WSU brings kids to computer science

Learning to Code:

Voiland College of Engineering & Architecture
WASHINGTON STATE UNIVERSITY
Greetings alumni and friends,

I hope you enjoy our latest edition of the School of Electrical Engineering and Computer Science newsletter. This year, as we celebrate Washington State University’s 125th anniversary, it’s a perfect time to look back at our school successes and forward to our future accomplishments.

As many of you know, we are continuing to experience rapid growth in the school as we strive to meet industry needs in our state for computer scientists and engineers.

We are pleased that our new electrical and software engineering programs are getting off the ground in Bremerton and Everett, providing access to degrees for place-bound students across the state. We will have expanded coverage of our new degrees and satellite programs in the next issue of the School of EECS newsletter. Our graduates continue to be in high demand all across Washington and the nation, where they have gotten positions at SEL, EMC Isilon, Boeing, Micron Technologies, Microsoft, and Hewlett-Packard.

I am especially pleased at our efforts in recruiting and retaining women and underrepresented minorities to our programs. There are many challenges to overcome that start many years before students ever apply or get to WSU. We are taking a proactive approach to address these challenges, and I look forward to improving the environment that will lead to success for all of our students.

While we are successfully growing our enrollments, we have also been building our faculty with key hires that greatly strengthen our school. Our successful strategy has been to focus on growing and signature programs in which we have a long and storied history.

With the addition of several new faculty members and the emerging prominence of the Energy Systems Innovation Center, our power engineering program continues to build its reputation as a national leader. I believe we have reached a critical mass for success. In this newsletter, you’ll find a number of exciting projects from this active and dynamic research group.

We also continue to see exciting advances among our research groups in machine learning, smart environments, and robotics, including work from Professors Matthew E. Taylor and Hassan Ghasemzadeh. Whether developing a smarter way to measure edema or robotic methods for farm work, these researchers are making advances that promise to have real impact on our lives.

In the past year, our university has become more clearly focused on critical grand challenges, and our research fits in well within this strategic effort. I look forward to moving forward strategically with new hires in the next year in critical research areas, including in machine learning, data science, microelectronics, and software engineering. We are excited about the new faculty members who have joined our program and look forward to telling you more about their accomplishments in future newsletters.

Of course, the support of you, our alumni and donors, continues to make our success possible. Your gifts, whether through scholarships, research, or for equipment, truly make a difference in helping the school achieve its goals. I look forward to keeping you apprised as we aim for being in the top tier of electrical engineering and computer science programs, and I hope you will come by the next time you are in Pullman.

Thank you for your continuing support.

Behrooz Shirazi
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The EECS News@WSU is irregularly published for the School of Electrical Engineering and Computer Science, Washington State University, PO Box 642752, Pullman, Washington, 99164-2752 by Washington State University, PO Box 645910, Pullman, Washington, 99164-5910. Distribution is free to EECS alumni, friends, personnel, and students. Volume 5, Issue 1, Spring 2016.

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Smart-Sock: Monitoring ankle edema at home

by Michelle Fredrickson for WSU News

Washington State University researchers have developed a “smart” sock to track ankle edema, a symptom of many serious medical conditions, at home. The researchers hope the innovation will lead to a more cost effective, accurate, and easier way to track edema, an accumulation of fluids in the lower parts of the body that is often a symptom of heart or kidney failure.

Although edema is an excellent health indicator, measuring it currently requires a doctor’s visit and is often done with a tape measure. Measuring edema continuously could also provide more useful information for doctors than sporadic measurements.

Led by Hassan Ghasemzadeh, assistant professor in the School of EECS, the researchers have designed a “Smart-Sock” that uses multiple wearable sensors to accurately monitor ankle circumference to keep track of edema. The researchers have a provisional patent on the technology, and hope to begin deploying the device in clinical trials this fall.

The device contains two types of sensors—a motion sensor and a circumference measurement sensor. The circumference sensor measures changes in the physical girth of the ankle, while the motion sensor differentiates the posture of the wearer. Taken together, the device can interpret the data. When a person is standing or sitting, fluid tends to move down to the ankles, whereas when a person is lying down or reclining, fluid tends to move to a more equalized distribution.

“When it comes to monitoring ankle edema, it really matters what the current body posture is when you’re measuring circumference,” said Ramin Fallahzadeh, a doctorate student working on the project.

