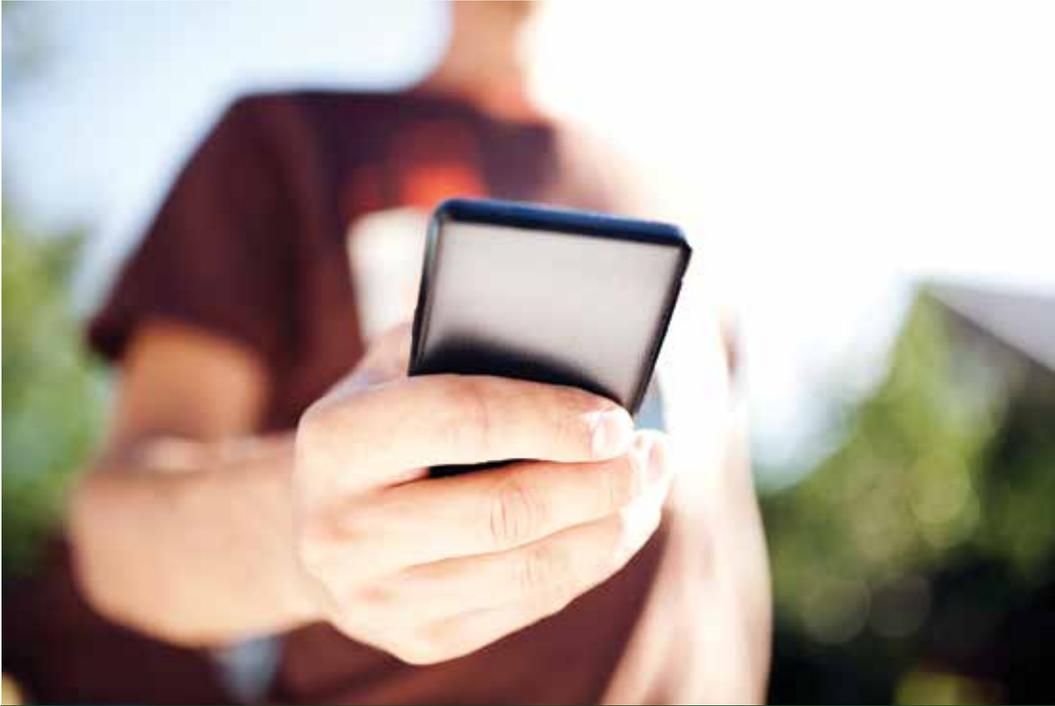




## REVOLUTIONIZING ENGINEERING EDUCATION



Faculty are illustrating fundamental ECE concepts using tangible examples, such as the smartphone.

Two years ago, we announced that a revolution is afoot in the Department of Electrical and Computer Engineering, thanks to a five-year “RED” (Revolutionizing Engineering Departments) grant from the National Science Foundation.

“It was time for a change,” said ECE Department Head Tony Maciejewski. “For years, too many capable students have failed or abandoned the discipline.”

Starting with the junior year of the curriculum – commonly referred to as the technical core – faculty and staff are in the midst of flipping the traditional teaching and learning model on its head. And while it is still too soon to form hard and fast conclusions, the early results are promising.

“When comparing Fall 2016 data with previous years, the number of students receiving Ds, Fs, and withdrawals in the junior year has been cut in half,” said Maciejewski.

### Throwing Away Courses

If you earned a bachelor’s degree in ECE, you know it is a tough program, and you understand that it is not uncommon to fail. So, what are we doing differently to slash failure and dropout rates? At a very basic level, our faculty are working creatively and collaboratively to help students “get it.”

The idea of a traditional course is gradually disappearing. Taking a bird’s-eye – or systems – view of the curriculum, changes are occurring in the delivery and integration of content. Instead of teaching material in unconnected pieces through a set of disparate courses, faculty teams are synchronizing

content and adapting their teaching practices to show students the connections between fundamental ECE topics in the technical core.

