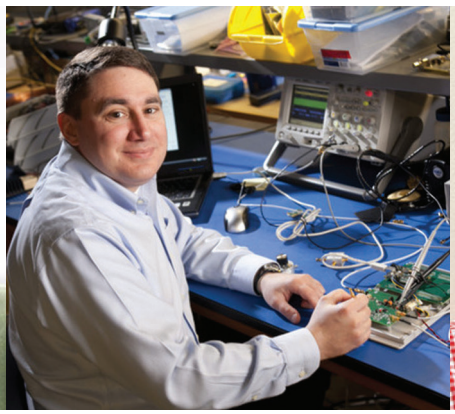
Fall 2013

UNIVERSITY OF WASHINGTON
ELECTRICAL ENGINEERING

The Integrator

In This Issue...



Three Rising Stars Join UW EE Faculty

The department is pleased to announce the hiring of three new faculty members, who are rising stars in the fields of digital circuits, photonics, and sensors. "We are thrilled to have Visvesh, Matt, and Arka join the UW EE team," says Vikram Jandhyala, professor and chair. "The three of them will add significant strength to the department, college and university's growing leadership position in the strategic areas of big data systems, biomedical systems, and energy."

Visveshe Sathe received his B.Tech degree from the Indian Institute of Technology Bombay in 2001, and his MS and PhD degrees from the University of Michigan, Ann Arbor in 2004 and 2007, respectively. Prior to joining the UW EE faculty, he served as a member of the technical staff in the Low-Power Advanced Development Group at Advanced Micro Devices (AMD), where he invented and developed new technologies for energy-efficient computing. Dr. Sathe led the research and development effort at AMD that resulted in the first-ever resonant clocked commercial microprocessor. Many of his inventions have also been adopted for use in future-generation microprocessors. His current research interests include next-generation clocking circuits and architectures, integrated voltage regulation, as well as self-optimizing systems. Previously, he has conducted research in the areas of adiabatic computing, adaptive circuit design, and power supply distribution and conversion.

Dr. Sathe has authored over 20 publications, including four invited papers and he holds six patents, with several others pending. His doctoral thesis was selected as the best dissertation in EECS for 2007, and it was nominated for the Rackham Graduate School Distinguished Dissertation Award at the University of Michigan. He is a member of the Technical Program Committee of the Custom Integrated Circuits Conference, and the International Conference on VLSI Design.

Matt Reynolds joins the UW from Duke University. He will hold a joint position in

Continued on page 8

Welcome Dean Michael B. Bragg

UW EE would like to welcome Michael B. Bragg, who joined the UW College of Engineering as its dean on July 15, 2013. An aeronautical engineer by training, Bragg previously held numerous leadership positions at the University of Illinois, including head of the aerospace engineering department, associate dean for research and administrative affairs, executive associate dean for academic affairs, and interim dean in the College of Engineering.

Bragg taught aerodynamics and flight mechanics at the undergraduate and graduate level and received department, college and university-level recognition for his teaching and advising. More than 50 graduate students and five post- doctoral researchers received their advanced degrees under Bragg's guidance.

Bragg's primary area of research is aircraft icing where he is an international expert on the effect of ice accretion on aircraft aerodynamics and flight safety. He directed over $15 million in externally funded research and published more than 200 research papers. He is a Fellow of the American Institute of Aeronautics and Astronautics and has received several national awards for his work.

Message from The Chair

This academic year brings several new faces to campus both within the department and at the College. I would like to extend a warm welcome to Michael Bragg, the new dean of the College of Engineering. Bragg previously held numerous leadership positions at the University of Illinois, including head of the aerospace engineering department, associate dean for research and administrative affairs, executive associate dean for academic affairs, and interim dean in the College of Engineering. We look forward to working with Dean Bragg in the years to come!