The researchers are developing an app that would take the sensor data from the device, determine its relevance, and then send the relevant information to either a desktop or phone. They are also working to include sensors to detect abnormal gaits of the patient. And, they aim to make the sensors embedded in the sock disposable, so users don’t have to wash it.
Grant funds “smart city” power grid lab at WSU

Addressing the critical national need for a reliable and secure electric power grid, WSU researchers are building the most comprehensive “smart city” laboratory in the United States to test smart grid technologies.

Scientists have received a $500,000 grant from the M.J. Murdock Charitable Trust to build a city of the future in WSU’s engineering buildings, complete with simulated windmills, solar panels, fuel cells, power substations, and smart meters.

“Smart grid technology is at a critical stage with a need for successful demonstration,” said Chen-Ching Liu, director of WSU’s Energy Systems Innovation Center and leader of the project. “Large scale deployment will provide great opportunities to improve energy efficiency and grid reliability. A realistic test bed will enable us to make sure our research will be practical in the real world.”

Simulates real-life, complex testing
Starting with the 2009 American Recovery and Reinvestment Act, the U.S. Department of Energy (DOE) began a $4.5 billion investment in smart grid technologies that included demonstration grants and workforce training at institutions and utilities around the country.

With a long history and top-ranked program in power engineering research, WSU received support for a number of projects. Those include workforce development and participation in a DOE-funded smart grid demonstration project. Pullman is one of just a few smart-grid cities in the United States.

Utilities are making and testing equipment upgrades for a smarter power grid, but the grid’s complexity doesn’t easily allow these technologies to be tested system-wide.

“The already complex power grid becomes an order of magnitude more complex when combined with information-age technologies,” Liu said. “With this comprehensive test bed, we will be among the best in the country. This will speed up adoption of smart grid technologies, which are difficult to test in real life.”

Renewable sources, technology require flexibility
Cities of the future will use more renewable energy to meet power needs. Solar and wind power are ramping up quickly in the United States, which creates technical issues and requires more flexibility from the power grid, Liu said.

The smart grid will have to be more efficient and secure and will increasingly use computerized communications and automation. Features such as smart meters will provide feedback to utilities about customer choices and desires.

The WSU researchers hope the test lab will help utilities answer questions such as how to better prevent and stop blackouts, save energy, and incorporate smart meters. The test bed will have comprehensive, advanced facilities for studying the power grid at the systems level and including complex interactions between subsystems and components.

Smart meters improve energy efficiency
The scientists last year received a donation from Alstom Grid that provided software to do simulations of electricity transmission and distribution. In addition to the Murdock Trust, Avista Corp. and Itron provide support for the lab.

The researchers will have the facilities to simulate automation, power substations, renewable energy devices, communication technology, and smart meters. The lab will include wireless links to smart meters at WSU Pullman. Research on smart meter data will enable development of demand-response programs that improve energy efficiency.
The electric power grid and electronic communications are increasingly intertwined and interconnected as part of our complex 21st century U.S. infrastructure. But when an extreme event like a large snowstorm or hurricane brings down part of the network, it’s pretty clear what can happen: chaos.

WSU researchers from disciplines as far-flung as sociology and electrical engineering aim to make the deeply connected systems more robust with a National Science Foundation grant to improve the electric power grid and its communications structure. As part of the $1.2 million, three-year grant, the researchers will be working to analyze and design more resilient power and communication networks.

Power and communication networks are two of the most critical infrastructures of the nation and they are highly interdependent, said Anjan Bose, Regents Professor in the School of EECS and primary investigator on the project. Communication networks transport data for the power system. But, at the same time, they require power to operate successfully. A power failure can cause failures in the communications networks, which then can contribute to a worsening power failure.

Ten to fifteen years ago, the data requirements of the power grid were simple and the communications system was an integral part of the grid.

“No, the smart grid means communications are ubiquitous—right up to the home meter and inside the home—and are complex systems on their own,” he said.

“We don’t usually think about these systems because they’re so woven into our lives that we take them for granted, but we couldn’t get through a day without noticing the lack of electricity or the internet,” added Christine Horne, professor in the WSU Department of Sociology and co-primary investigator on the grant. “Our goal is to increase resilience of the critical electricity and communication systems that society relies upon to function.”

Researchers from computer science and WSU’s top-ranked power engineering program have been working together on better communication tools for the power grid for more than a decade, partly because the two programs are uniquely colocated within the School of EECS.