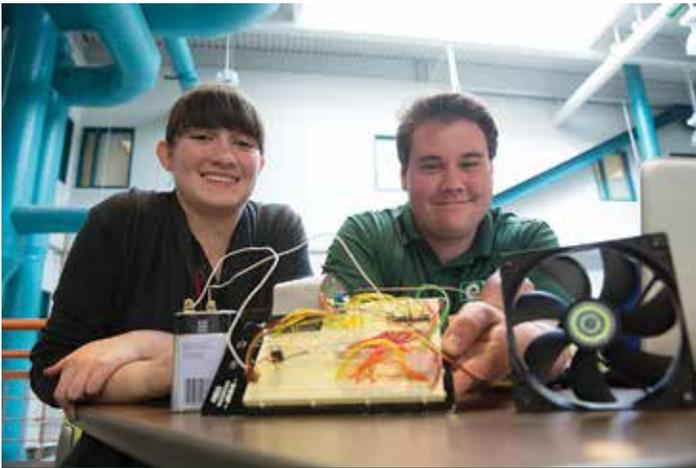
“It seems basic, but it is actually a big shift in the way students learn engineering,” said Tom Chen, a co-principal investigator on the RED grant. “All too often, students feel like they are learning information in a vacuum, and they also struggle to understand why their knowledge is relevant in the context of our everyday lives.”

### Knowledge Integration to Understand Why

To help students understand *why* they are learning material and how it will help them engineer a better world, every four weeks we are bringing together all the professors and students from the technical core to participate in hands-on group exercises called knowledge integration (KI) activities. Using relevant examples such as the smartphone, KI activities illustrate how ECE concepts make the magic happen inside modern technologies.

“The KI activities are great, because I learn through doing,” said ECE junior Marta Camacho. “It’s really the tangibility factor that is making all the difference. The faculty teams are helping us apply dense theory to something real – and suddenly it all makes sense.”





The RED project aims to hook students with the excitement of engineering beginning early in the program.

## WEAVING THREADS TO CREATE WELL-ROUNDED ENGINEERS

In addition to overhauling the technical core, we have implemented overarching initiatives that weave throughout the undergraduate program essential themes, or threads, that impact a student's ability to become a well-rounded engineer.

### Creativity Thread

We know that engineering is nothing without creativity. From open-ended projects early in the program to vertically integrated projects that span multiple years, we are finding new ways to hook students with the excitement of design and research.

### Foundations Thread

Students are often intimidated by the mathematics required for the

major and struggle to see *why* math matters. Starting in the freshman year, we are putting math in context by showing students that almost every calculation they perform is critical to solving engineering problems.

### Professional Formation Thread

Being an effective engineer in today's world takes more than technical know-how. Beginning early in the program, we are partnering with industry to ensure students develop professional skills (think communications and teamwork) more meaningfully and effectively.

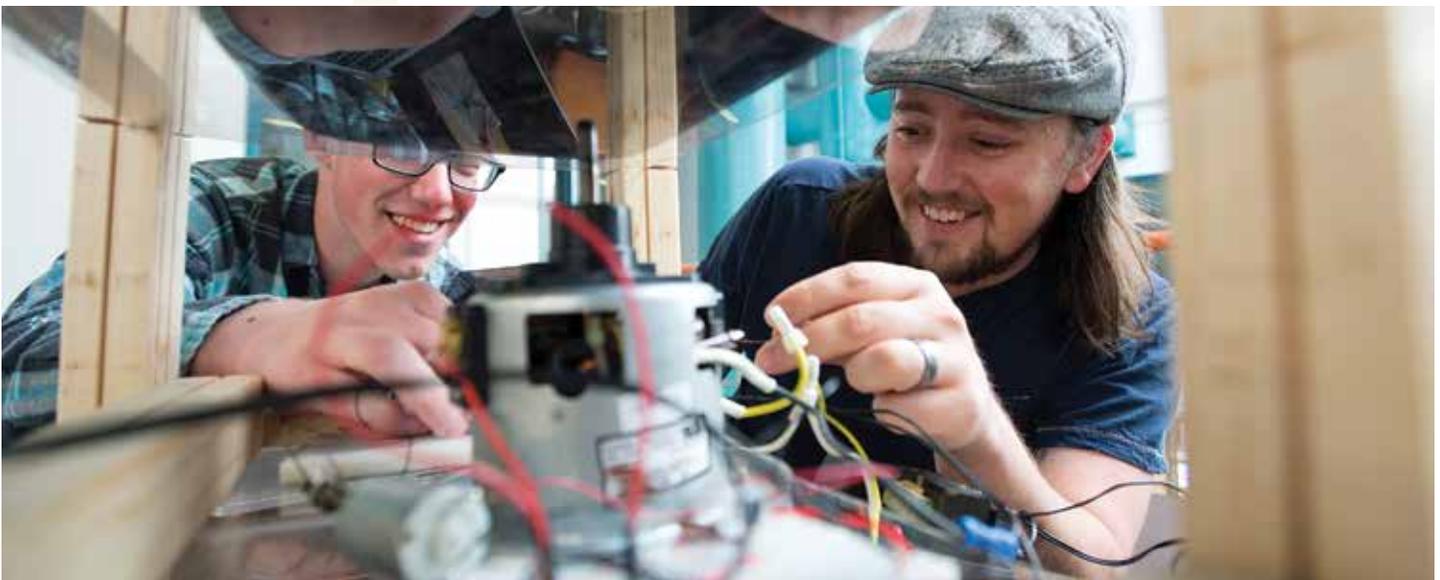
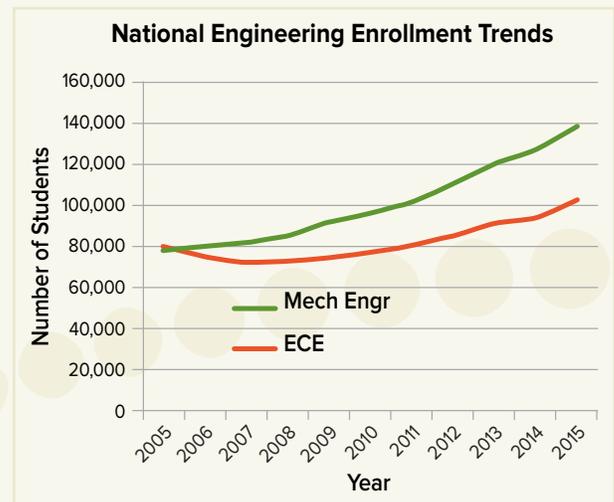
## WHY WE NEED A REVOLUTION

