The PSU ETIC Story

The Maseeh College of Engineering and Computer Science at Portland State University creates an inspiring educational and research environment for students, faculty, and staff to expand knowledge and improve lives through innovation in research and engineering education. The hallmark of the college is a locally relevant and globally significant impact, as demonstrated by:

- A diverse portfolio of collaborative and cross-disciplinary research.
- Exceptional students who apply cutting-edge research to current issues and who are sought after in the global market.
- Strong partnerships with industry, government, and non-profit organizations that promote economic opportunities and contribute to the economic development of the region.

Eight years ago with ETIC investment we embarked on a mission to refine, reshape, and expand our role as the region's engineering research hub. As a result, and with significant help from ETIC funding we have experienced a period of unprecedented growth, including:

- A 35 percent annual increase in externally funded research.
- The recruitment of 50 new faculty members from some of the most prestigious institutions in the world.
- The addition of 22 new laboratories.
- An upsurge in student enrollment.
- The continuous expansion of our research partnerships with regional industries and government agencies.

The ETIC investment has been a critical part of the growth of our college and has strengthened our value to the companies located in Oregon's high-tech corridor – the Silicon Forest. Portland is uniquely situated in its importance to electronics, environmentally friendly building, transportation planning, and the metals industry, and all rely on the tools and people at the Maseeh College to stay competitive. Our Intelligent Transportation Lab, infraStructure Testing and Applied Research Lab, and Integrated Circuit Design and Test Lab are just three examples of Maseeh College resources that are unequaled in the Pacific Northwest. These facilities, and the human knowledge behind them, are reasons why industry- and government-sponsored research projects at the college continue to grow at a steady rate. Employers seek out PSU engineering graduates both for their research ability and their practical work experience. Most Maseeh College students either participate in internships or work as part-time or full-time employees in their field before they graduate. And Intel Oregon looks to the Maseeh College as a source of engineering talent.

Department Success

CEE – Civil And Environmental Engineering

Civil and Environmental Engineering faculty and graduate students are heading research projects throughout the Pacific Northwest in four major areas: environmental/water resources, structural, geotechnical, and transportation engineering. Portland is viewed as a national leader in transportation and environmentally sensitive building and is situated in a region where hydroelectric power, water quality, and geologic concerns are of everyday importance. PSU graduates are also in high demand among government agencies and consulting firms for their role in maintaining the region's quality of life.

- The Center for Transportation Studies is one of only 10 National University Centers in the country focusing on traffic congestion, safety, road planning, and mass transit.
- The infraStructure Testing and Applied Research laboratory is renowned throughout the region as the place where structural designs can be tested and refined to make them safer in the event of earthquakes.

- Geotechnical researchers are analyzing the earth's structure to make sure ground conditions are suitable for construction.
- The Environmental Engineering group is working with Oregon agricultural interests to ensure that fertilizer use does not pollute groundwater with heavy metals. They are also addressing the competing needs for clean water in rivers, lakes, reservoirs, and estuaries and researching the impact that dams, dikes, and oceanic changes have on the whole coastal and estuarine ecosystem, including salmon.

ETIC Supported Faculty accomplishments

Robert L. Bertini, Associate Professor, Ph.D., Civil Engineering, University of California, at Berkeley, 1999. The automobile was king in the San Francisco suburb of Millbrae where Robert Bertini grew up. You drove to get just about anywhere. But on a family trip to Italy at age 14, Bertini was fascinated to see the ease with which people used other ways to get around: buses, trains, ferries, motor scooters, planes, and of course walking. The trip sparked a lifelong interest in transportation, and today Associate Professor Bertini is actively working with industries and public agencies to improve transportation systems. Bertini is the head of the Intelligent Transportation Systems Laboratory. The lab collects and interprets traffic data from 500 road sensors placed throughout the Portland metropolitan area. Information from the lab can be used for everything from timing traffic signals to building roads and planning for mass transit. Bertini is also the director of OTREC, the Oregon Transportation Research and Education Consortium. It's a partnership between Portland State, University of Oregon, Oregon State, and Oregon Institute of Technology to stimulate research, educate future transportation professionals, and help transfer research results where they're needed. "The transportation field is fundamentally about people. It directly affects everyone, so I feel very motivated to help make it safer, more accessible, and more environmentally friendly," Bertini says. <Bruce, we have higher resolution versions of these images, these are here as place-holders and to show you a sample of what we have.>