The communication improvements mean that grid operators can monitor and control electric distribution better than 10 years ago, but the systems remain complex and intertwined—from generation and transmission to electric power distribution.

“It is critical infrastructure,” said Bose. “We do worry—we can always think of scenarios that are worse than what the grid was designed for.”

In the new grant, the researchers aim to develop a new paradigm for understanding the complex interdependence between communication and power networks to better predict what will happen in extreme events and strengthen critical elements to prevent cascading failures.

The researchers will look at the power grid network at both small and large scales and will use detailed simulations to develop practical solutions, said Bose. At the large scale, the researchers will analyze power and communications networks that span the entire country and mathematically model the relationships to improve decision-making around failures. At the micro-level, the researchers will examine individual entities within the power and communication systems, such as power generators, and analyze how they are affected by events across the network.

The project includes researchers from an unusually wide variety of disciplines and partner institutions, including the University of Buffalo, Arizona State University, and Texas A&M University.

Economists will analyze the investments that might best ensure the power grid’s resilience and robustness, and sociologists will study group dynamics to identify social factors that can impair or improve the electric power and telecom systems. By analyzing government and organization documents and interviewing a broad range of electricity and telecom stakeholders, the WSU sociology researchers want to determine processes or behavior that either increases or reduces power grid vulnerability, said Horne. In particular, Horne and her colleagues will assess how perceived risk is reflected in current operations, policies, and plans for the power grid’s future.
WSU researchers were awarded a $1 million federal grant to develop an intelligent bin management system supported by a robotic self-propelled fruit bin carrier in tree fruit orchards.

“This grant gives us the chance to convert what we thought would work into something that orchards can use,” said Dr. Qin Zhang, who will lead the research. “It’s one aspect to help address the overall labor shortage that orchards are dealing with.”

Zhang, director of the Center for Precision and Automated Agricultural Systems and professor in the Department of Biological Systems Engineering, said the project objective is to develop a system that can place and collect bins in a fruit tree orchard to reduce labor needs and increase worker productivity.

Zhang, along with his colleague Matthew E. Taylor, assistant professor in the WSU School of EECS, will develop algorithms for a self-propelled robotic bin carrier, test the system in a lab, and then validate it in a working orchard.

The grant is one of four totaling $3 million awarded by the U.S. Department of Agriculture’s (USDA) National Institute of Food and Agriculture (NIFA) in December as part of the National Robotics Initiative, a partnership that includes NIFA, the NSF, the National Institutes of Health, NASA, and the Department of Defense.

The goal of the National Robotics Initiative is to accelerate the development and use of robots in the United States that work cooperatively with people.
When a natural disaster strikes, the failure of the electric power grid often makes the catastrophe even worse.

WSU researchers were part of a team who received a $1.2 million Department of Energy grant to design a sophisticated circuit breaker for “microgrids,” or power grids that are on small, more localized scales. The researchers hope that the work will someday help allow critical infrastructure, such as hospitals and police stations, to keep running on their own tiny electric power grid during a massive power failure.

“The microgrid exists to provide power separate from the main grid. In the event that the main grid goes down, the microgrid will detect something is wrong and disconnect,” said Ali Mehrizi-Sani, the lead researcher on the project and assistant professor in the School of EECS in the Voiland College of Engineering and Architecture.

In a power failure situation, a microgrid sensor will detect a problem with voltage on the power grid, which might be anything from a tree bringing down a single power line to a major city-wide outage. Within milliseconds, the sensor will send a command to the circuit breaker switches to disconnect the microgrid from the main system. While such switches already exist, they are currently too slow to operate at the high voltage levels experienced in this type of situation—which is more than 20 kilovolts, Mehrizi-Sani said. The researchers are working to use an amplifier to increase the impedance, a measure of resistance to current flow, to bring down the current to a level that existing switches can handle quickly.

They hope to test a prototype system at a naval shipyard in Pennsylvania in the next two years.

Putting the technology to use in such a setting presents huge challenges, Mehrizi-Sani said. “It’s not a research lab,” he said. “We will test everything extremely rigorously.”

Eventually, the researchers hope to create multi-microgrid systems that would be much harder to damage in a disaster than the traditional power grid. Because they would be decentralized, the systems could work independently of each other in a disaster.
It’s no secret that while computer science offers great job prospects and interesting careers, attracting women to the field has been problematic. In fact, fewer women are entering computer science than a generation ago. Many women who initially have an interest in the field often become discouraged and quit.

