

ECE

ELECTRICAL & COMPUTER ENGINEERING

UConn | COLLEGE OF ENGINEERING

FALL 2023
WWW.EE.UCONN.EDU



UConn STEAM Tree

A solar tree built on the UConn Storrs campus is a sustainable energy harvesting tree, research and educational tool, and a social gathering place. See story on page 17.

MESSAGE FROM THE DEPARTMENT HEAD



I am pleased to share with you the Fall 2023 edition of our newsletter. The data below summarizes the ECE Department activities during the past year. However, numbers never tell the full picture of a department, and the following pages highlight some recent student, alumni, and faculty success stories. Our faculty and students continue to conduct world-class research in all aspects of electrical engineering. In light of the recent emphasis on the semiconductor industry as a result of the bipartisan CHIPS and Science Act, this year's newsletter includes a short article on some of the research we are doing in nanotechnology.

We are very excited about our new robotics engineering major which kicked off in Fall 2022 with an inaugural freshman class of 11 students, and the incoming Fall 2023 class has increased substantially to 18 students – over 20% of the overall ECE freshman class. We are in the midst of hiring new robotics faculty and creating new laboratory facilities to support this new program

In some sad news, the department lost two of our esteemed former department heads: **PETER LUH**, who passed away in November 2022 and **PETER CHEO**, who passed away in February 2023. They were both outstanding researchers, educators and colleagues, and will be sorely missed.

We are pleased to announce that the UConn Board of Trustees has approved the transition to elevate the “School of Engineering” to a “College of Engineering”. This will enhance our profile externally, streamline operations internally, and allow for future growth beyond the extraordinary progress and development we have already experienced.

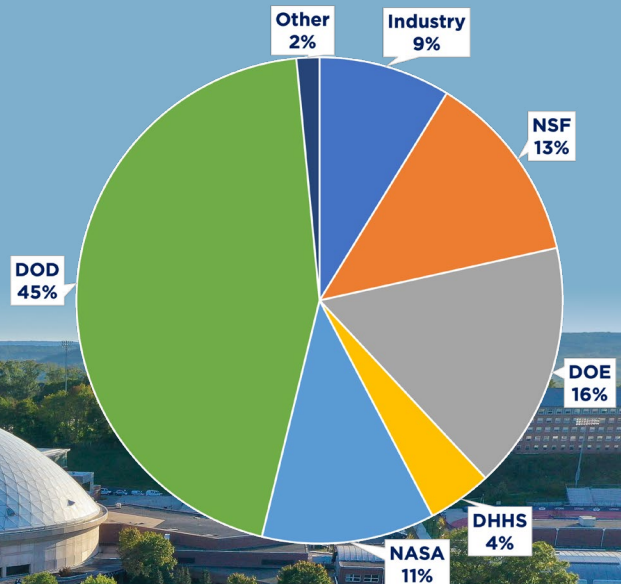
If you would like more information about any item in the newsletter or about our research and educational programs, please send me a note at john.chandy@uconn.edu. Also, check our website (www.ee.uconn.edu) for the latest news about the department.

JOHN CHANDY
Professor and Head

2022-2023 SUMMARY

245	Peer-Reviewed Publications
\$7.3M	Research Expenditures
14,234	Citations
27	Tenured-Tenure Track Faculty
371	Undergraduate Students
81	BSE Degrees Granted
122	Graduate Students
11	Ph.D. Degrees Granted

2022-2023 RESEARCH EXPENDITURES



FALL 2023

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This newsletter is published for the alumni, faculty, students, corporate sponsors, and friends of the Department of Electrical & Computer Engineering at the University of Connecticut. Comments are always welcome.

Please send correspondence and address corrections to the address below or email john.chandy@uconn.edu.

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The creative efforts of the College of Engineering staff members Brandy Ciraldo, Chris LaRosa, and Claire Galvin are gratefully acknowledged.

UConn COLLEGE OF ENGINEERING

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WATCH
THE VIDEO

ON THE COVER

Associate Prof. Sung-Yeul Park poses with two ECE undergraduate students who worked on the solar tree project. (L-R) Peter Leppones, Sung-Yeul Park, Kevin Knowles. Story on page 17.

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UConn, National Renewable Energy Laboratory Announce Partnership for Research and Innovation

By Matt Engelhardt, UConn Today

An agreement with the U.S. Department of Energy's National Renewable Energy Laboratory leverages scientific collaboration to research renewable energy technologies at the Innovation Partnership Building at UConn Tech Park.

UConn has reached a partnering agreement with the U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory (NREL) on a collaboration for clean energy innovation and grid resilience.

NREL will establish a research collaboration with UConn at the Innovation Partnership Building (IPB) at the UConn Tech Park designed to leverage scientific knowledge and state-of-the-art facilities to address global energy challenges, including energy efficiency and resiliency, renewable energy technologies, and smart grid innovation.

"The partnership between UConn and NREL further builds our university's reputation as a leader in the field of clean energy research and innovation," says UConn President **RADENKA MARIC**. "Connecticut is known as the birthplace of the fuel cells that provided electricity to the command module in the Apollo moon mission. A great deal of related education, research, training, and demonstration related to fuel cells, hydrogen, and batteries happened and continues to happen at UConn.