I'm also pleased to announce that we have three excellent new faculty members joining our department. The hiring of Visveshe Sathe, Matt Reynolds and Arka Majumdar will bolster the department's strength in the strategic areas of big data systems, biomedical systems and energy. We are thrilled to have them on board.

Our annual Lytle Lecture Series is just around the corner, and Stephen P. Boyd of Stanford University is our distinguished speaker for this premiere event. He will give a talk intended for a general audience about optimization in smart systems, and a technical colloquium.

Prior to the general talk on October 28th, the department will be hosting an exclusive lab tour. I encourage you to join us for this tour of our state-of-the-art labs and facilities, and to stay afterwards for our annual Lytle Lecture, as these events are a great way to connect with the UW EE community.

Vikram Jandhyala
Professor and Chair

Stephen P. Boyd to Deliver Lytle Lectures

Stephen P. Boyd, the Samsung Professor of Engineering, and Professor of Electrical Engineering in the Information Systems Laboratory at Stanford University is the speaker for the annual Dean Lytle Electrical Engineering Endowed Lecture Series.

Boyd received the A.B. degree in Mathematics from Harvard University in 1980, and the Ph.D. in Electrical Engineering and Computer Science from the University of California, Berkeley, in 1985, and then joined the faculty at Stanford. His current research focus is on convex optimization applications in control, signal processing, and circuit design.

Professor Boyd is the author of many research articles and three books: Convex Optimization (with Lieven Vandenberghe, 2004), Linear Matrix Inequalities in System and Control Theory (with L. El Ghaoui, E. Feron, and V. Balakrishnan, 1994), and Linear Controller Design: Limits of Performance (with Craig Barratt, 1991). His group has produced several open source tools, including CVX (with Michael Grant), a widely used parser-solver for convex optimization.

Professor Boyd has received many awards and honors for his research including an ONR Young Investigator Award, a Presidential Young Investigator Award, and the AACC Donald P. Eckman Award. In 2012, Michael Grant and he were given the Mathematical Optimization Society's Beale-Orchard-Hays Award, given every three years for excellence in computational mathematical programming. In 2013, he received the IEEE Control Systems Award for outstanding contributions to control systems engineering, science, or technology. He is a Fellow of the IEEE, and a Distinguished Lecturer of the IEEE Control Systems Society.

The Science of Better:

Embedded Optimization in Smart Systems

For General Audience

Monday, October 28th, 2013, 3:30-4:30pm

The Paul G. Allen Center - Microsoft Atrium

Abstract: *Many current products and systems employ sophisticated mathematical algorithms to automatically make complex decisions, or take action, in real-time. Examples include recommendation engines, search engines, spam filters, on-line advertising systems, fraud detection systems, automated trading engines, revenue management systems, supply chain systems, electricity generator scheduling, flight management systems, and advanced engine controls. Basic ideas behind these and other applications will be covered in this talk, emphasizing the central role of mathematical optimization and the associated areas of machine learning and automatic control. The talk will also focus will on the central issues that come up across many applications, such as the development or learning of mathematical models, the role of uncertainty, the idea of feedback or recourse, and computational complexity.*

Convex Optimization:

From Embedded Real-Time to Large-Scale Distributed

Technical Colloquium

Tuesday, October 29th, 2013, 3:30-4:20pm

Electrical Engineering Building, Room 105

Abstract: *Convex optimization has emerged as a useful tool for applications that include data analysis and model fitting, resource allocation, engineering design, network design and optimization, finance, and control and signal processing. After an overview, the talk will focus on two extremes: real-time embedded convex optimization, and distributed convex optimization. Code generation can be used to generate extremely efficient and reliable solvers for small problems that can execute in milliseconds or microseconds, and are ideal for embedding in real-time systems. At the other extreme, we describe methods for large-scale distributed optimization, which coordinate many solvers to solve enormous problems.*

Watch both talks via a live stream at:

www.ee.washington.edu

The UW EcoCAR2 Team is comprised of students from Mechanical, Electrical, Computer and Chemical Engineering schools as well as the Business and Design schools. The electrical team included EE professor Bruce Darling as the faculty advisor, Jordan Roush, Blake Simpson, Jake Garrison, Ryan Mallory, Jacob Shannon, Carl Oleson and Brian Magnuson.