With continuing industry demand, especially in the state of Washington, WSU’s School of EECS is focusing efforts on bringing and keeping more women in computer science. Last year the school, for the first time, became active in the National Center for Women and Information Technology (NCWIT), a nonprofit group that is leading efforts to increase women’s participation in computing and technical fields.

Working with NCWIT and its affiliated Aspirations in Computing program, the school will provide awards and scholarship opportunities for high school girls in computer science. The awards program has been shown to be successful in recruiting girls into the field. In part, it simply provides needed encouragement for young women to overcome prejudice and stereotypes that can keep them from pursuing the field. WSU will focus its recruiting efforts for the awards program with Spokane County high schools this year and expand to the Tri-Cities next year. The school also hopes to continue its Programming for Girls workshop (see p. 10).

“We’re just beginning this discussion,” said Shira Broschat, diversity and curriculum coordinator for the School of EECS and the coordinator for Eastern Washington’s affiliation of the Aspirations in Computing program. “I want to keep adding cities each year until I’ve reached the smaller towns in Eastern Washington. Ideally, I’ll end up making it everywhere east of the Cascade Mountains!”

Once they get to WSU, the school is also making a concerted effort to keep women in computer science. The school, for instance, is working to provide a
Providing the chance for everybody to code

More than a dozen middle school girls joined in this summer’s “Learn to Code! Programming for Girls” workshops at WSU Pullman. The week long series of workshops was led by computer science graduate students Gina Sprint and Jessamyn Dahmen and aimed to encourage the girls’ interest in the field. WSU’s Broadening Participation in Computing Club received a grant last year to conduct the workshops from the National Center for Women & Information Technology and Symantec to introduce girls to computer science. In the course, Sprint and Dahmen presented engaging, hands-on programming projects and told the girls about research and career opportunities for women in computer science.

“We want to break down stereotypes, give students creative programming experience, and inspire them,” said Dahmen.

The WSU students will work with the Office of Assessment of Teaching and Learning to assess the program’s success. They also hope to make it an annual event and provide support in the future for students who want to attend.

“The goal is to have junior and senior students help the incoming female students adjust to the program and help them to overcome the obstacles that they might experience during their first year,” said Sakire Arslan Ay, assistant director of the School of EECS, who is leading retention efforts. “We hope that catching problems early on and providing help to solve them will help retain more females in the program.”

The school has also begun working with introductory programming course instructors to make classroom and lab environments more supportive for women by, for instance, bringing female students together in lab sessions. Usually, women drop out from computer science and engineering programs because of the lack of support around them, but not because they can’t succeed in classes, said Arslan Ay.

“They often don’t feel like they will ever be able to fit in in a male-dominant field,” she said. “We are trying to establish this support circle for them, provide opportunities for them to get help, and encourage them to seek for help when they need to.”

And, the school is making progress in having its introductory computer science course satisfy university-wide requirements by next fall, meaning that a larger and wider variety of students could get exposure to the field.

“We want all of our WSU students to have the opportunity to learn computational thinking and the fundamentals of programming,” said Broschat. “It will serve them well in the 21st century, regardless of gender.”

The school will be carefully tracking its efforts.

“As a female computer scientist, I have experienced the same problems that today’s computer scientists have,” said Arslan Ay. “But, we need women in computer science and engineering; I would like to help the new generation of women become aware of their qualities and not let anything stop them.”
**Warren Seely**, a senior in electrical engineering, is a recipient of a NSF scholarship to encourage students in power engineering.

The program awards 19 EECS scholarships per year and aims to address the dramatic need for power engineers for the smart electric power grid. Approximately 21 percent of power engineers in the Northwest are eligible for retirement in the next five years, and there is also concern that the region is not producing enough engineers to meet the need for the growing green economy.

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**Jessamyn B. Dahmen** is the recipient of a prestigious National Science Foundation graduate research fellowship. Dahmen is conducting research in using technology to understand cognitive health in the elderly. The grant provides funding for three years.

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**“Go Cougs!” says Roberto**

By Ethan Nash, WSU News Service

Walk up to Roberto and he blurts out, “Hello! Go Cougs!” Walk away and he waves good-bye. Say “I love cats,” and he breaks into a song about cats.

Roberto, a three feet tall robot that talks, sings, dances, follows commands, and interacts with people, is the work of two teams of electrical and computer engineering students at WSU. They hope he’s coming soon to a recruitment fair near you.