"As one of only five research universities to collaborate with NREL in the eastern United States, we are in a select group of leading institutions whose work will

shape the way businesses and governments respond to the energy challenges of the 21st century," Maric says. "I am proud that UConn is playing an important role in this crucial sector, and I am excited to see the creativity and determination our faculty and students bring to this work."

NREL is one of 17 DOE national laboratories uniquely focused on creating a clean energy future. Based in Golden, Colo., NREL has a vast network of industry, academic and government partners throughout the world.

UConn is now a member of a prestigious cohort of universities engaged with NREL through its University Partnerships Program. It joins MIT, Princeton, Georgia Tech, and Carnegie Mellon, to name a few, in the eastern half of the country. Through its University Partnership Program, NREL works across disciplines to enhance research, foster an exchange of ideas, mobilize resources and create opportunities for undergraduate and graduate students in cutting-edge fields related to the clean energy economy.

"NREL sees the partnership with UConn as a

critical part of achieving clean energy at scale that brings together talent from both institutions to further our collective goals," says Dr. **ELLEN MORRIS**, director of University Partnerships at NREL.

Among the many goals of the partnership, UConn and NREL will work together to invest in the development of joint solutions to clean energy challenges in the Northeast and increase funding opportunities not otherwise available to either individual institution. The program enables pathways for undergraduate and graduate students to work jointly with NREL scientists and UConn faculty.

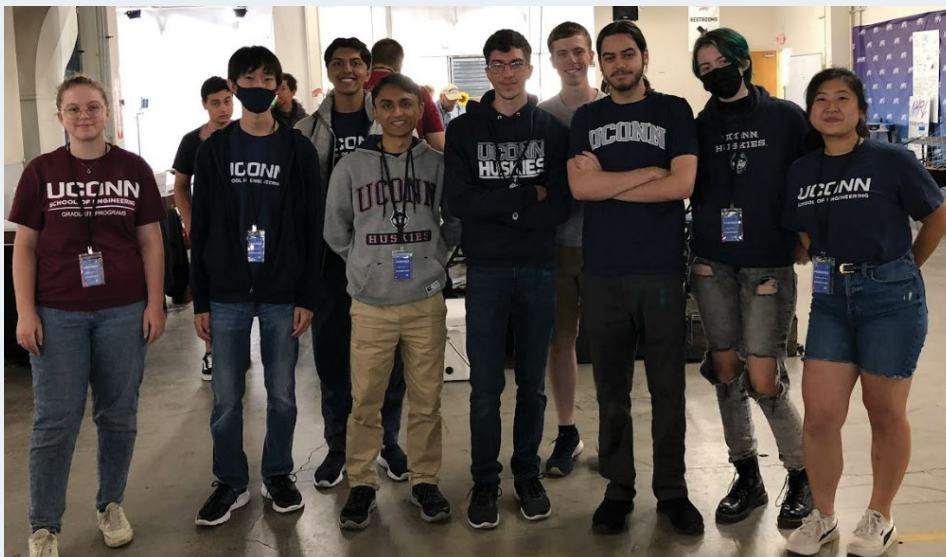
"Partnering with NREL opens UConn to unlimited possibilities and advancements in clean energy research and innovation," says Dr. **PAMIR ALPAY**, UConn's vice president for research, innovation, and entrepreneurship. "We have worked hard to build our reputation as a leader in the field, creating opportunities for students and our faculty

Continued next page



STUDENT CLUB NEWS

The **FROST ROBOTICS CLUB** (below) competed at Norwalk Havoc Robot League (NHRL) in September 2022. The club was awarded a \$10K grant by NHRL. FROST has purchased materials, tools, equipment, and entire bot kits using these funds. With premade bot kits, even the most inexperienced club members, including non-STEM majors, can build their own bots and participate in competitions, while advanced materials allow more skilled members to build cutting-edge designs. With this equipment, FROST is well positioned to expand UConn's footprint in the battlebot community.

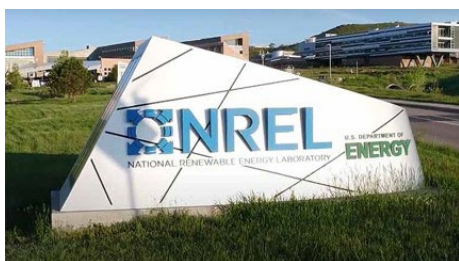


UPSILON PI EPSILON hosted **FINN NAVIN** (CS'22), as a speaker with Q&A on working in industry. Finn is currently a Software Engineer at Microsoft. UPE also inducted five new members in April 23.

Partnership continued

to contribute global solutions to meet energy needs and reduce dependency on carbon. NREL brings resources and collaborations that expand our reach, to the benefit of the energy and workforce infrastructure of UConn and the state.”

NREL will support research in the IPB, UConn's state-of-the-art facility for laboratories and specialized equipment.



UConn is the fifth university on the East Coast to partner with NREL for clean energy research and innovation.

Several national and international companies and organizations support research centers within the IPB, collectively investing more than \$150 million in the UConn Tech Park.

The IPB is the home of highly visible energy centers, including the Eversource Energy Center, a dynamic partnership with New England utility company Eversource Energy that advances leading interdisciplinary research and technology to ensure the reliable provision of clean power and resilience to extreme events; the DOE Southern New England Industrial Assessment Center, which offers energy efficiency audits to small and medium-sized manufacturers across the southern New England region; and the Connecticut Center for Applied Separation Technologies, which supports the industry through

research and development to identify energy and cost-efficient solutions for separations needs.

