Professor Emeritus (2003). His current research focuses on high voltage engineering, electromagnetic field (EMF) and EMC. His major research accomplishment was the pioneering of the scale modeling techniques of high voltage AC and HVDC transmission stations.

Dr. Sebo’s honors include the Edison Electric Institute’s Power Educator Award (1981), Best Paper Award of the IEEE Power Engineering Society with Ross Caldecott (1982), appointed as American Electric Power Professor at OSU (1982), named Technical Person of the Year by Columbus Technical Council (1994), and was the Neal A. Smith Professor at OSU (1995-2003). Dr. Sebo was the Public Member of the Power Siting Board of the State of Ohio (1998-2004) and is a Fellow of the IEEE (1993).

Eric K. Walton
Senior Research Scientist Emeritus

Dr. Walton’s areas of interest include radio and radar signal analysis, radar target identification, compact range development and antenna design. A major area of continuing research is the development of high resolution radar imaging techniques. Specific research topics include superresolution inverse synthetic aperture imaging, higher order spectral analysis and time frequency distribution interpretation of radar scattering. All of these topics have led to improved radar scattering phenomenological concepts with applications to radar target identification. He is the author of several papers and more than 15 reports specifically related to radar target identification.

Jonathan D. Young
Senior Research Scientist Emeritus

Dr. Young has more than 25 years experience in Ground Penetrating Radar. His recent GPR research is devoted to improved antennas, airborne GPR systems, and Unexploded Ordnance detection and identification. He has also focused on ultra-wideband (UWB) radar and antennas. His project developed the OSU Compact Radar Cross-Section Range, which has been the foundation for the ESL Compact Range Consortium, involving over 16 companies over the period 1987 to the present. His recent involvement in transient scattering phenomenology studies involve higher order scattering mechanisms in target signatures, and the application of image processing to extract these features.
Aimee L. Bross  
Senior Research Associate Engineer

Aimee L. Bross is a Senior Research Associate in the ECE Department and is the primary electron beam lithography engineer for the Ohio Nanoscale Patterning Center. Prior to her arrival at OSU, Ms. Bross spent five years at TriQuint Semiconductor in Dallas, Texas, where she was a member of the electron beam lithography group in the Process Engineering Department. During that time, she was a primary member of cross-functional engineering teams that improved DC yield across several product technologies (for which she was a TriQuint President’s Award recipient, the highest award given at TriQuint), reduced cycle time in the fab, and moved the fab from its original location on the campus of Texas Instruments to its current location in Richardson, Texas. Ms. Bross’ research interests include nanoscale lithography and patterning, advanced resist processing and materials, and advanced surface analysis. Ms. Bross also worked for Molecular Electronics, Inc. of State College, PA.

John Carlin  
Research Scientist

Dr. Carlin joined the department in 2005 as a research scientist in the Electronic Materials and Devices Laboratory (EMDL). Dr. Carlin’s research interests include heterogeneous integration of electronic materials for application to optoelectronics, energy conversion, sensing, and high speed devices and substrate and lattice engineering via relaxed buffers for such applications.

Currently, Dr. Carlin is coordinating activities and working jointly with the Survivability and Sensor Meters Division (MLPS) of Air Force Research Labs (AFRL) at Wright Patterson Air Force Base on the Heterogeneous Materials Integration Initiative (HMI2). The HMI2 partnership between EMDL and AFRL/MLPS fosters collaborations in critical areas of forward looking electronic materials, nanomaterials and integrated devices/systems through joint research projects.

Emre Ertin  
Senior Research Associate Engineer

Dr. Ertin’s research interests include sensor networks, radar imaging, remote sensing and statistical learning theory. Prior to joining OSU in 2002, he was with the Core Technology Group at Battelle, as the technical lead in the design of wireless smart sensor systems. At OSU he was an investigator for the DARPA-NEST program working in hardware and distributed detection algorithm design for the ExScan Project, a perimeter security sensor network deployment comprising over a thousand multimodal sensor nodes. For the NRL-Windsat program he developed a probabilistic model of space-borne radiometer measurements for the retrieval of wind vectors from ocean surface microwave thermal emissions. For the AFRL-RASER program he worked on three dimensional polarimetric radar imaging algorithms. He is also one of the creators of Kansei, a remotely accessible large-scale wireless sensor network testbed at OSU. Presently, he is a Co-PI for the AFOSR MURI on Automatic Target Exploitation.