Eight students worked to develop Roberto for two years as part of their senior design projects. While the work enhanced the students’ programming, engineering, and computer science skills, it also provided an opportunity to create a unique student recruitment tool.

“Some of my friends will walk by the hall and see it, and they will come up to me and ask, ‘Have you seen that awesome robot?’ and I’m like, ‘Yeah, I helped build it,’” said Ben Barton, a senior in electrical engineering who worked on Roberto.

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Answer our short survey and you’ll be entered to win a fantastic prize!

[bit.ly/1SuwkaW](bit.ly/1SuwkaW)
SEL and WSU build strong partnership

When Washington’s governor came to Pullman along with Senator Maria Cantwell and Representative Cathy McMorris Rogers last year, they made two stops: one at WSU’s Energy Systems Innovation Center and the other at Schweitzer Engineering Laboratory (SEL) to learn about smart electric power grid innovation.

Aligned from SEL’s earliest days, WSU and SEL have collaborated closely over the years, and their success has brought attention from local, national, and international policy and industry leaders. They have supported each other as they have grown in stature, developing state-of-the-art power grid technologies for the country and training next-generation power industry leaders.

“We began in Pullman because of WSU,” said Edmund O. Schweitzer III, SEL founder and president, who was attracted to WSU’s famed power engineering program to study for his Ph.D. “WSU has a recognized electrical engineering program that has educated so many students who have gone on to serve us in all kinds of disciplines, including electric power.”

SEL has provided years of support to WSU’s programs.

“We’ve enjoyed a long and close relationship through SEL’s support of labs, our research, and scholarship,” said Behrooz Shirazi, Huie-Rogers Chair Professor and Director of the School of EECS. “We look forward to continuing this valuable collaboration and supporting each other in future years.”

After completing his doctorate at WSU in 1977, Schweitzer came back as a faculty member to WSU. Based on the research that he conducted while a student at WSU, Schweitzer’s work led him to start his business in the basement of his Pullman home. In 1982, he left the university to devote his efforts full time to the company, which is headquartered in Pullman.

Schweitzer invented the first digital protective relay that went on to largely replace the electro-mechanical relays traditionally used in the power industry for monitoring and control of electric power systems. The digital methods he developed and commercialized help to prevent, locate, and limit power outages more quickly and provide detailed reports that help users improve the system. Nearly every utility in North America uses SEL products, which can also be found in industrial and commercial power applications, and Schweitzer’s work to develop computer-based protection and control technology has led to safer and more reliable generation, transmission, and distribution for the electric power grid.

SEL is one of the largest employers on the Palouse and contributes significantly to its economy. The company employs nearly 4,000 people and sells products in 148 countries.

Schweitzer gift in memory of Professor Al Flechsig

By Marissa Mararac, Voiland College of Engineering and Architecture

In honor of a fondly remembered professor, Edmund O. Schweitzer III and SEL are making donations of $100,000 each to the Alfred and Nancy Flechsig Fund for Laboratory Improvement at Washington State University.

Alfred (Al) Julius Flechsig Jr. passed away in August. He was a WSU alumnus (’57 BS EE) and a professor of electrical engineering at WSU for 42 years until his retirement in 2003. Flechsig did important research in the areas of power grid protection and was influential in setting up the Western Protective Relay Conference, a highly successful power industry conference.

During those years, he also touched the lives of many students. Several generations of undergraduate and graduate students he mentored went on to gain prominence in the power industry and transform grid protection technology with the use of microprocessors and high bandwidth communications.
Meanwhile, EECS has also seen dramatic growth in the past few years. Research expenditures in the school have more than doubled to $7.6 million in the past six years, with about $4 million of that in power engineering research. Enrollment in EECS has also doubled to more than 1000 undergraduates and nearly 200 graduate students.

EECS anticipated the growing interest in energy and strategically expanded the already strong power engineering program to 12 faculty members. That resulted in doubling the number of undergraduate and graduate students who go to work for the energy industry.

The relationship between WSU and SEL remains close.

In the past two years, SEL has hired more than 10 percent of EECS graduates—more than any other company. More than 200 WSU alumni work at SEL, and the company provides internship learning opportunities for many WSU students. Every year, the company also supports student senior design projects.

“So many of us at SEL enjoy working with WSU students on their design projects, serving on advisory boards, and teaching an occasional class,” said Schweitzer. “I love what WSU offers,” he added. “It has never lost its roots of a land-grant institution advancing science, agriculture, and technology.”