The NREL partnership is the latest endeavor for UConn in its growth in clean energy research and innovation. In May 2022, U.S. Secretary of Energy Jennifer M. Granholm visited the IPB and the Center for Clean Energy Engineering, where she called UConn and its Assessment Center an “example of what we want to have happen across the country.”

“It's just really an exciting time to be in this energy space,” Granholm said during her visit. “We feel like we're in the middle of history being made. Sometimes it's hard to tell that you're making history when you are in the middle of it, but we are right in the thick of just an incredible time.”

Opposite page: The Innovation Partnership Building will host a research collaboration between UConn and the National Renewable Energy Laboratory through a partnership to jointly address clean energy challenges.

GRADUATE FELLOWSHIPS

KALINATH KATURI, AALVEE KAUSANI, YANSONG PEI and **BENDONG TAN** received GE Fellowship of Excellence awards. Kalinath is advised by **HA NGUYEN**, Aalvee is advised by **MEHDI ANWAR** and Bendong and Yansong are advised by **JUNBO ZHAO**. Nina Stefanovic, advised by **JOHN CHANDY** also received one (deferred from last year).

2023 ECE B.S. grad, and incoming M.S. student, **JACQUES GOOSEN**, as well as **KESHAWN SMITH** received the GE Inclusion and Equity Fellowship. Jacques is advised by **MEHDI ANWAR**, and Keshawn will be advised by **MIHAI DUDUTA** from the ME department.

Incoming graduate students, **GREGORY ASCHENBRENNER, YITONG LIU**, and **MOHAMADAMIN RAJABINEZHAD** were selected as GE NextGen Scholars. Yitong will be advised by **JUNBO ZHAO**, Gregory will be advised by **BAHRAM JAVIDI**, and Mohamadamin will be advised by **SHAN ZUO**.

USMAN ALI, advised by **OMER KHAN**, received a Synchrony Fellowship for the Fall 2023 semester. **ALAA SELIM**, advised by **JUNBO ZHAO**, received the Eversource Fellowship.

MATTHEW MACESKAR, advised by **KRISHNA PATTIPATI**, received the first of the new fellowship in Dr. Pattipati's name.

This year's Peter Willett fellowship goes to **BENJAMIN BROWN**, advised by **PETER WILLETT**.

This year's Vijaya Raghavan fellowship is split between **QIAN YANG** and **SHANGLIN ZHOU**, both advised by **KRISHNA PATTIPATI**.

ALAA SELIM, advised by **JUNBO ZHAO**, received a Future Climate Venture Studio Fellowship for the Fall 2023 semester.

GRADUATE STUDENT NEWS

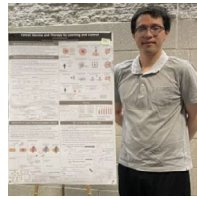
BEST POSTER AWARDS



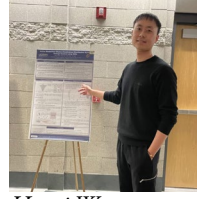
Hasan Talukder



Tashfiq Kashem



Yen-Che Hsiao



Haoyi Wang

HASAN TALUKDER, advised by **ALI GOKIRMAK** and **HELENA SILVA**, won the best ECE poster award at the 2023 SoE Poster Competition, and **TASHFIQ KASHEM**, advisee of **HELENA SILVA, YEN-CHE HSIAO**, advisee of **ABISHEK DUTTA**, and **HAOYI WANG**, advisee of **JUNBO ZHAO**, won 1st, 2nd and 3rd place respectively in the IEEE/ECE Poster Competition.

Prize winners from the Connecticut Microelectronics & Optoelectronics Consortium poster competition include **ABDULMAJEED ALMALKI**, advisee of **FAQUIR JAIN**, for Best Poster Paper and **ELISA PARENT**, advisee of **JOHN AYERS**, for Best Poster.

DEVELOPMENT AWARD

Graduate student **LEILA CHEBBO**, advised by Prof. **ALI BAZZI**, was one of only 12 students to receive a Professional Development Award to attend the iREDEFINE Workshop, which is designed to increase the number of women and underrepresented minorities among faculty in ECE departments.



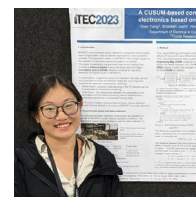
Leila Chebbo

BEST PAPER AWARDS

Several of Prof. **JUNBO ZHAO'S** students received best paper awards including:

- **JINXIAN ZHANG** - from the 6th IEEE Conference on Energy Internet and Energy System Integration, for "Multi-fidelity Gaussian Process for Distribution System Voltage Probabilistic Estimation with PVs."
- **TONG SU**, from the IEEE PES General Meeting 2023, for "Analytic Input Convex Neural Networks-based Model Predictive Control for Power System Transient Stability Enhancement."
- **KETIAN YE**, from the 2023 IEEE PES Technical Committee, for "Physics-Informed Sparse Gaussian Process for Probabilistic Stability Analysis of Large-Scale Power System with Dynamic PVs and Loads."
- Incoming graduate student **YITONG LIU**, from the 2023 IEEE PES General Meeting for "Analytic Input Convex Neural Networks-based Model Predictive Control for Power System Transient Stability Enhancement."