Engineering and computer science programs hold the key to our technological future, yet research tells us that we need to do a better job of educating students to be leaders and innovators in the 21st century. The numbers speak volumes. Students continue to leave engineering at unsatisfactory rates, and our department is no exception, with six-year graduation rates hovering around 35 percent.

Women and minorities are still vastly underrepresented in the field. In 2015, a mere 12 percent of bachelor's degrees in ECE were awarded to women, and recent data show that approximately 45 percent of women entering tech fields leave within five years.

On the flip side, mechanical engineering is a hot major, with enrollments soaring and surpassing ECE.

As one of 13 schools chosen by the National Science Foundation to lead the nation to change, we are working to move the needle and unravel these issues facing engineering education. We look forward to sharing our work with the engineering community as the RED project progresses.





ECE students are assisting in the design and automation of a custom brewery system, in partnership with CSU's Fermentation Science and Technology program.

## CREATIVITY IS BREWING IN THE ECE DEPARTMENT

With more than 20 craft breweries in Fort Collins – paired with CSU's emerging Fermentation Science and Technology (FST) program – the ECE department is pleased to have a new multiyear project on tap to get students excited about electrical and computer engineering. (See more about the creativity thread on Page 2.)

Working in partnership with fellow students in mechanical engineering and chemical and biological engineering, ECE students are assisting in the design of a custom brewery system that will reside on campus. This year's cross-disciplinary senior design team focused on design and automation, while future teams will have opportunities to work on optimization and energy efficiency.

Though small in size, the system is being built with all the same capabilities as a commercial brewery. Alumnus Dan Malyszko (B.S.E.E., '02) collaborated with this year's team to set up the automation "brains" of the brew house, which will serve as a hands-on learning laboratory for FST students, as well as a test and pilot brewery for local industry partners. Malyszko's firm, Malisko Engineering, is sponsoring the project.

"I've told the students that I'm jealous of them, getting this practical experience before graduation," said Malyszko. "I wish I'd had exposure to industrial manufacturing design in college, but now being part of providing the platform and coaching the students is very rewarding."



Engineer in Residence volunteers spent more than 300 hours in the student projects lab this semester.

## ENGINEERS IN RESIDENCE BRING INVALUABLE PERSPECTIVES TO CAMPUS

Something unique is happening inside the student projects laboratory in the ECE department. The Engineer in Residence program, a partnership with the Institute of Electrical and Electronics Engineers, is bringing experienced professionals – 23 engineers, to be exact – into the lab to work alongside students.