Robert Burkholder  
Senior Research Scientist

Dr. Burkholder joined the department in 1989 and is an elected Fellow of the IEEE. He has co-authored 32 journal papers, 75 conference papers and three book chapters. His research interests include Electromagnetic theory and modeling, computational methods for electromagnetics, radar scattering from ships on rough sea surfaces, and in-situ antenna design and analysis. Current projects of Dr. Burkholder’s include “Development of Asymptotic High Frequency Based Solution for EM Scattering,” Air Force Research Labs; “Validation of Sea and Target Scattering Models,” Office of Naval Research; “Radiation Patterns of Antennas Through an Aerodynamic Radome,” Naval Research Labs; “EM Threat Analysis for Wireless Systems,” Sandia National Labs, Livermore, CA; and “Optimal Vessel Performance in Evolving Nonlinear Wave Fields,” MURI funded by Office of Naval Research, Prof. Joel Johnson OSU P.I.

Chi-Chih Chen  
Research Scientist

Dr. Chen’s research interests include ground penetrating radar, radar signal processing and wide bandwidth antenna development. He introduced several UWB, fully polarimetric dielectric antenna designs that have been applied to reflector feed, near-field probing and ground penetrating radar. He was the principal investigator on several research projects involving the detection and classification of buried pipes, landmine and unexploded ordnance. He also developed a new commercial X-band imaging radar for automobile backup sensing and blind spot elimination. Currently he is involved in small antenna developments from VHF to GPS.

Inder J. Gupta  
Senior Research Scientist

Dr. Gupta’s research interests include radar imaging, EM scattering, compact range technology, adaptive antennas and target identification. He has developed various techniques for enhancing the quality and resolution of radar images, including AR modeling, maximum likelihood estimation and data extrapolation. He has designed state-of-the-art reflectors for compact range measurement systems, as well as techniques to evaluate the performance of antenna and radar ranges. He has worked extensively on adaptive antenna arrays for radio frequency interference suppression and multipath mitigation in communication systems and navigation systems. Currently, he is working on GPS antennas and antenna electronics. He is a member of JPALS Antenna Bias Group and GPS JPO’s Antennas and Antenna Electronics Working Group. Presently, he has research projects with ONR, AFOSR, AFRL and many U.S. aerospace companies. Dr. Gupta is a Fellow of IEEE.
Teh-Hong Lee
Research Scientist

Lee received the B.S. degree from National Taiwan University, Taipei, Taiwan, in 1980, and the M.Sc. and Ph.D. degrees from The Ohio State University in 1984 and 1987, respectively, all in electrical engineering. Since 1982, he has been associated with the ElectroScience Laboratory where presently he is a Research Scientist. His major research area is in the antenna analysis, design and measurement. He is the main developer of NEC Reflector Antenna Code at the ElectroScience Laboratory and has also been involved with design and upgrade of measurement facilities. He is a senior member of IEEE and a member of Antenna Measurement Techniques Association.

Ronald J. Marhefka
Senior Research Scientist

Dr. Marhefka is involved in the analysis of practical scattering and antenna problems. This has included developing high frequency asymptotic solutions such as the uniform geometrical theory of diffraction, hybrid solutions, and other scattering techniques. He has been applying these high frequency techniques to analyze the radiation patterns of and the coupling between antennas in a shipboard and other complex environments. Dr. Marhefka has also extended these techniques and developed new solutions for finding the radar cross section of complex scattering bodies. Portions of his work have been incorporated in well-known and widely distributed general purpose computer codes. In addition, he has recently worked on developing frequency selective surfaces and broadband antenna arrays.

John I. Martin
Research Associate II - Engineering

John Martin received the Bachelor of Science degree from The Ohio State University in 1997, and an MS degree from OSU in 1999. He worked at OSU from 1999 to 2001, and recently returned to OSU in 2004 after contracting for National Highway Traffic Safety Administration. While contracting for NHTSA, John also worked on image stabilization and automatic target recognition tasks. His primary activity at OSU has been robotics research and recently participated in OSU’s entry in the 2005 DARPA Grand Challenge.

G. Frank Paynter
Research Scientist

Frank Paynter received the B.S. degree from Ga Tech, in 1972 BPC (Before Personal Computers), and the M.Sc. and Ph.D. degrees from The Ohio State University, Columbus, Ohio, in 1996 and 2000, respectively, all in electrical engineering. Since 1993 he has been associated with the ElectroScience Laboratory, Department of Electrical Engineering, The Ohio State University, where presently he is a Research Scientist. His major research area is in development of graphical user interfaces for computational electromagnetics (CEM) codes. He is the main developer of the NEC-Workbench, The ESP Workbench, the Antenna Workbench, and the USA Satellite Industry Consortium (SatCom) Workbench. He is also a pilot with single-engine commercial, instrument, and instructor ratings and an ardent glider pilot.