Gaining Hands-On Experience Through UW's EcoCAR2 Project

Team Places 4th at Nation-Wide Competition

Last spring, UW's interdisciplinary team, which included UW EE undergraduates, tested their "ecofriendly" design of a 2013 Chevrolet Malibu at the EcoCAR2: Plugging In to the Future Competition held in Yuma, Arizona. In all, 15 schools nation-wide were selected to compete. UW's Eco-Car2 team placed an impressive 4th overall, as well as 1st place in all four Emissions and Energy Consumption (E&EC) events.

"Sweeping all four of the E&EC events is a true testament of the time and dedication these students have put into this project," says faculty advisor of the electrical team, professor Bruce Darling. "UW completed year two of the competition with working forward and rear powertrains, which allowed us to be the only team to successfully complete the 100 mile E&EC event."

The team converted their 2013 Chevy Malibu into a Parallel TTR PHEV (Through-The-Road Plug-in Hybrid Electric Vehicle) where the diesel engine is connected to the front axle and an electric motor is connected to the rear axle. The Electrical team was responsible for designing and implementing all the electrical systems within the car. "Component compatibility, robustness, and space claim along with dynamic performance and charge depleting range were all important factors that we took into account for our design," says EE undergraduate student Brian Magnuson. Progress reports were due to General Motors every three months; the reports, which were often handled by the leads of the electrical teams, included models of their electrical systems working under load along with various specifications related to their design.

Engineering students who compete in this three-year competition gain invaluable hands-on experience creating a vehicle that minimizes energy consumption and reduces emissions. "Not only has the EcoCar2 project given me great hands-on experience, but it has also helped me to develop my career plan," says Magnuson. "I would strongly encourage EE students to find an interdisciplinary

project, if not for the experience gained, but for the career direction it might provide."

Going into year three of the competition as the electrical team lead, Magnuson says they plan to make their electrical systems in the car more robust, backing their systems with road-tested models. They will also aim to gain points in areas such as progress reports and presentations, and will work closely with the controls team to optimize their low voltage system.

For more information about the EcoCar2 Project, visit:
www.uwecocar2.com

Kaiwen Sun Receives the 2013 Bonderman Fellowship

EE undergraduate student Kaiwen Sun has recently been awarded the 2013 Bonderman Travel Fellowship. Kaiwen is one of fourteen UW students selected to receive this fellowship, which will allow each fellow to travel to a minimum of two regions and six countries around the world over the span of at least eight months.

The Bonderman Fellowships provide $20,000 to each awardee and the unique, once in a lifetime experience to learn about new cultures, people and areas of the world. Students may not engage in academic study or conduct research while traveling.

Kaiwen is a UW Honors Program Student dual-majoring in EE and Philosophy. Through his travels, he intends to gain an understanding for new and radically different cultural ideologies. Kaiwen will travel to Russia, Kazakhstan, Nepal, Bhutan, India, Kenya and South Africa. He is fascinated by the way cultural values and world outlooks differ so much among different societies, and how difficult it is to reflect on them since they are so deeply ingrained. He is particularly interested in the way different cultural ideologies affect the beliefs, values, and interactions between people of those cultures, and what the differences tell us about how people can perceive life differently.

Fellowship Winners

Congratulations to our 2013-2014 graduate student fellowship recipients, and thank you to the organizations and individual donors who enable this essential support.