CS – Computer Science

The Maseeh College is located in the heart of Oregon's "Silicon Forest," named for the cluster of high-tech companies located here. It's one of the fastest growing high technology centers in the United States, and researchers at the college's Computer Science Department are major contributors to a thriving and competitive industry. Research areas in the department include systems and networking, computer security, programming languages, data and information management, learning and adaptive systems, and biologically-related computing.

- The Computer Science Department has a multi-million-dollar-per-year research funding portfolio, including sponsorship from federal agencies such as the Department of Defense, the National Institute of Justice, and the National Science Foundation as well as industrial partners such as Google, IBM, Intel, and SRC.
- PSU's Computer Science program is recognized as a Center of Excellence in Information Assurance Education by the National Security Agency.
- PSU is a regular participant in the Google Summer of Code and was the only university in the United States to participate in the first event held in 2007. The Google Summer of Code is a program that offers student developers stipends to write code for various open source projects. The program accepts only one out of approximately every seven applicants.

ETIC Supported Faculty accomplishments

David Maier, Maseeh Professor, Ph.D., Princeton University, 1978. Databases and their management lie at the heart of the computing world, and their applications are seemingly endless. David Maier, Maseeh Professor of Emerging Technologies, is involved in a number of these applications. In one project, he is compiling many gigabytes of data profiling river estuaries and turning that data into a visual simulation of the estuaries' temperature, movement, and composition. This work is of particular interest to coastal resource managers, including Native American tribes, the Coast Guard, U.S. Army Corps of Engineers, and the National Marine Fisheries Service. In another, he's working with Portland State's Intelligent Transportation Systems Laboratory to pinpoint how events such as road construction and inclement weather affect traffic at various times of the day.

And in a project with Oregon Health & Science University, he is looking at ways in which computer stored patient information is managed in rural communities. Improving the data management could help caregivers avoid common problems such as duplicating prescriptions for older patients. Maier, an Oregon native who learned computer programming before going to high school, says Portland State is one of the ideal institutions in the world to perform database research. "Most places would probably have one database faculty member. We have three," he says.

ECE – Electrical and Computer Engineering

Portland State's department of Electrical and Computer Engineering is renowned in the Northwest for its combination of theoretical research which lays the groundwork for solving long-range problems, and its

collaboration with local industries to meet short-term demands. Department research covers an array of technologies important to the semiconductor industry, health care, the environment, national security, energy generation and distribution, communications, the global economy, and robotics.

- Areas of research include computational intelligence; computer architecture; design automation for VLSI ICs, SOCs and nanotechnologies; electromagnetics and acoustics; energy systems; nano and bio technologies; quantum computing; electronics packaging; signal processing; VLSI design, test and measurement; and high-frequency devices and measurements.
- Research is sponsored by a number of private industries and government agencies. They include Intel, the National Science Foundation, the Semiconductor Research Corporation, the Office of Naval Research, and the Defense Advanced Research Projects Agency.
- The Credence Integrated Circuit Design and Test Laboratory is one of a few of its kind in the world, allowing researchers at Portland State to test circuits for industry remotely via the Internet. One of the lab's distinguishing characteristics is its close working relationship with leading companies in the semiconductor industry, including LSI Logic, Texas Instruments, IBM, Credence Systems, Sharp, Intel, Tektronix and Electroglas.