Kubilay Sertel
Senior Research Associate Engineer

Dr. Sertel’s research areas include electromagnetic theory, computational electromagnetics, volume and surface integral equations and hybrid finite element methods, fast and efficient methods for large-scale electromagnetics problems and parallel implementations of fast algorithms, periodic structures and metamaterials, EMI/EMC, indoor wireless propagation, and antenna performance evaluation for large arrays on large platforms. Current projects include “Novel Materials for Antennas and RF Devices” (MURI funded by the AFOSR), 2004-2009; “Effects of Rotating Blades on Performance of Direction Finding Antennas”; Applied EM Corp.

Dr. Sertel has co-authored 17 journal papers, over 40 conference papers and a book chapter. He is currently the vice president of the IEEE AP-MTT Columbus Chapter.
Aaron Aufderheide  
Systems Developer/Engineer

Mark Brenner  
Laboratory Supervisor, ESL

Judy Dean  
Receptionist

Tyra DeBerry  
Personnel Aide, ESL

Margaret Dodd  
Assistant to the Chair

Carol Duhigg  
Program Coordinator

Ray Feast  
Business Services Officer, ESL

Lucinda Flores  
Human Resources Administrator

Gary Gahm  
MURI Program Administrator, ESL

Don Gibb  
Systems Developer/Engineer

Fred Herchline  
Design Engineer

Sean Jaynes  
Network Support Specialist, ESL

Jim Jones  
Laboratory Supervisor

Vincent Juodvalkis  
Senior Systems Manager

Edwin Lim  
Systems Specialist

Cory Matyas  
Academic Advisor

Jeri McMichael  
Administrative Assistant

Jill Mobley  
Information Associate

J.C. Moncrief  
Electronic Technician, ESL

Susan Noble  
Academic Program Coordinator

Bruce O’Keefe  
Academic Counselor

Kevin Reaver  
Network Support Specialist, ESL

Claudia Riser  
Manager of Fiscal and Business Services

Connie Roberson  
Fiscal Administrator, ESL

Stella Rubia  
Program Coordinator

Lisa Stover  
Document Production Specialist, ESL

Aaron Swinger  
Accountant 1

William Thalgott  
Laboratory Supervisor

Tricia Toothman  
Office Associate

Molly Wambold  
Assistant to the Director, ESL
Charles Allen  VP, General Manager, Honda R&D North America, Raymond, OH
James Armitage  VP Engineering, Northrup Grumman Electronic Sensors and Systems Sector, Balmore, MD OSU 1975 B.S.
Bami Bastani  President and CEO, Anadigics, Warren, NJ OSU 1977 M.S.; 1980 Ph.D.
Robert S. Chau  Director, Transistor Research and Nanotechnology, Intel Corporation, Beaverton, OR OSU 1984 B.C.; 1986 M.S.; 1989 Ph.D.
Frank Henson  President Emeritus, Columbus Technology Council, Columbus, OH OSU 1961 B.C.
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Joseph Weimer  Chief, Electrical Technology Branch, W/LPOOC Aerospace Power Division, Wright-Patterson AFB, OH
Dan Williams  NASA
Ed Zelnio  Chief, Sensor ATR Division, Air Force Research Laboratory, Wright-Patterson AFB, OH
The Department honors the memory of Prof. Ken Breeding who passed away on February 11, 2006 at The Ohio State University Hospital. Professor Breeding taught at OSU for 38 years and although he became professor Emeritus in 2003, he remained active in teaching and working with students.

Dr. Breeding’s research interests over the years have focused on visual pattern recognition/computer vision and image processing. This research also involved him in the design of special purpose computer structures and systems for processing images and related information.

Dr. Breeding was actively involved in curriculum development and responsible for the upgrade or development of numerous laboratories and courses dealing with microprocessors, large-scale digital systems, and computer architecture. He has also developed a technical writing course for the Department of Electrical and Computer Engineering, was instrumental in creating a model implementation of technical writing throughout the College of Engineering, and was responsible for the development of the College of Engineering core undergraduate program. His latest research interests centered on the development of modern engineering curricula and computer-aided instruction for facilitating the learning process.

In honor of Ken’s memory, The Professor Kenneth J. Breeding Memorial Scholarship Fund has been established and will be used for undergraduate scholarships for students enrolled in the Department of Electrical and Computer Engineering.
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