The initiative, which is part of the professional formation thread (see Page 2), is designed to help students develop professional skills and learn firsthand how their knowledge will allow them to succeed in the workplace. Ranging from helping students

overcome technical challenges to providing a window into life after CSU, EiR volunteers spent more than 300 hours in the lab last semester.

"I couldn't be more pleased with the early results of this program," said Richard Toftness, IEEE section secretary and founder of the EiR program. "Students really seem to appreciate the support of our industry volunteers. Likewise, we gain energy and fulfillment from our interactions with the next generation of engineers."

If you are interested in learning more about the EiR program, contact Richard Toftness at [rtoftness@gmail.com](mailto:rtoftness@gmail.com).

## YOU GO, GIRL!



Left to right: Priscilla Mercedes Vázquez, Marta Camacho, Heather Straley, and Veronica Foster.

## Creating a Community for Women in ECE

Imagine an inviting room with soft lighting, cozy couches, and plenty of coffee. That's the scene every Thursday morning for the Women in ECE club. Whether seeking friendship, mentorship, or advice, the program creates a social outlet and welcoming space for our female students, and serves as the source of much caffeine-fueled conversation and laughter.

"I love seeing these women and enjoying a nice break from my studies," said ECE sophomore Heather Straley. "They help me stay confident,

and their guidance definitely gets me through the worst and the best days."

Led by Olivera Notaros, head of ECE student projects, Women in ECE is sponsored by Keysight, Micron Technologies, Institute of Electrical and Electronics Engineers, and Intel, as well as individual supporters, Susan Hunter, Molly Johnson, and Martha Small. In addition to refurbishing the club's meeting space, the funding allows them to organize special events and outreach activities designed to recruit and retain women in the major.

**CLASS NOTES: WHERE ARE THEY NOW?**

**Lt. Col. Robert Johnson (B.S.E.E., '68)** received the National Order of the Legion of Honor, France's highest award, for his volunteer work in support of France's veteran recognition programs.



Lt. Col. Robert Johnson (right) with French Consul General Christophe Lemoine.

**Adnan Munir Mian (B.S.E.E., '95)** successfully defended his dissertation in April at the University of Colorado Boulder and received his Ph.D. in telecommunications in May. He also received the Katherine Snow Best Paper Award at ITERA – the conference on telecommunications and information technology.



Adnan Mian successfully defended his dissertation at CU Boulder.

**Blair Miller (B.S.E.E., '94)** is currently the director of global transport engineering at Verizon.

**Haneet Singh Mahajan (M.S.E.E., '16)** reports that he landed a great job with IAV Automotive Engineering as a functional safety engineer in Troy, Mich. As a former member of the EcoCAR 3 project team, he said he is grateful for the experience and knowledge he gained at Colorado State.

**Josh Olson (B.S.E.E., '16)** is working for Keysight Technologies in Colorado Springs. He and his fiancée, Rylie, are getting married in July, and the couple recently purchased a new home.



Josh Olson and his fiancée, Rylie.

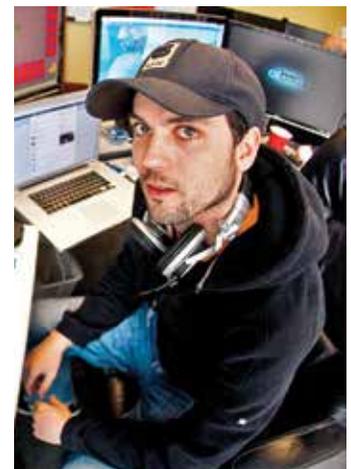
**ECE ALUMNI MAKE US PROUD**

With countless examples of former ECE students making their marks in the world, we think our alumni are a big deal. Exemplifying the innovative spirit of our discipline, Susan Benzel and Ian Bernstein are two recent success stories.



**Susan Benzel** is one of two CSU alumnae leading the development of "The Machine" for Hewlett Packard Enterprise. Designed to dramatically increase computing speed and reduce the energy needed to perform computing functions, The Machine is touted as one of the most revolutionary changes to modern-day computing.

**Ian Bernstein**, co-founder of Sphero, is at the forefront of the "connected play" revolution. He and his partner are on a mission to put a robot in every home. As the creator of the popular *Star Wars*™ BB-8™, an app-enabled Droid™, Bernstein appreciates the practical knowledge he gained through his design experience at CSU. "The ECE senior design class was incredibly helpful. I learned a lot, especially the key principles of managing a project," he said.