ETIC Supported Faculty accomplishments

Lisa Zurk, Associate Professor Ph.D., University of Washington, 1995. The terahertz frequency band is a portion of the electromagnetic spectrum that was virtually unexplored until recent advances in sensing technology. The so-called "terahertz gap" represents the last frontier in electromagnetics research and is emerging as one of the most exciting topics of the 21st century. Lisa Zurk, director of Portland State's Northwest Electromagnetics and Acoustics Research Laboratory (NEAR-Lab), is investigating the use of this frequency in a number of technologies. She's researching terahertz imaging for medical applications, such as a new sensing technique with potential for non-invasive detection of skin cancer. She is also examining terahertz detection of explosive devices, which would be a major contribution to the field of national security. All projects in the NEAR-Lab have a similar theme: sensors and their applications. Zurk is working to develop advanced sonar systems for a number of Navy programs and also for more exotic applications such as the mapping of coral reefs – one of the most threatened environments in the world. Recently, Zurk and her colleagues developed software called EchoMap that will be distributed by The Nature Conservancy for use in its marine conservation efforts throughout the world. "The Nature Conservancy chose to team with Portland State. It's an ideal match, because our technical expertise supports science-based conservation and environmental stewardship," Zurk says.

ETM – Engineering and Technology Management

Portland State University established the Engineering and Technology Management (ETM) Program in 1987. Twelve years later it became its own department within the Maseeh College and is an internationally renowned model used by dozens of other universities throughout the world. ETM alumni have become project and program managers, vice presidents, and CEOs of leading companies. The department's programs in innovation and entrepreneurship also prepare ETM graduates for starting their own companies. ETM is designed for engineers and scientists seeking a master's degree that adds management value to their engineering and science education. Professionals can take selected courses to enhance their careers, meet leadership goals, or simply get a feel for the program before pursuing the degree. The ETM department has more than 200 full-time and part-time students from 35 countries pursuing M.S. or Ph.D. degrees.

PICMET (Portland International Center for Management of Engineering and Technology) is housed in the ETM department. PICMET organizes international conferences, symposia, and workshops every year. Areas of research include: technology management, technology forecasting, technology evaluation, project management, decision making, new product development, technology road-mapping, productivity analysis, quantitative benchmarking, management of emerging technologies, technological innovation, and entrepreneurship.

ETM has served as the editorial headquarters for the John Wiley Book Series on Engineering and Technology Management from 1987 to 2000, and *IEEE Transactions on Engineering Management* from 1987 to 2002.

ETIC Supported Faculty accomplishments

Antonie Jeter, Assistant Professor Ph.D., RWTH Aachen University, Germany, 2004. Great innovations usually start out as fuzzy "what if" concepts, barely more than a glimmer of an idea. The ideas are usually qualitative (What should the product look like? What should it do?) rather than quantitative, and are based on information that changes daily. So how can entrepreneurs bring their ideas into sharper focus and decide how (or whether) to move forward on a project?

Antonie Jetter and Charles Weber are using their research findings to help companies of all sizes navigate these treacherous waters. Jetter utilizes Fuzzy Cognitive Maps (FCMs) to elicit, document, and systematically process knowledge from various experts involved with a project – from marketers to engineers – each of whom brings his or her own interpretation of customer needs and technological possibilities. FCMs help companies plot a product development course that takes both qualitative and quantitative information into account, smoothing the process and increasing its chances for success. Weber, a graduate of MIT's Sloan School of Management, looks at the financial ramifications of a project, and how innovative ideas affect the bottom line. How, for example, can companies use their sparks of genius to their best advantage without harming their financial future? His real-world approach comes in part from his 17 years as a semiconductor engineer with Hewlett-Packard.

MME – Mechanical and Materials Engineering

Faculty and student researchers in Mechanical and Materials Engineering (MME) are engaged in research projects that range from fundamental investigations sponsored by federal agencies to applied projects sponsored by local industry. The department is organized into three groups: design and manufacturing, materials science, and thermal and fluid sciences. The department's laboratory facilities, its computer tools, the practical design experience of the faculty, and its frequent collaboration with regional industry enable the department to meet the technological needs of the Northwest.