Achievement Awards for Scientists (ARCS) Fellowship
Edward Wang

College of Engineering Fellowships
Julie Medero *(Osberg Fellowship)*
Elliot Saba *(Baker & Boeing Fellowships)*

Grainger Fellowship
Yushi Tan

Intel PhD Fellowship
Nicole Thomas

NSF Fellowship
Kevin Huang
Ethan Keeler

NASA Space Technology Research Fellowship
Erin Sanehira

Rattie Fellowship
Jesus Contreras Ocana

SMART Scholarship for Service Program
Eldridge Alcantra

Vadari Fellowship
Drew LaQua

Leach Fellowship
Mayoore Jaiswal

Frey Graduate Scholarship
Alex Marin

Brew Fellowship
Yongdong Chen

WHERE ARE THEY NOW?

A Look at Emeritus Faculty: ***Rubens Sigelmann***

Rubens Sigelmann transitioned from a UW PhD alumnus in 1963 to becoming a beloved EE faculty member in the areas of acoustics, ultrasonics, signals and systems. He enjoyed his time in the department immensely and had a hard time retiring. In fact it took three attempts before he finally retired in 1991! During his tenure at the UW, he had the opportunity to be a visiting professor in Germany as well as his hometown in Brazil.

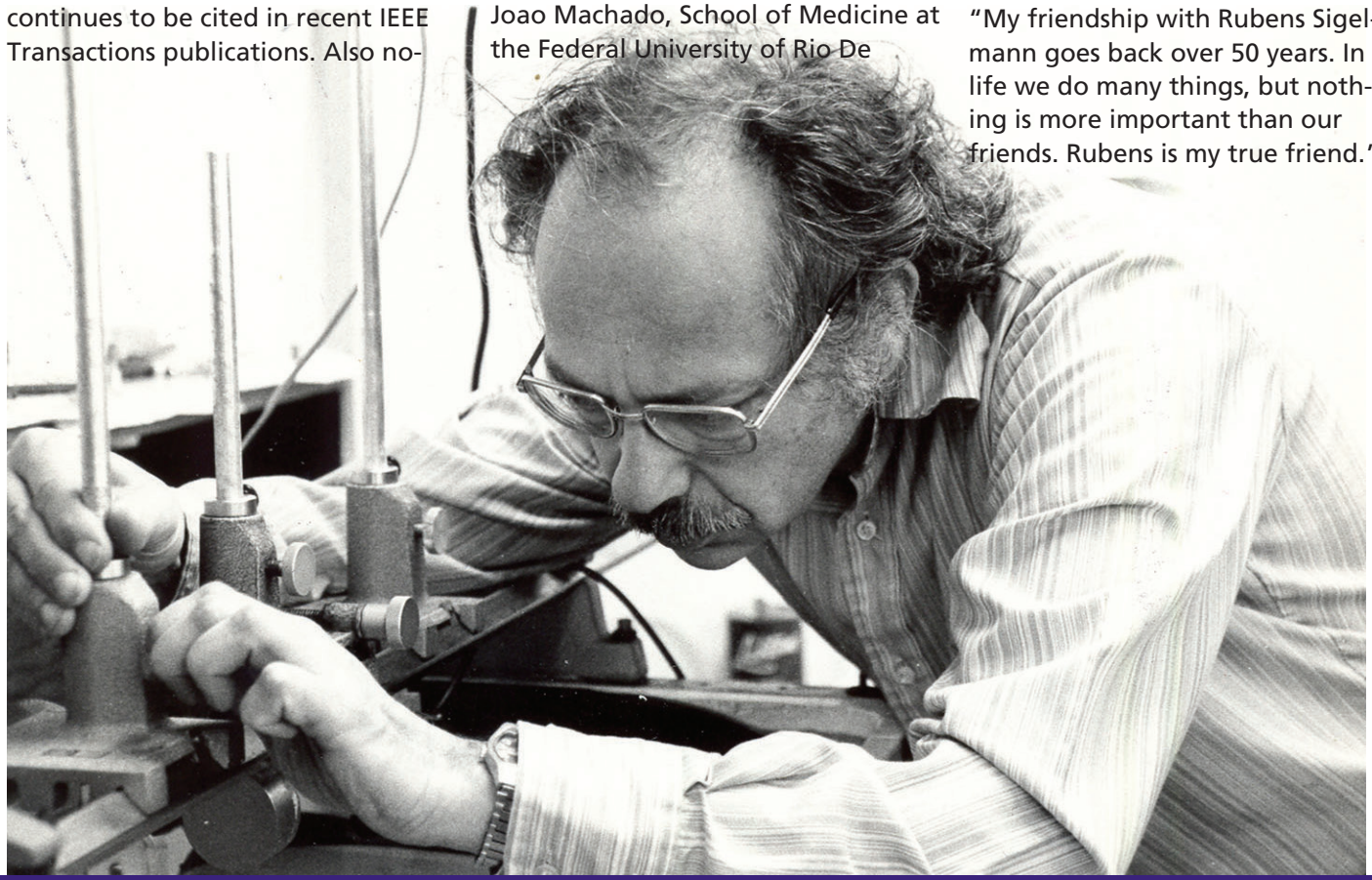
In the 1960s, Sigelmann published a paper with UW EE faculty member Akira Ishimaru dealing with periodic structures excited by a point source. This was an important topic for advanced antennas; his contributions included the use of an infinite series of branch cut integration in a complex plane. This was a new theoretical concept at the time, and is still current. Sigelmann's work in this area continues to be cited in recent IEEE Transactions publications. Also notable was his pioneering paper on ultrasound pulse scattering, which has been widely cited in bio-ultrasound imaging research work.