Also, **QIAN YANG** and her advisor, **KRISHNA PATTIPATI**, were authors of the paper "A Distance-Based Health Indicator for RUL Prediction of Power Electronics,"



Qian Yang

which was selected as one of the Best Papers at the 2023 International Transportation Electrification Conference.

SENIOR DESIGN DEMONSTRATION DAY 2023 WINNERS

Senior Design Demonstration Day was held at Gampel Pavilion on April 28, 2023. The ECE department had 30 Teams sponsored by 18 various companies, with a total of 85 students participating. The teams selected as the top projects last year were the following:

1st Place

TEAM 2301

Single-Phase Solid State Transformer

SPONSOR: ECE

Transformers are essential components in many industrial, commercial, and academic settings. Compared to other modern electronics however, traditional transformers are large and unwieldy, often limiting their applications in projects that have strict limits on size and weight. The goal of this project is to design and construct a transformer without the disadvantages of a traditional transformer by using compound semiconductor technology to build a solid-state transformer. Solid state transformers are designed using multiple power converter circuits connected together to provide the same basic functionality of a traditional transformer while also possessing other advantages such as enhanced efficiency, power flow, and harmonic isolation, as well as the aforementioned space and weight savings. The IEEE International Future Energy Challenge (IFEC) is an international collegiate competition with the intention of developing innovative solutions in the power electronics field. This year's challenge is to create a single-phase solid state transformer. The input of this transformer will be 1Φ -230Vac nominal (85V-250V), with the desired output of 1Φ -230Vac; total harmonic distortion <5%; 600W. The efficiency must be over 95% at 600W and over 96% at 300W. The transformer must be bidirectional with a compact design and autonomous control. The transformer will be judged based on the efficiency of the output and overall functionality. Team 2301 was also chosen for the finals of the IFEC competition, and ultimately earned the Educational Progress Award.



(L-R) Alfred Lee (EE/CMPE), Abram Rosario (EE), Dawid Karpiej (EE), Uiliam Kutrolli (EE), and award presenter Liang Zhang.

2nd Place

TEAM 2304

ASNE Electric Powered Boat
(joint with ME)

SPONSOR: AMERICAN SOCIETY OF NAVAL ENGINEERS



(L-R) Sergio Pires (EE), Blake Pember (CMPE), Tyler Shoban (EE), and award presenter Liang Zhang.

3rd Place

TEAM 2311

Embedded Encoding for Biosensor Implants

SPONSOR: BIORASIS



(L-R) Lucas Scarante (EE), Tian Wang (CMPE), Kaitlyn Rauccio (EE), Y'leise Saez (EE), and award presenter Liang Zhang.

ECE Faculty Work to Advance Semiconductor Research

By Olivia Drake

In 1948, Bell Laboratories revealed the invention of a solid-state semiconductor switch that could replace the bulky, short-lived vacuum tube. This novel electrical component, named the “transistor,” is celebrating its 75th anniversary in 2023.

Electrical and Computer Engineering (ECE) Department faculty at UConn have explored the many applications of transistors and other semiconductor devices since the early 70’s. Prof. **FAQIR JAIN**, who received his Ph.D. from UConn in 1973, has spent the past two decades researching cladded nanoparticles of semiconductors known as “quantum dots” for microchip technologies, whereas Assistant Prof.

NECMI BIYIKLI is using a low-temperature thin film deposition technique called atomic layer deposition (ALD) to create functional nanoscale semiconductor films.

Both professors have a similar goal: to create smaller, more energy efficient, more powerful electronic devices that enable faster complex computations in smartphones, computers, televisions, digital cameras, doorbell cameras, vehicles, solar panels, medical equipment, LED lighting, and so much more. They’re also advocates of Moore’s Law, which suggests the number of transistors on integrated circuits will double every year as research and development on semiconductors continues to advance.

“You can’t change the properties of conductors drastically, but you can change the properties of semiconductors,” Jain said.

Their research not only benefits UConn and the state of Connecticut, but it also aligns with the bipartisan CHIPS and Science Act of 2022. This law requires the government to provide more than \$52 billion to revitalize and bolster domestic semiconductor research, development, manufacturing, and workforce development in America.

“So many semiconductor fabrication facilities have moved offshore, and with the CHIPS Act, Professor Jain and Professor Biyikli’s technologies will get a boost from companies looking to build capacities and bring them back to the U.S.,” said John Chandy, ECE professor and department head. “In addition, and equally important, they’re training the next set of engineers to work in those facilities.”

Using Quantum Dots

Jain, who’s become an expert on microelectronic devices, integrated circuits, optical modulators, and quantum well and semiconductor-based lasers, began his career studying the metal-oxide-semiconductor field-effect transistor, commonly known as a MOSFET. MOSFETs became a fundamental building block used in the

design and construction of computer chips, communication systems, and other applications including solar cells and solid-state lighting.

But as the demand grows for smaller and faster logic, MOSFET technology is being pushed to its limits. The MOSFET microchip, which is packed with billions of transistors, logic “gates” to perform complex computations, memory cells, and power and control circuitry, can overheat, “leak” currents resulting in reduced battery life, and reach a processing speed limit.