Top photo: Larry Ellis with his wife, Deborah, (left) and sister, Cynthia, (right) at the Lockheed Martin InSight Family and Friends Night. Bottom photo: InSight was one of 12 missions Ellis worked on at Lockheed Martin.

**Larry Ellis (B.S.E.E., '81)** retired in 2016 after 31 years of service with Lockheed Martin, where he served on 12 NASA interplanetary missions, including several that are still in progress: Mars Odyssey, Mars MAVEN, Jupiter Juno, Osiris Rex, and InSight, which is set to launch in 2018.

*If you would like to share your professional and family updates, please contact the ECE department at [ece@engr.colostate.edu](mailto:ece@engr.colostate.edu). Your updates will be published in the next ECE newsletter.*

*This newsletter is produced by the Department of Electrical and Computer Engineering. Send story ideas and comments to Andrea Leland, lead writer and editor at [andrea.leland@colostate.edu](mailto:andrea.leland@colostate.edu).*

## CAN YOU IDENTIFY THESE ECO-FRIENDLY ALUMNI?

Being a “green” University is not a new concept for CSU. Back in the day, this lively group of HKN Honor Society members were committed to sprucing up Colorado through the *Adopt A Highway* program.

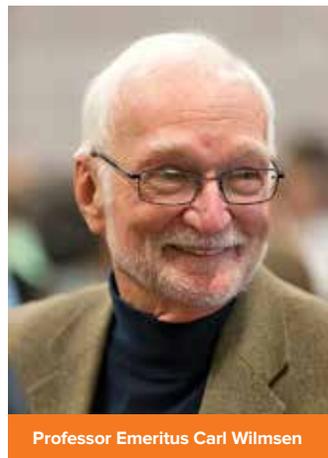


Can you identify the alumni in this photo (or do you recognize yourself)? Do you know what year this was taken? Contact the ECE department at (970) 491-6600 or [ece@engr.colostate.edu](mailto:ece@engr.colostate.edu), and we will run an update in the next issue.

**Update from last newsletter:** Shortly after sharing the photo below, we identified the violinist on the far left as **Mari Ochiai Holcomb (M.S.E.E., '93; Ph.D.E.E., '97)**. We recognized her when she returned to campus for the reception to honor Professor Emeritus Carl Wilmsen.



## WILMSEN SCHOLARSHIP ENDOWED



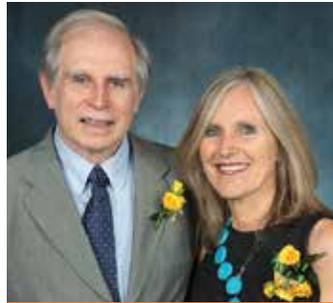
Professor Emeritus Carl Wilmsen

We are pleased to announce that, earlier this year, the Carl Wilmsen ECE Scholarship surpassed \$25,000 in funding – the amount required to establish the endowment. Thanks to the generosity of our alumni and friends, the scholarship will honor Professor Wilmsen's legacy for years to come, while providing need-based financial assistance for high-achieving students. The first scholarship recipient will be named in 2018.

Wilmsen, who retired in 2003, served as a professor in the department for 37 years. He was department head from 1982 to 1987.



Lisa and Desi Rhoden, College of Engineering Distinguished Alumni Award winners



Jorge Rocca and Carmen Menoni, Distinguished Alumni Employee Award winners

## OUTSTANDING ALUMNI DUOS HONORED

The Colorado State University Alumni Association has honored two outstanding ECE couples for their individual and combined achievements.

**Lisa (B.S.E.E., '84) and Desi (B.S.E.E., '83; M.S.E.E., '84) Rhoden** were the 2015 recipients of the Distinguished Alumni Award for the College of Engineering. Both Lisa and Desi have a long and successful history of working on the bleeding edge of technology with companies around the globe. From establishing the department's first-ever professorship to providing funding for a named teaching lab, the Rhodens are committed to empowering the next genera-

tion of engineers with the gift of knowledge.

**Carmen Menoni (Ph.D., Physics, '87) and Jorge Rocca (Ph.D.E.E., '83)** were named Distinguished Alumni Employees in 2016. From their initial employment in 1979 as teaching assistants to their current status as University Distinguished Professors – the highest recognition available on campus – Menoni and Rocca are internationally recognized pioneers in laser science, optics, and engineering. Together, they have garnered more than \$50 million in federal research funding.