- MME faculty are involved in multidisciplinary research on problems involving energy use and the environment, including studies of urban heat island effects and eco-roof performance.
- MME faculty are performing basic research on surface tension driven flows, flow in microgravity environments, microfluidics, and cellular-level biomechanics.
- MME faculty are looking into the structure of ultra-high-strength alloys at the microscopic level. The information provided by this work enables scientists to adjust the metal's microstructure to make it stronger – an ability that is crucial to the safety of structures ranging from bridges to aircraft.
- MME faculty designed a wind tunnel, located on Swan Island, to test the effects of drag on full-scale tractor trailer trucks. It is the only facility of its kind in the world.

ETIC Supported Faculty accomplishments

Mark Weislogel Associate Professor Ph.D., Northwestern University, 1996. As a graduate student, Mark Weislogel saw video footage of a NASA experiment involving the movement of fluids through a tube in zero gravity. From that point, he knew what he wanted to do with his professional life. Weislogel worked for NASA for 10 years, during which time he sent his own zero-g experiments into both air and space. He came to Portland State in 2001. "I really caught the vision and the potential of this university," he says. His research is about finding methods to improve the transport of fluids within a variety of systems and devices. The fluids often must travel through highly angular geometries unlike those found in nature. Weislogel and his students study conduits of different shapes, and test their theories by sending them into zero-g, whether in NASA drop towers, low-g aircraft, the Space Shuttle, or the International Space Station. Space is the perfect training ground for many engineering pursuits. Weislogel provides undergraduates opportunity through the Launch PSU program, a NASA co-sponsored program in which students send high altitude balloons with mission specific instrumentation into the limits of the atmosphere. It's great fun, and highly instructional. "Just like any 'launch', you really only get one shot. So you have to rely more on planning and analysis than for more typical designs where one could exploit trial and error more effectively. However, we use some of the latter from time to time too," he says.

Unused Text

Peter Dusicka, Assistant Professor, Ph.D., Civil Engineering, University of Nevada, Reno, 2004. Infrastructure, including bridges, towers, and large buildings, needs to be strong to withstand an earthquake or a sudden impact. But they also need to be flexible; they have to be able to move and absorb shock in order to survive. Assistant Professor Peter Dusicka's research revolves around the materials and engineering that promote survivability. Dusicka came to Portland State in 2004 from the University of Nevada in part because of PSU's infraStructure Testing and Applied Research (iSTAR) lab. The lab features a large platform that reproduces the seismic shaking of real earthquakes and is used to test the resiliency of engineered structures and their materials. The laboratory's capability is of enormous value to public agencies and engineering firms that are designing structures for the earthquake-prone regions of the Pacific Northwest. He is currently working with the Oregon Department of Transportation to determine the seismic vulnerability of more than 2,000 highway bridges in the state. He's also investigating new uses for high-performance materials such as fiber reinforced composites and flexible elastomers, which can be used along with more traditional building materials such as concrete and steel. "Public safety is my primary concern," Dusicka says. "One of the gratifications of the civil engineering profession is its direct impact on society."

Melanie Mitchel, Professor, Ph.D., University of Michigan, 1990. One of the unsolved challenges in computer technology is enabling computers to identify and analyze visual images. Melanie Mitchell is working to develop new algorithms to do just that, using ideas from biology and evolution. Mitchell's research may have wide ranging influence on the role computers play in our lives. In medicine, it could enable computers to do much of the X-ray and MRI analyses currently done by humans. In national security, it could make computers take over a greater share of the job of viewing and interpreting the millions of satellite images taken every day. It can even make a difference on a personal level.

"The World Wide Web has changed everyone's life. It's given us access to huge amounts of information through the use of search engines. But more and more information is stored in visual images rather than text, so we have to find better ways to find the information stored in those images," she says. Her work addresses a key concept in the field of artificial intelligence. She earned her Ph.D. under one of the field's pioneers, Douglas R. Hofstadter, author of the Pulitzer Prize-winning book *Gödel, Escher, Bach: An Eternal Golden Braid*.