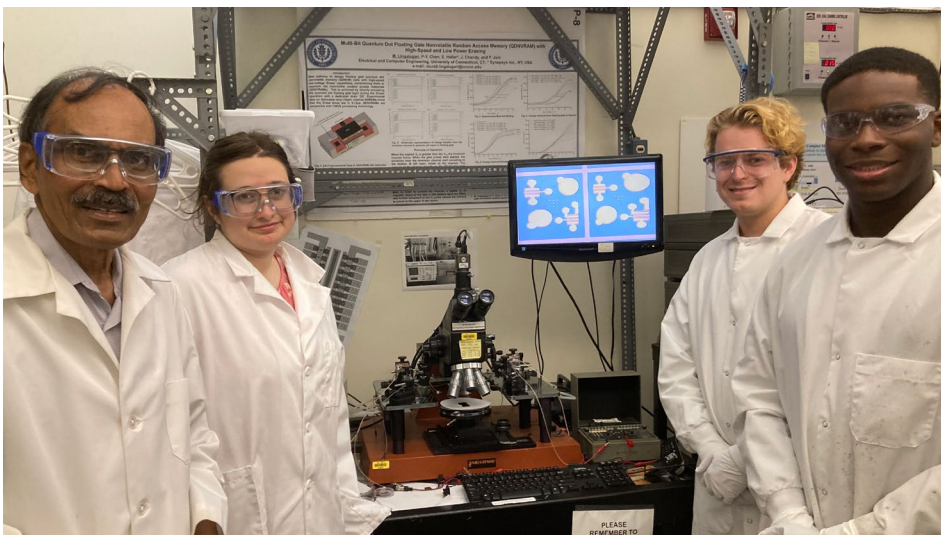
This riveting technology led Jain and his research group to explore the option of using “quantum dots” as opposed to the commonly used silicon-based microchips. (In the accompanying picture, you can see an electron microscope picture of these cladded quantum dots.)

While a microchip can range in size from a fingernail to a grain of rice, Jain realized he could create a new quantum dot field effect transistor (QD-FET) on a nanometer scale made of germanium-oxide-coated germanium and/or silicon-oxide-cladded silicon. This process would result in a microchip only 3-4 nanometers wide—roughly the size of a few atoms.

“FETs usually have one conducting channel, so we came up with this idea of ‘stacking’ quantum dots vertically, so instead of having one channel, we could have eight channels crammed with quantum dots which would exhibit eight times the processing power of a regular MOSFET device,” Jain explained. “The QD chip can be used in computers, laptops, smartphones, or any place where you need computation, communication, or data storage.”

In 2000, Jain began fabricating quantum dot films inside his lab at UConn, and by 2007, his group published their first paper on the emerging technology. His research group continues to explore other applications that could benefit from using nanosized semiconductors.

Continued next page



Posing with the integrated circuit prober are: L-R: Dr. Faquir Jain, Elisa Parent (Grad Student), Michael Schneider (Grad Student), John Simeon Jr (Undergrad student)

Using Atomic Layers

Like Jain, Biyikli took an interest in semiconductors and nanoscale energy materials while working on his Ph.D. at Bilkent University in Turkey. Since joining UConn in 2017, Biyikli's research interests have shifted to synthesizing wide bandgap semiconductor layers—at the atomic level—at significantly lower temperatures.

Traditionally, scientists use a chemical vapor deposition technique at $\sim 1000^\circ\text{C}$ to grow such layers, however, by using a specific plasma-enhanced ALD technique, Biyikli lab members can grow crystalline films at unprecedented temperatures as low as 200°C .

“Our first goal of synthesizing a decent quality crystal film (using ALD) is fulfilled, but then the question becomes, what are we going to do with these films. Will they be used in electronic devices? Right now, they're not as good, so we need to keep working to achieve better electrical properties, so the semiconducting properties become electronic device compatible,” he said.

Despite achieving significant milestones, the synthesized films still do not match the quality of films grown at higher temperatures. But Biyikli is optimistic and believes this challenge provides a golden opportunity for his research team.

“I really love the semiconductor research area, especially the hands-on research,” he said. “Others may prefer working on device/circuit design or simulations, but I'm a hands-on person and I enjoy contributing to the advent of emerging wide bandgap semiconductors which will play an increasingly critical role in the net zero emission (NZE) future where fossil-based energy is completely replaced by electrification revolution featuring these powerful new generation of semiconductors.”

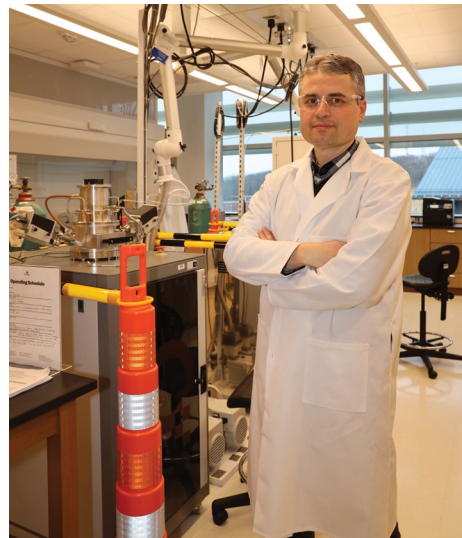
Commercial Applications

Both Jain and Biyikli are now striving to use their semiconductors for use in the medical field.