While students at CSU in the '80s, the Rhodens were well acquainted with Rocca and Menoni, and remain in touch today.

## ECE SCHOLARSHIP RECIPIENTS

Academic Year 2016-2017

**Aram Budak ECE Fellowship**

Michael McCaffery  
Odessa Noriega  
Jacob O'Burke

**Chris Kautz Memorial Scholarship**

Forest Kunkel

**Eads Family Scholarship**

Jacob Alfieri  
Caleb Begley  
Kathleen Cunningham  
Devon Fossceco

**Electrical and Computer Engineering Scholarship**

Jared McKneely

**Fry Family Scholarship**

Ryan McCullough

**Lee and Bette Wehrman Scholarship**

Jessica Boyd  
Antonio Segovia Maldonado  
Eugene Zadorozhny

**Manuel Montoya Memorial Engineering Scholarship**

Swagata Sharma

**Perl Family Graduate Fellowship**

John Burks

**Thampachen Kunjunny Memorial Scholarship**

John Hall

**Thomas A. Brubaker Scholarship**

Ryan Loaiza

**Willis T. Johnson Memorial Scholarship**

Addiel Vega



Katya Stewart-Sweeney with ECE graduate Qiang Cui.

## NEW GRADUATE ADVISOR FOSTERS DIVERSITY AND INCLUSION

Katya Stewart-Sweeney proudly displays a sign on her office door that exemplifies her approach to advising: “You are welcome here.”

Stewart-Sweeney, who joined ECE last fall, provides academic guidance and support to the department’s predominantly international graduate student population. She also works closely with INTO CSU – a graduate pathways program for foreign-born students that combines intensive language study with academic skills development.

“I feel energized by the high-achieving people in this department,” said Stewart-Sweeney. “I am also drawn to our international students, because I love learning about different cultures.”

With a diverse background in student affairs and counseling, Stewart-Sweeney has thrived in student-centric roles since 1988. Most recently, she served as an academic adviser for Colorado State’s College of Business, where she also coordinated the Business Diversity and Leadership Alliance.

In addition to empowering our students’ success, Stewart-Sweeney is heavily involved with CSU’s Center for Mindfulness, as well as the Women and Gender Collaborative.

Outside work, Stewart-Sweeney loves practicing tai chi and hiking near her home at Horsetooth Mountain Park.

**You are  
welcome  
here.**



## ALUMNUS JESSE WILSON JOINS ECE FACULTY



Assistant Professor Jesse Wilson (B.S.E.E., '04; M.S.E.E., '07; Ph.D.E.E., '10)

ECE’s newest faculty member, Assistant Professor Jesse Wilson, always had a fascination with how things work. Destined for a career in engineering, Wilson was obsessed with *Star Trek* as a child, and pored over *Engineer’s Mini-Notebooks* from Radio Shack. Today, he is proud to share his insatiable appetite for knowledge with ECE students.

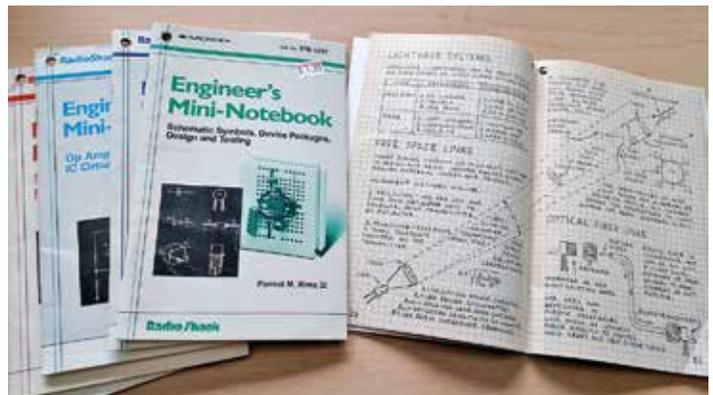
“I love teaching and feel deep gratitude for the opportunity to shape our students and open their eyes to the immense potential of this discipline,” said Wilson.

An alumnus of the ECE department three times over, Wilson earned his bachelor’s, master’s, and Ph.D. in electrical engineering from Colorado State. He is thrilled to be back at CSU, where he is working in collaboration with fellow ECE

faculty, the School of Biomedical Engineering, and the College of Veterinary Medicine and Biomedical Sciences.