Schweitzer fondly remembers the support he received at WSU. In the past couple of years, he and his wife, Beatriz, and SEL have provided significant scholarship support in the name of former professors, Clifford Mosher and Al Flechsig, and a street entrance into SEL was named Mosher Drive. Mosher was Schweitzer’s WSU academic advisor and introduced him to protective relays and to the university. Schweitzer has said that SEL wouldn’t have been created without Mosher’s support.

SEL is also very generous with equipment donations, said Anjan Bose, Regents Professor in the School of EECS. A few years ago, for instance, the company provided students with an electric car for a senior design project and had them retrofit it as a solar-powered car. After the student project was completed, the company donated the car back to WSU for use in a renewable energy course.

“The whole idea of an undergraduate lab is to provide hands-on experience, and by having the latest and best equipment from SEL, we can teach them better,” he said.

The company also supports the work of WSU researchers and graduate students in power engineering in areas such as health monitoring of substations and critical infrastructure protection. SEL supports a graduate student fellowship, which the school uses to attract top graduate students.

“SEL and WSU have a great industry/university relationship,” said Schweitzer. “We are both very active in research and are doing things together. We have come up with new models of collaboration and research.

“Dr. Flechsig had a profound effect on our community, industry, and universities,” said Schweitzer. “His influence on power system protection is worldwide. In the classroom, Al was the kind of professor you’d like your kids to have. His love of learning and discovery was infectious. He led by example, and pushed his students, including me, to be more than we ever imagined.”

Upon his retirement, the School of EECS established a fund in the couple’s name for laboratory improvements and to ensure that students have up-to-date labs for hands-on activities.

The Flechsig fund supports upgrades of EECS’s power protection, power machinery, and circuit laboratories. In the past two years it has also supported the Protective Relay Lab, which provides hands-on experience in power system protection with substation equipment, tools, and engineering practices.

“Much of the work of professors like Al Flechsig reverberates on in the lives of our students long after they have left the classroom,” said Behrooz A. Shirazi, Huie-Rogers Chair Professor and Director of the School of EECS. “We’re so grateful to Ed Schweitzer and SEL for reminding us of his impact and for passing support along to the next generation of students.”
In 2015, Washington Governor Jay Inslee, U.S. Senator Maria Cantwell, U.S. Congresswoman Cathy McMorris Rodgers, and Pat Hoffman, assistant secretary for the U.S. Department of Energy’s Office of Electricity Delivery and Energy Reliability, came to Pullman to talk smart grid and power engineering at WSU’s first energy summit.

It wasn’t a coincidence that brought state and national leaders to campus to get a firsthand look at research laboratories in WSU’s Energy Systems Innovation Center. Rather, the highly successful event was a culmination of a longtime public-private partnership that has built and propelled WSU’s power program to a leadership position in the United States.

WSU’s history in power engineering goes back to the earliest days in electric power and energy systems in the state of Washington, beginning with the testing of hydroelectric dam models in the 1930s, development of aluminum cables and wires in the 1950s, and power grid protection in the 1970s. Starting in the 1990s, WSU led efforts to develop a smart electric power grid, even though the term “smart grid” actually came later.

As the power industry entered the 21st century, industry leaders realized that they were facing an aging workforce and dramatic changes in technology. Clamoring for more and better-trained power engineers, leaders around the state joined in a partnership with WSU to advance clean technology and to expand the power engineering program.
During the past five years, industry, state, and university support of the program has grown dramatically—which has led to real impact. Washington state developed the Engineering Expansion Initiative, which allocated significant annual funding to increase engineering and computer science students and graduates.

Industry involvement has also been critical to attracting top faculty, educating the future workforce for the Washington economy, and enhancing the program’s reputation, said Chen-Ching Liu, director of the Energy Systems Innovation Center. “It is industry that has helped to build these programs to what they are today,” he says.

There are more than 30 companies and entities supporting the power program at WSU, with several additional members every year. Industry supporters include small public utility districts, such as Pend Oreille PUD, and larger utilities like Tacoma Power and Snohomish County PUD, which provide support to undergraduate programs through the power engineering partnership. Larger companies and national labs, including Avista, Alstom Grid, Idaho National Laboratory, Megger, M.J. Murdock Charitable Trust, Itron, Pacific Northwest National Laboratory, Puget Sound Energy, and Schweitzer Engineering Laboratories, support research, facilities, and graduate students.