Sigelmann's accomplishments are wide and varied. He has more than 30 reviewed papers, more than 20 presentations—several of them invited. He is one of the few professors to be a certified PE. However, when asked what he considers his greatest accomplishment Sigelmann simply says, "his students." Sigelmann has always felt that it was his role as a professor to guide students to be successful in their careers. "We are living through an exciting time—we have to prepare the next generation." He commented that he often felt guilty about getting paid because he loved what he did so much.

His former students include Professor Joao Machado, School of Medicine at the Federal University of Rio De Janeiro, who is a leading expert in bio-ultrasound research; Professor Kirk Shung, Penn State, a leader and author on ultrasound imaging in bio-tissues; and Professor Andrew Chan, Texas A&M, an expert and author on wavelet theory and applications.

One of Sigelmann's recent accomplishments is his favorite. On January 5, 2010, Sigelmann received a patent on his "One-Movement Balanced Hands Clock." Sigelmann is also a part of the National Association of Clock Collectors and his clock won 1st place for innovation.

Sigelmann and his wife Dulce reside in Seattle. They have two children, Camila and Milton. In his spare time he likes to read, think, work on clocks, and visit with the emeritus faculty. Ishimaru said, "My friendship with Rubens Sigelmann goes back over 50 years. In life we do many things, but nothing is more important than our friends. Rubens is my true friend."



Join Us for An Exclusive Tour of the

UW Electrical Engineering Labs

Monday, October 28, 2013

1:45 - 2:45pm

Paul G. Allen Center Atrium

EE Office Entrance

Witness the latest technology and cool gadgets being developed by UW EE students and faculty and learn how UW EE research is improving our lives, the environment and the economy. The behind the scenes tour will be led by Associate Chair John Sahr and includes:

Ubiquitous Computing Lab
Biorobotics Lab
Agilent Lab
Circuits Lab
Synthetic Biology
Anechoic Chamber
Cleanroom

To RSVP, please contact Kelly Williams:
kvw9880@uw.edu or 206.221.5072

Alumni on the Radar - *EE Class Notes*

We'd like to hear from you! Check out our Alumni Connections web page to read a complete list of updates from your former classmates, or to provide your own:

www.ee.washington.edu/people/alumni/index.html

Kevin Lau, *MSEE (PMP) '11*
Issaquah, WA – Lau works at T-Mobile leading the device development group. He enjoys working on wireless technologies as well as developing products and services for the latest smartphones. In fall 2013, Lau came back to campus to start the UW EE PhD program. He enjoys family time and helping his son with go kart racing.