In 2016, Jain teamed up with Fotios Papadimitrakopoulos, professor of chemistry at the Materials Science Institute at UConn, to develop practical uses for semiconductor chip technology—the Biorasis' miniaturized

glucose sensor (GlucoWizzard). Initially funded by a U.S. Department of Defense grant, the sliver-sized biosensor can be implanted inside the body and has the ability to communicate with smartphones or other digital accessories. And unlike other glucose monitors, this one can remain inside the body for at least three months, unlike current sensors that need to be replaced about every two weeks. “Our hope is to have it last a year,” Jain said.

And Biyikli is collaborating with Kyungjin Kim, assistant professor of mechanical engineering, on developing implantable bioelectronic Brain-Computer Interface devices (BCI) that could remain inside the body 10 years without corrosion.



Assistant Professor Necmi Biyikli in his lab.

He's working to obtain this goal by creating stable permeation barriers that will block the diffusion of water into the polymer-based electrodes.

Surgeons, for example, could potentially implant BCI electrodes in the brain of a patient with partial paralysis and re-activate the muscles by stimulating areas in the brain.

“BCIs are getting more and more attention ... the solution is there, but there's still the problem that normal electrodes in the brain corrode quickly, stop functioning, and then the device needs to be removed, which is not desired,” Biyikli said. “We are hoping that our ALD materials will help this. It may take many more years of trying to overcome the limitations, but when you have a direct application that might impact and benefit human life directly, of course it's highly rewarding.”

Teaching Future Semiconductor Scientists

When Jain and Biyikli aren't conducting research in the lab, they're busy teaching undergraduates and graduate students alike.

During the 2023-24 academic year, Jain is teaching ECE 4242: Micro/Opto-electronic Devices and Circuits Fabrication Laboratory, a fall semester course that focuses on semiconductor device fabrication and basic integrated logic circuit components such as inverters, SRAMs, NVMs; and a senior-level class, ECE 4244: Nanotechnology II, which involves fabricating solar cells, LEDs, transistors, and sensors using quantum dots. This fall, Biyikli is teaching ECE 3221: Digital Integrated Circuits, a class focused on switching, timing, wave shaping, and using logic circuits and ECE 5232: Optoelectronic Devices, a spring-semester graduate class on semiconductor-based optoelectronic device fundamentals and applications including optical detectors and light emitters (LEDs, lasers).

Biyikli and Jain's former Ph.D. students are now working in the semiconductor industry at Intel Corporation, IBM, Synopsys, Inc., Wolfspeed, and the Department of Energy Argonne National Laboratory.

Students not only participate in lab work, but they contribute to studies that are published in scientific journals. And they're all invited to attend, or present, at the annual Connecticut Symposium on Microelectronics and Optoelectronics. Now in its 32nd year, the symposium welcomes students from seven academic institutions and over 13 industries in the state, to collaborate and share their ongoing research on electronics, photonics, biosensors, energy systems, and emerging technologies.

“We give our juniors, seniors, and graduate students hands on experience in semiconductor fabrication, and that can be a unique experience,” Jain said. “And we always try to promote underrepresented students.”

ALUMNI NEWS



QIN LU (Ph.D.'18) (co-advised with **PETER WILLETT**) joined the University of Georgia in June as Assistant Professor.

She will be the 17th tenure track professor among Prof. **YAAKOV BAR-SHALOM** advisees.



ARSHIAH MIRZA (Ph.D.'22) won the Outstanding Senior Women Academic Achievement Award from the UConn Women's Center.



DAVID RIVERA (M.S.'90, Ph.D.'05) an electronics engineer in the Naval Undersea Warfare Center (NUWC) recently won the IEEE-USA Harry

Diamond Memorial Award, for groundbreaking contributions in applied electromagnetic engineering resulting in advancements in antenna design for submarine applications.

UNDERGRADUATE NEWS

Undergraduate **SENIOR DESIGN TEAM 2301** was chosen to compete in the finals of the IEEE International Future Energy Challenge (IFEC), which is an international competition with the intention of developing innovative solutions in the power electronics field. The team earned the Educational Progress Award with their Single-Phase Solid State Transformer project, which is a type of electric power converter that can be smaller and more efficient than a conventional transformer because it operates at high frequency.

(L-R) Associate Professor Sung-Yeul Park, Abram Rosario (EE), Dawid Karpiej (EE), Alfred Lee (EE/CMPE), (not pictured is Uiliam Kutrolli (EE))



2023 COMMENCEMENT
**Congratulations to
All of Our Graduates!**

FACULTY NEWS



YAAKOV BAR-SHALOM (center above) received the Pioneer Award from the IEEE Aerospace and Electronic Systems Society.



ALI BAZZI was featured on local news, giving viewers expert advice on how to save on energy costs. [Read about it here.](#)

JOHN CHANDY was recognized as a co-recipient of the 2023 AAUP Service Excellence Award.

ABHISHEK DUTTA had a paper entitled “COVID-19 Waves: Variant Dynamics and Control” which ranked 45th in the Top 100 in Engineering – 2022 Collection in Nature Scientific Reports. He was also invited to speak at the Gates Foundation’s Annual Symposium at the Institute of Disease Modeling.