Below are major changes and initiatives that have occurred since 2010 with your generous support:

- Establishment of the Energy Systems Innovation Center. The center, led by Chen-Ching Liu, Boeing distinguished professor of electrical engineering at WSU, is “taking a leading role in addressing one of the greatest technological challenges of the 21st century: demand for clean and reliable energy.” The center consists of more than 30 WSU faculty members and collaborates with a wide range of government and industry partners.
- New laboratories including the Smart Grid Demonstration and Research Investigation Lab, the Laboratory for the Integration of Power Electronics, and the most comprehensive “smart city” power laboratory in the United States.
- Eleven power engineering faculty members have been hired, making for one of the largest programs in the United States. Total research expenditures by the power engineering faculty have doubled in the last four years.
- WSU launched the first online professional master’s degree program in electrical power engineering in the United States.
- The NSF awarded a grant to WSU to provide scholarship support for undergraduate and master’s students in electric power engineering, providing 19 student scholarships per year over five years.
- Enrollment increased to more than 90 undergraduate students and 55 graduate students, and WSU saw a dramatic increase in postdoctoral fellows and visiting scholars due to the high-level international recognition of the Energy Systems Innovation Center.
- For two years in a row, WSU students received the greatest number of scholarships in power engineering of any school in the United States. Eleven WSU students from the Pullman and Vancouver campuses received the prestigious Institute of Electrical and Electronics Engineering scholarship in power engineering out of 184 scholarships awarded nationwide. In 2014, WSU students received nine scholarships, which was tied for the highest number of scholarships.
- A week-long industry practicum for students has grown to 20 student participants, with an enrollment increase of 50 percent expected in the next year.
- The development of an undergraduate power protection teaching lab that is unparalleled in the United States.
- WSU hosted an inaugural energy summit in April 2015, with guest speakers including Washington Governor Jay Inslee, U.S. Senator Maria Cantwell, Representative Cathy McMorris Rodgers, as well as Imre Gyuk, energy storage program manager, and Pat Hoffman, assistant secretary for the U.S. Department of Energy’s Office of Electricity Delivery and Energy Reliability.
Gaymond and Cindy Schultz of Reno, Nevada, were honored by the Washington State University Alumni Association for cutting-edge work in the telecommunications industry and mentoring students in the WSU Harold Frank Engineering Entrepreneurship Institute.

Gaymond received the Alumni Achievement Award for his successful career, service to the WSU Voiland College of Engineering and Architecture executive leadership board, and support of WSU students. Cindy received the Honorary Alumna Award for opening the couple’s Los Altos, California, home to hundreds of WSU students from the Frank program over the years. She provided personalized mentoring, logistical support, and hospitality to students interning with technology industry leaders in Silicon Valley.

The WSU Alumni Association created the Alumni Achievement Award in 1970 to recognize and honor alumni who have given outstanding service to WSU or outstanding contributions to their community, profession, or nation. The award has been bestowed upon 512 alumni, or .002 percent of the estimated quarter million people who have attended WSU. Cindy is the 110th person to have received an Honorary Alumni Award.

Edmund Schweitzer receives Regents’ Alumnus Award

Edmund O. Schweitzer III, founder and president of SEL and a pioneer in digital protection for the electric power grid, received the Regents’ Distinguished Alumnus Award, WSU’s highest alumni honor. Since 1962, the Regents’ Distinguished Alumnus Award has been given to alumni who have made significant contributions to society and, through their accomplishments, have brought attention to the quality of a WSU education.

Schultzes honored for tech career achievement, student support

Demand for our graduates has led to nearly a doubling in school enrollment in the past five years.

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- **Equip** them for the future with state-of-the-art teaching laboratories.

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**More info?** Contact Pete Isakson
EECS Development Director
pisakson@wsu.edu • 509-335-4144
Washington state and industry leaders are calling for more graduates in computer science and engineering as the industry looks for workers highly skilled in technology in the Puget Sound area.

Answering the need, and with state support, WSU is increasing its computer science and electrical engineering programs at both WSU North Puget Sound at Everett and at Olympic College in Bremerton. Starting in 2016, WSU software engineering and data analytics programs will be offered in Everett. Meanwhile, a new electrical engineering degree will be offered at Olympic College.

WSU’s North Puget Sound at Everett program has grown to more than 150 students since getting underway in 2010 with a mechanical engineering program. WSU was given management and leadership responsibilities at Everett with a focus on programs in science, technology, engineering and math. An electrical engineering program got started in 2014.