Wilson’s current research is pushing the boundaries of biomedical optics, with the goal of making early detection of melanoma faster, cheaper, and less invasive. He is also exploring new collaborations that leverage laser technologies to advance the study of metabolism.

Prior to joining CSU, Wilson served as a postdoc at Duke University, where he received the JenLab Young Investigator Award from SPIE – the International Society for Optics and Photonics, and a Ruth Kirchstein Fellowship from the National Cancer Institute. Wilson and his wife, Juliana – also an alumna of CSU – have a 2-year-old son, Jackson.



Wilson pored over *Engineer’s Mini-Notebooks* as a child. The manuals are on the shelf in his faculty office today.

## PASRICHA RECEIVES ROCKWELL-ANDERSON PROFESSORSHIP

ECE Associate Professor Sudeep Pasricha has been named the 2017 recipient of the Rockwell-Anderson Professorship.

"I'm very appreciative of this support," said Pasricha. "This is essential for academics who are heavily invested in doing research to improve our quality of life and push the frontiers of what is possible."

Pasricha's research interests are broad, ranging from technologies as small as embedded sensors to massive supercomputers. Pasricha, director of the Embedded Systems and High Performance Computing Laboratory, was also named a Colorado State University Monfort Professor.



Associate Professor Sudeep Pasricha

## INTRODUCING NEW PROGRAMS IN ECE



In addition to a new graduate program in computer engineering, ECE now offers certificates in specialized areas.

### Graduate Degrees in Computer Engineering Now Available

Building on the foundation of our computer engineering bachelor's degree, which continues to grow, we are now offering master's and Ph.D. programs in computer engineering. Combining many aspects of electrical engineering and computer science, the new degrees focus on hardware and software for a wide range of applications, such as mobile and cloud computing, big data, Internet of Things, medical devices, aerospace, and smart-grid systems.

### ECE Certificate Program Launched

Providing an opportunity for students to gain new knowledge in a concentrated area of interest, the ECE department now offers certificate programs in computer systems engineering, embedded systems, and power and energy. The certificates are available online or on campus.

For more information about ECE graduate programs, contact Katya Stewart-Sweeney ([katya.stewart-sweeney@colostate.edu](mailto:katya.stewart-sweeney@colostate.edu)) or visit our web site: [www.engr.colostate.edu/ece](http://www.engr.colostate.edu/ece).

## PROF. SID NAMED INAUGURAL RECIPIENT OF RHODEN PROFESSORSHIP



Prof. Sid (right) is the inaugural recipient of the Lisa and Desi Rhoden College Professorship in ECE.

ECE Associate Professor Siddharth Suryanarayanan, or Prof. Sid, has been named the inaugural recipient of the department's first-ever endowed professorship, the Lisa and Desi Rhoden College Professorship in Electrical and Computer Engineering.

ECE alumni Lisa (B.S.E.E., '84) and Desi (B.S.E.E., '83; M.S.E.E., '84) Rhoden, who met at CSU while taking electrical engineering course work, created the professorship to ensure transformative learning experiences for future generations. (See more about the Rhodens on Page 5.)

"I'm thrilled and humbled," said Suryanarayanan, director of the Advanced Power Engineering Laboratory at CSU. "It's fantastic that the Rhodens are demonstrating their commitment to engineering education through this invaluable professorship."

With the help of the Rhoden professorship, Suryanarayanan is exploring the field of high-performance computing for application in the smart-grid area, while providing support for a cohort of graduate students.



## RADAR GIFT FROM VAISALA TO ENHANCE ECE RESEARCH AND EDUCATION

Opening up new opportunities for research observations around the world, Vaisala has donated a customized C-band radar to CSU. ECE Professor V. Chandrasekar will leverage the new system to enhance research and education in radar remote sensing and weather observations.

FACULTY ACCOLADES

New Fellows

Three ECE faculty members have been named Fellows of important professional societies, a status reserved for the most accomplished scientists and researchers.