Nirupama Bulusu, Assistant Professor, Ph.D., University of California at Los Angeles, 2002. "People have an impression that computer scientists work behind a desk, interacting with a virtual world. But the work I do enables interaction with the physical world," says Assistant Professor Nirupama Bulusu. Bulusu is involved with a project in Australia tracking the growth and migration of cane toads using a wireless network of acoustic sensors. The toads were introduced to Australia to control pests in the sugar cane fields. But over time they have become pests themselves, multiplying and spreading throughout the country's east coast. Knowing how to track them by their individual sound frequencies is a key step in learning how to control them. For Bulusu, it's also a way of advancing sensor network technology. The kind of acoustic sensor network Bulusu is using in Australia could have broad applications in the next generation of health care. For example, sensors in an assisted living facility may use speech recognition technology to tell the difference between a distress call and normal conversation, and alert caregivers accordingly. Bulusu chose Portland State for her research because it gave her the opportunity to work with engineers in other disciplines. "This is the place where I know I can make an impact because of the collaboration possibilities."

Suresh Singh, Professor, Ph.D., University of Massachusetts, 1990. The amount of electricity used to power the Internet in the United States is equivalent to the output of two nuclear reactors. Professor Suresh Singh has identified ways to reduce this power consumption by as much as 70 percent. It's part of a project he calls "Green Internet," funded by the National Science Foundation (NSF). By analyzing Internet traffic patterns he's found that router circuits can be selectively turned off to eliminate excess power usage without affecting the flow of data. As part of this effort, he's designing new Internet routing hardware as well as new software algorithms to run them. The work has piqued the interest of Intel, and is of great importance to developing countries with scarce power resources. Making routers more efficient has other fringe benefits, Singh says. Greater efficiency means hardware can run at cooler temperatures, reducing the need for air conditioning and enabling the hardware to run faster and more efficiently. Another NSF-funded project Singh is working on is called Rescue-net. It links high frequency radios to analyze and map the condition of partially collapsed buildings. The visual images inform search and rescue crews about a building's stability before they attempt to enter it.

Wu-chang Feng, Associate Professor, Ph.D., University of Michigan, 1999. Online gaming is a $25-billion industry, and is expected to go beyond $40 billion by the end of the decade. A significant amount of the money comes from monthly subscriptions that players pay to gain access to game sites. Like any game, it's no fun when you lose – especially at the hands of a cheater. If it happens often enough, you're likely to drop your subscription. Associate Professor Wu-chang Feng is working with Intel to develop hardware that detects cheating in much the same way that computers detect viruses and worms. It's an offshoot of other work he's done in computer security to prevent malicious network attacks, spam, and other costly irritants. "Cheating in on-line games is an important area of research because security solutions can be applied to the problem," he says. He worked in a high-tech startup company in California before coming to Portland in 2001. "Portland State is pretty unique in its computer science research. No one else in the region has the research base that we do," Feng says.

Gerald Sheblé, Maseh Professor Ph.D., Virginia Polytechnical Institute, 1985. Optimal scheduling of electrical production and transportation is a challenging engineering task that takes into account consumer and industrial demand, climate, the environment, and the availability of fuel. Financial economics and asset management are two of the largest factors and they are areas outside the realm of expertise of most engineers. "I wanted to be a better bridge between engineering solutions and management decisions," says Gerald Sheblé. "There's a huge disconnect between economists and engineers today, but I can speak both languages." Sheblé spent 15 years working in the power industry, developing software systems to optimize the control and scheduling of electrical power systems such as Commonwealth Edison in Chicago and the Bonneville Power Administration in Portland. He has worked for several companies outside of academia, including his own consulting firm. In addition to his Ph.D. in engineering, Sheblé has a master's degree in business administration, which enables him to talk to utilities managers about everything having to do with the financial end of their businesses. Among other things, Sheblé's computer models help utilities minimize their operating costs by determining the most economical combination of resources, including coal, oil, geothermal, and hydroelectric, as well as renewable energy sources. His research has helped power companies in more than 24 countries around the world in over 40 control centers.