A new 95,000-square-foot building on the campus is under construction and set to open by 2017. The $54.6 million project will include classrooms and laboratories, offices, and a public gathering space. Meanwhile, interest in the programs is growing dramatically. The programs even have fledgling professional student clubs.

The Bremerton program has also grown since its start in 2010 when the state legislature, citing the need for engineers in the region, provided support. Puget Sound Naval Shipyard is a major employer in the area.

Both the Everett and Bremerton programs allow students to complete their WSU degrees while taking classes near their homes. They address two major concerns for the state by providing more affordable and accessible higher education options for students and more engineers and computer scientists who are critically needed for the state’s economy.

The programs include a combination of local and Pullman-based faculty with courses originating at the local and Pullman location. Students follow WSU’s semester system and pay WSU tuition rates. Several classes are broadcasted via video from Pullman, and students are required to take some laboratory classes on the Pullman campus during the summer. Upon graduation, they will have fulfilled WSU’s School of EECS degree requirements.
Faculty honors

Chen-Ching Liu,
Boeing distinguished professor in the School of EECS, was named a member of the prestigious Washington State Academy of Sciences. The group, established by the state legislature, serves as a technical resource for policymakers. Liu is an international leader in smart grid research and a pioneer in development of decision support systems for power system restoration following major outages. His research interests include cyber-power system vulnerability assessment, wide area control and protection technologies for the power grid, and engineering and economic issues related to the integration of renewable energy. He has published more than 100 articles in major power engineering journals and 20 book chapters.

Vaithianathan (Mani) Venkatasubramanian,
professor in the School of EECS, has been named a fellow of the Institute of Electrical and Electronics Engineers. He was recognized for contributions to online detection of oscillatory behavior of electric power systems. With WSU since 1992, he holds several patents for real-time stability monitoring in power systems using synchronized wide area measurements. Venkatasubramanian conducts research in the area of power system dynamics with an emphasis on stability and control. This includes monitoring and control of oscillations and voltage collapse in power systems and analysis of complex nonlinear behavior in large power system models.
Welcome new faculty

We are pleased to welcome new faculty members into the School of EECS who are helping to fulfill the dramatic need for computer scientists and engineers in Washington.

We have focused our research efforts in what have been our traditional strengths to address our most critical national challenges in areas such as electric power and energy, microelectronics, machine learning and smart environments, and data science.

Our new tenure track and research faculty members since 2014 include:

**Power Engineering**
- **Anamika Dubey**  
  Smart Grid  
  PhD, University of Texas at Austin

- **Adam Hahn**  
  Cybersecurity, Smart Grid  
  PhD, Iowa State University

- **Saeed Lotfifard**  
  Protection and Power Engineering  
  PhD, Texas A&M University

**Data Science**
- **Assefaw Gebremedhin**  
  Data Science, High Performance Computing  
  PhD, University of Bergen, Norway

- **Predrag Tosic**  
  Data Science, Modeling  
  PhD, University of Illinois at Urbana-Champaign

- **Yinghui Wu**  
  Data Science, Database Systems and Management  
  PhD, University of Edinburgh, Scotland

**Microelectronics**
- **Subhanshu Gupta**  
  Microelectronics—analog  
  PhD, University of Washington

- **Dae Hyun Kim**  
  Microelectronics—digital  
  PhD, Georgia Institute of Technology

**Machine Learning**
- **Jana Doppa**  
  Machine Learning  
  PhD, Oregon State University

- **Hassan Ghasemzadeh**  
  Embedded System Design  
  PhD, University of Texas at Dallas

- **Shuiwang Ji**  
  Machine Learning, Data Mining  
  PhD, Arizona State University

**Software Engineering**
- **Venera Arnaoudova**  
  Software Evolution, Empirical Software Engineering  
  PhD, Polytechnique Montreal, Canada
From 1966 to 1980, Washington State University professor Harriet B. Rigas taught one of the first computing curriculums in the nation. Known by her students as “The Elite Petite,” Rigas helped create the technology that made it feasible to update computer operating systems through the use of automatic patches, known today as “software upgrades.”

Today, WSU students and faculty encourage girls to explore the field of computer science. WSU hosts a computer science course to educate, inspire, and equip girls in grades 7-9 with the skills and resources to pursue opportunities in computing.

125 years, and counting.