BAHRAM JAVIDI was named Fellow by the American Association for the Advancement of Science (AAAS) and a Fellow in the Asia-Pacific Artificial Intelligence Association (AAILA).

OMER KHAN was promoted to full Professor in August 2023.

PETER WILLETT was inducted into the Connecticut Academy of Science and Engineering and **ERIC DONKOR** was also elected as Secretary.

RAJEEV BANSAL released his book entitled “From ER to ET; How Electromagnetic Technologies are Changing Our Lives” in an edition translated into Chinese.

Both **JUNBO ZHAO** and BME affiliate, **YI ZHANG**, were named as co-recipients of the AAUP Excellence in Research and Creativity Award –Early Career.

Research.com’s ranking of Top Scientists in the Field of Electronics and Electrical Engineering featured several ECE faculty:

- **BAHRAM JAVIDI** was ranked 55th and **YAAKOV BAR-SHALOM** was ranked 78th nationally on the 2023 edition. Prof. Javidi was also recognized with Research.com’s Electronics and Electrical Engineering Leader Award for 2023.
- **SHENGLI ZHOU** and **PETER WILLETT** also ranked in the top 400.
- **BAHRAM JAVIDI, YAAKOV BAR-SHALOM, PETER WILLETT, AND KRISHNA PATTIPATI** also ranked among the top scientists in the field of Computer Science.

AMY THOMPSON was awarded a K12 Renew America’s Schools grant, valued at \$3.6 million from the Department of Energy, towards two “Smart Schools.” The funding will support equipment upgrades, use of renewables, and implementation of smart control systems which will help modernize infrastructure, and reduce costs.

MARTEN VAN DIJK received the 2023 Edward J. McCluskey Technical Achievement Award from the IEEE Computer Society for contributions to oblivious and encrypted computation.



JOHN CHANDY has been renewed for another term as ECE Department Head, and ECE Faculty held a retreat (above) at UConn’s Avery Point campus to discuss strategies for the future.

JUNBO ZHAO has had several accomplishments this year including:

- Received \$4.4 million grant for storm readiness efforts via the Solar Energy Technologies Office (SETO) as well as two grants from the department of energy office- one in partnership with Pacific Northwest National Laboratory, and the other with Oak Ridge National Laboratory.
- Honored as IEEE PES Connecticut chapter 2022 Outstanding Engineer.
- Received awards from several journals for his editorial service including *IEEE Transactions on Network Science and Engineering*, *IEEE Transactions on Power Systems*, *CSEE Journal of Power and Energy Systems*, and *the Journal of Modern Power Systems and Clean Energy*.
- Had two papers recognized on the IEEE Transactions on Power Systems’ list of 2022 Outstanding papers: One as first author, on the paper, “Roles of Dynamic State Estimation in Power System Modeling, Monitoring and Operation,” and secondly as a contributor on the paper entitled “Data-driven Optimal Power Flow: A Physics-Informed Machine Learning Approach.”
- Received the highly cited paper award from the *International Journal of Electrical Power & Energy Systems* for his paper “A Rough Set-Based Bio-Inspired Fault Diagnosis Method for Electrical Substations,” and also notified by Web of Science of the highly cited papers “A Novel Hybrid Short-Term Load Forecasting Method of Smart Grid Using MLR and LSTM Neural Network,” in IEEE Transactions on Industrial Informatics, and “Planning-Oriented Resilience Assessment and Enhancement of Integrated Electricity-Gas System Considering Multi-type Natural Disasters,” in Applied Energy.
- Acting chair of a working group which won the IEEE PES Working Group Recognition Award.

OUTREACH PROGRAMS

ROBOTICS OUTREACH



The Armored Artemises



The Husky Robotics Invitational took place in June on the UConn Campus. This robotics competition was an off-season First Tech Challenge event co-sponsored by the Electrical and Computer Engineering Department and FTC Team 16008, The Armored Artemises, from Glastonbury, CT. They are a gender minority team made up of middle school and high school students. The competition included 14 teams from MA, NY, RI and even as far away as Pennsylvania.

IN MEMORIAM



Prof. **PETER CHEO** joined the Department of Electrical and Computer Engineering as Head of Department in February 1991. He took retirement from the United Technologies Research Center, UTRC (now Raytheon Technologies Research Center, East Hartford, CT). He worked as senior principal scientist and lead in the area of Electro-Optics at UTRC.

During his tenure, Prof. Cheo was instrumental in establishing Photonic Research Center with the support of ECE faculty members engaged in Photonics research.

Dr. Cheo guided doctoral students supported by Photonic Research Center and external grants from industry, NSF and other federal agencies.

Dr. Cheo stepped down as ECE Head in 1995 after serving one term. After retiring from UConn in 2000, he continued research on high power fiber gratings, laser systems through his own private company, PC Photonics.

UNDERGRAD STUDENT PROFILE

MATT SILVERMAN

Matt Silverman (EE'24) is a senior majoring in Electrical Engineering. Since December 2021, he has worked as an undergraduate researcher at the Power Electronics and Drives Advanced Research



Laboratory (PEARL) at UConn. Matt has had the opportunity to contribute to NASA and USDA-funded projects on reconfigurable microgrids for aerospace

applications and electrical characterization of graphene respectively. He recently co-authored his first paper on fault-tolerant microgrids which was published in IEEE. This fall, he looks forward to continuing his exploration of this topic at PEARL as an IDEA Grant recipient and serving as the Vice President of the UConn Radio Electronics Club.