James McNames Associate Professor Ph.D., Stanford University, 1999. One of the hurdles in helping patients with Parkinson's disease is making accurate treatment adjustments to fit their constantly shifting symptoms. Throughout the day, a patient may experience speaking difficulties, lack of balance, rigidity, and shaking – and each of those symptoms may go up and down in severity. Prescribed treatments stand the chance of being too much or too little at any given time. Associate Professor James McNames is working with doctors at Oregon Health & Science University (OHSU) to develop a device that can measure a patient's condition and fine tune therapeutic adjustments. In the future, a patient could wear such a device and receive precisely controlled electrical brain stimulation whenever his or her symptoms warranted it. This project is just one of several McNames is working on which is aimed at helping clinicians extract information from medical monitoring equipment. He joined the Department of Electrical and Computer

Engineering faculty in 1999 after earning his doctorate from Stanford. “I wanted to start a research program that would benefit society. OHSU is practically next door, and they have a need for technology that no one else was providing,” he says.

Shalini Prasad Assistant Professor Ph.D., University of California at Riverside, 2004. Technical devices have been shrinking for decades, to the point where many of the key components are in the nanoscale. Portland State’s reputation and interest in the emerging multifaceted field of nanotechnology is what drew Shalini Prasad to join the faculty in 2005. Prasad’s area of expertise is designing chemical and biomedical sensors on the nanoscale, which have promising uses in health care, environmental science, and defense. For health care, she is working on portable devices to diagnose conditions such as cardiovascular disease, cancer, and sepsis. Current diagnostic tests can take as long as 12 hours. The devices Prasad is developing can do it nearly instantaneously. For the environment, Prasad is working on a device to detect specific greenhouse gases. It will be faster and more accurate than the suitcase-size equipment now being used, and will fit in the palm of a hand. Her defense work consists of designing sensors that soldiers can use in the field to detect toxic chemicals and explosives. “There’s great synergy here,” says Prasad. “With Oregon Health & Science University right next door, and because of the Oregon Nanoscience and Microtechnologies Institute (ONAMI), this is the place to be in nanotechnology.”

Tugrul Daim, Associate Professor Ph.D., Portland State University, 1998. The way projects are assigned within a company – making sure they go to the right people and that the projects themselves support the company’s strategic goals – is critical to business success. Yet there is little research to show how to do it most effectively. Another management puzzle is how to assess and integrate emerging technologies into project plans. Technology has become the backbone of almost every industry today, but effective management is required.

Dragan Milosevic and Tugrul Daim are addressing both of these issues. Milosevic, a leading authority on project management and author of *Project Management Toolbox* and *Project Management for Improved Business Results*, is using case studies of prominent organizations and panels of company experts to develop decision support models for assigning projects. The models are clearer, more explicit, and more systematic than similar models in the existing literature. Daim’s research and teaching revolve around creating roadmaps that organizations can use to integrate emerging technologies into their projects. He approaches the subject from both an academic perspective and his own experience. One of his last career steps before joining the faculty was managing a 300-person microprocessor development team at Intel, with revenues of more than $1 billion.