**Professor Carmen Menoni**  
American Association for the Advancement of Science



**Professor Stephen Milton**  
Institute of Electrical and Electronics Engineers



**Professor Branislav Notaros**  
Applied Computational Electromagnetics Society



Chandra Knighted by Finnish Government

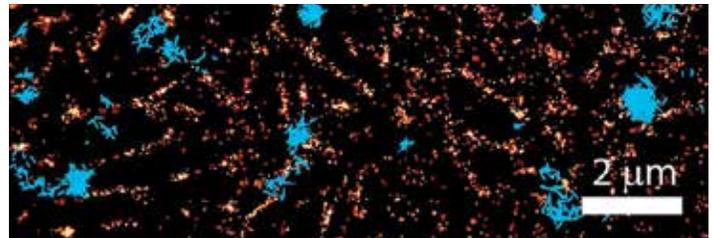
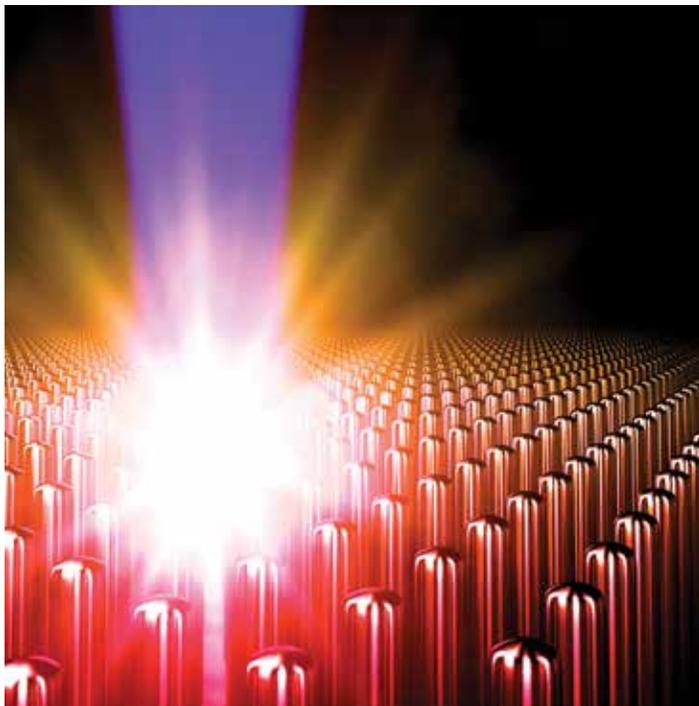
ECE Professor V. "Chandra" Chandrasekar has been awarded the Insignia of Knight, First Class, of the Order of the White Rose of Finland for contributing to technical expertise through research collaborations with the Finnish Meteorological Institute, University of Helsinki, and industry.

RECENT BREAKTHROUGHS FEATURED BY CSU

The following scientific advancements were featured on SOURCE – the web site for news and information about the people, places, and events that make Colorado State an exciting place to study and work. To read more, visit [source.colostate.edu](http://source.colostate.edu).

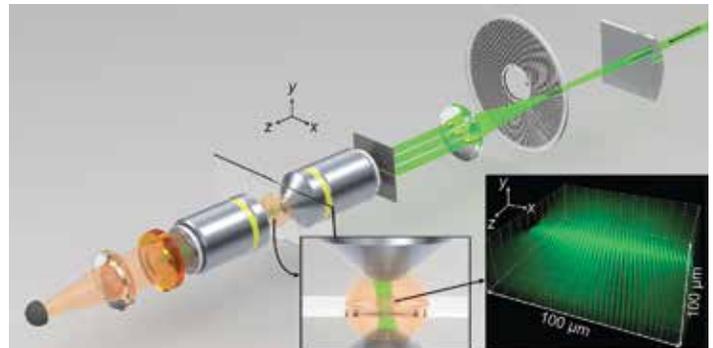
Re-Creating Conditions Inside Stars with Compact Lasers

University Distinguished Professor Jorge Rocca and his team conducted an unprecedented experiment that re-creates the high energy-density conditions inside stars with compact lasers. The results, published online in *Science Advances*, open a path to obtaining unprecedented pressures in the laboratory with compact lasers.



Shedding Light on Long-Obscured Cell Process

The surface of every living cell hums with activity. Now, for the first time, the scaffolding that organizes the cell surface was visualized with nanometer resolution and found to have a self-similar fractal nature, thanks to ECE Professor Diego Krapf and his multidisciplinary research team. A discovery that could advance our understanding of disease progression, the breakthrough appeared in American Physical Society's *Physical Review X*.



Upending the World of Biological Imaging

ECE Professor Randy Bartels and collaborators designed and built a fluorescence-detection microscope that combines three-dimensional and high-resolution image processing that is also faster than comparable techniques. The work was published in *Optica*, the journal of the Optical Society of America.