Seth Tai, *BSEE '11*
Federal Way, WA – In July 2012, Tai began working as an enterprise engineer at The Boeing Company's Engineering Career Foundation Program (ECFP). ECFP is a 2-year, fast-paced engineering rotational program designed to accelerate the technical growth and leadership of college graduates. Participants experience six 4-month rotations spanning Boeing commercial airplanes, engineering operations and technology, and Boeing defense, space and security. Rotations represent each stage of the product lifecycle: technology development, requirements definition, product definition/design, production support, post-delivery product support, and enterprise support.

Loukas Lazos, *PhD '06*
Tucson, AZ – Lazos was promoted to associate professor with tenure at the University of Arizona, Tucson, effective August 2013. He was a member of the Network Security Lab (NSL), and was advised by Professor Radha Poovendran. Loukas received the NSF CAREER Award in 2009 for his research in wireless security. During his doctoral studies, Lazos was also a player-coach of the Husky volleyball team, a game which he started playing in Greece and continues to this date in Arizona.

Paul Burke, *BSEE '48*
Mercer Island, WA – In 1947, professor Hill led an EE class on a field trip to an underground powerhouse at Snoqualmie Falls, which was built in 1898. Burke formed Burke Electric in 1958, and their work primarily focused on Hydro power plants. Before retiring and leaving his son and grandson to continue on with the company, Burke will work on his last project this year, a $15,000,000 contract to remove and replace major electrical controls, instruments, lighting and switchgear to upgrade a power plant. Burke thanks the UW for helping form a future.

The Integrator

UNIVERSITY OF WASHINGTON
ELECTRICAL ENGINEERING

Website: www.ee.washington.edu | Tel: 206.221.5270 | Fax: 206.543.3842

To learn about supporting EE, please call 206.685.1927, or visit www.ee.washington.edu/supportee

University Of Washington
Department of Electrical Engineering
Paul G. Allen Center - Room AE 100R
Box 352500
Seattle, Washington 98195-2500

New Faculty

(Continued from page 1)

the electrical engineering and computer science and engineering departments. The research of Dr. Reynolds, which has resulted in five best paper awards, focuses on ultra-low power sensing and computation, RFID, wireless power transfer, biomedical applications, and smart materials and surfaces. Dr. Reynolds holds 14 patents, with more than 30 patents still pending, and he has co-founded three companies. He received his S.B., M.Eng., and PhD degrees from Massachusetts Institute of Technology.

Dr. Reynolds has demonstrated considerable entrepreneurial and intellectual property expertise, and his outstanding work will be of great benefit to UW EE students. He joins other recent hires in the department through the UW College of Engineering ExCEL initiative, including Josh Smith, Georg Seelig, and Shwetak Patel, who are all making an enormous impact in electrical and computer engineering.

Arka Majumdar will join the faculty from Intel Labs in Santa Clara, CA where he is working with the Photonics Signaling Research Group as a Postdoctoral Research Scientist. He received his B.Tech degree from the Indian Institute of Technology, Kharagpur in 2007, and his PhD in electrical engineering from Stanford University in 2012. He then spent a year as a postdoctoral scholar in the physics department at the University of California, Berkley.

Dr. Majumdar's research interests include devices in nanophotonics, nanometallics and quantum optoelectronics with a goal to explore the fundamentals and applications of photonics in information processing. He has published more than 30 scientific papers in distinguished journals, and has been cited more than 400 times. Among other accolades, he is a recipient of the Gold Medal from the President of India and the Stanford Graduate Fellowship. Dr. Majumdar will hold a joint position between the EE and Physics departments.