Tim Anderson Associate Professor Ph.D., Georgia Institute of Technology, 1995. A recent testament to the value of Tim Anderson’s research on benchmarking occurred recently when a PSU graduate student asked him for help in assisting his new employer – a bank with more than 100,000 employees – to assess the performance of their employees. Anderson and the student developed a model that the bank is now using on an ongoing basis for target setting and performance evaluation for many of its service employees. Benchmarking is widely used by companies, but often in an anecdotal or ad hoc manner for simple performance measures. Anderson’s research has come up with more sophisticated and robust ways to use benchmarking to assess the strength of both people and products in an organization. It’s especially useful in companies with separate operating units. His tools can measure dozens or hundreds of operating units and compare them, allowing the company to set performance targets that accurately reflect each unit’s operating circumstance. Anderson is known internationally for his work on benchmarking. He’s currently working on assessment models for technology forecasting in new product development that, in its preliminary stages, showed a 30 percent improvement over existing methods. Originally an electrical engineer, Anderson gravitated toward engineering and technology management after working with companies such as Qwest, Honeywell, and Oki Electric. He joined the Portland State faculty in 1995.

David Sailor, Associate Professor Ph.D., University of California at Berkeley, 1993. Portland is recognized throughout the nation for its green building technologies and architecture. So it was a natural destination for David Sailor, an expert in urban climates and how they’re affected by buildings, energy consumption, and human activity. Eco-roofs, or green roofs – roofs that have a layer of soil and vegetation to reduce energy

consumption and storm water runoff – are a big part of Sailor's research. Until recently, there were no good tools to help architects design effective eco-roofs. Sailor implemented a model that precisely calculates the energy saving outcomes of different designs. The model is now used in the U.S. Department of Energy's building energy design and analysis software. "There is a big demand for green roofs, especially in a place like Portland. Before, people evaluated green roofs qualitatively – that is, the general benefits in terms of aesthetics, habitat, reducing runoff, and of course energy. Now we're able to quantify their benefits," he says. Green roofs – seen by many as the next big thing in environmentally sound architecture – have many benefits that make them attractive from an economic and environmental standpoint. Their widespread use has the potential of cutting the "urban heat island" effect in typical cities.

Research Funding Record Of ETIC Faculty

National Science Foundation	$626,894	Xie, Fei	CS	CAREER: Component-Based Hardware/Software Co-Verification of Embedded Systems
National Science Foundation	$566,428	Zurk, Lisa	ECE	CAREER: Electromagnetic Scattering and Propogation in Random Media at terahertz Frequencies
Oregon Health and Science University	$492,556	Maier, David	CS	Science & Technology Center for Coastal Margin Observation & Prediction (CCF-0424602)
Maryland Procurement Office	$489,976	Jones, Mark	CS	Programatica for System Software
National Science Foundation	$410,670	Maier, David	CS	Exploiting Live Plus Archive Data for Intelligent Transportation Systems
US Department of Agriculture	$394,392	Johnson, Gwynn	CEE	A Mechanistic Study of the Transport and Fate of Biosolid Colloids in Soil
National Science Foundation	$390,000	Delcambre, Lois	CS	Adapting Information Using Superimposed Models and Structures
National Oceanic and Atmospheric Adm	$360,000	Jay, David	CEE	Estuarine Habitat and Juvenile Salmon: Current and Historic Linkages in the Lower Columbia River a
Thrasher Research Fund	$319,882	McNames, James	ECE	Modeling Intracranial Pressure Dynamics in Pediatric Traumatic Brain Injury (PI Transfer of OHSU Su
Office of Naval Research	$300,000	Zurk, Lisa	ECE	Mid-Frequency Bottom Scattering Model Development and Validation
Office of Naval Research	$290,680	Zurk, Lisa	ECE	Multistatic Active Target using an Invariance Constraint within an Evolutionary Formulation
Semiconductor Research Corporation	$271,240	Xie, Fei	CS	Scalable Co-Verification Based on Hardware IPs and Software Components
National Science Foundation	$242,678	Sheard, Tim	CS	SoD-HCER Semantics Based System Design Using Omega
National Science Foundation	$214,226	Tretheway, Derek	MME	MRI: Instrument Development: An Integrated Optical Tweezers/Micro-PIV System to Investigate Cell
National Science Foundation	$185,973	Xie, Fei	CS	SoD Team: A Feedback-Based Architecture for Highly Reliable Embedded Software
Funded Proposals This list	$5,555,595			