After attending a software-defined radio demo his sophomore year, Matt developed an interest in communications systems. To learn more about the field, he helped start the UConn Radio Electronics Club. The club has engaged UConn students in activities such as building Yagi antennas and using them to receive weather images from satellites using software-defined radios. His goal is to grow the club and help make radio technology more accessible to UConn students.

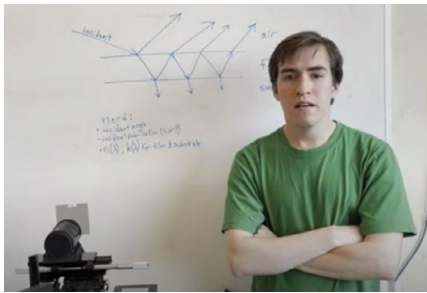
This past summer, Matt furthered his experience in power electronics as an electrical engineering intern at Sikorsky. His project was to design equipment for thermal tests on power electronics for hybrid-electric flight.

After graduation, Matt aspires to attend graduate school and start a career in research within power electronics and communications systems.

OUTREACH PROGRAMS

RESEARCH FOR UNDERGRADUATE EDUCATION PROGRAM (REU)

Students **KEVIN KNOWLES** and **ALISON VERNEY** attended an REU program in ECE's Nanotechnology lab in Summer 2023. They were tasked with constructing and programming an interferometer capable of measuring the thickness of thin films. This was done using an incident light source and



measuring the amount of light reflected off the film at chosen angles with a spectrometer. A LabVIEW program was created to both record data collected by the spectrometer as well as control the motors that the sample and spectrometer were mounted to. Many physical components of the set up were designed in Solidworks and 3D printed. The students were also exposed to the basics of fabrication and depositing thin films in a clean room setting.

ROBOTICS ENGINEERING

Robotics Engineering Pre-College Summer students with mentor Prof. **ABHISHEK DUTTA**, and Department Head, **JOHN CHANDY**.



ACADEMY OF DISTINGUISHED ENGINEERS

RICHARD IERARDI and **RICHARD THIBEAULT** were both inducted into the Academy of Distinguished Engineers.

RICHARD IERARDI
(B.S EE'88, M.S.'96)

Richard Ierardi, an engineering Fellow for Pratt & Whitney, has worked at Raytheon Technologies for his entire career. With 35 years of experience in the development of



leading-edge military and commercial engine control systems, his experiences include design and development of digital electronic

engine control and diagnostic hardware for the F-22, X-35, and F-35; integration of propulsion system and aircraft control systems for the Joint Strike Fighter; engine control software development and validation for the F-35 including the short take-off and vertical landing variant; and control system product leader for the first commercial certification of the geared turbo-fan product family of engines.

RICHARD THIBEAULT
(B.S EE'74)

Richard Thibeault (B.S EE '74) is a Principal Investigator for the Shipboard Electromagnetic Compatibility Improvement Program for all active



United States submarines. Thibeault developed a "line of defense" concept that coordinates fleet, naval shipyard and EMC

engineering personnel in the detection, correction, and prevention of electromagnetic interference (EMI) on submarines. Thibeault also investigated submarine mission degrading EMI problems reported by the fleet and developed corrective actions for them. One such corrective action was awarded a patent. These fixes were institutionalized and are currently installed on submarines.

The UConn Academy of Distinguished Engineers is a highly selective and esteemed community of accomplished alumni and friends who have made exceptional contributions to their fields of engineering. Membership in the academy is a recognition of an individual's significant achievements and leadership in their profession, as well as their commitment to the advancement of engineering education and research. The academy's members are considered to be among the most successful and distinguished engineers in their respective fields.



IN MEMORIAM: Emeritus Engineering Professor Peter Luh

By Mike Enright '88 (CLAS), *UConn Today*

Luh was well known for his research in electrical engineering, his faculty leadership, and his active participation in the UConn community



Peter Luh, an emeritus prof. in the University of Connecticut School of Engineering known for his leadership and pioneering research in electrical engineering, passed away on November 28, 2022.

Luh joined the Department of Electrical and Computer Engineering in 1980 after graduating from Harvard University with his doctorate in applied mathematics. He earned his undergraduate degree from the National Taiwan University and a master's from MIT.

He served as the head of the department from 2006-2009 and as director of the Booth Research Center for Advanced Technology. Luh was recognized as a Board of Trustees Distinguished Professor in 2018. He retired in December 2020, but remained an active contributor to the department and the school.

"Peter's passing saddens me deeply," says UConn President Radenka Maric. "He had many outstanding accomplishments as a faculty member at UConn and served as a mentor to numerous students and fellow faculty."

Luh was well known for his research contributions particularly in optimization for power systems, smart grids, smart buildings, and intelligent manufacturing. His pioneering work has made a lasting impact in the power systems industry.

Even after retirement, he continued his research and advising graduate students.

Luh had also taken on numerous leadership positions in the Institute of Electrical and Electronics Engineers (IEEE). He served on numerous societies within IEEE, including control systems, robotics and automation, and the power and energy societies. He was also chair of the IEEE Technical Activities Board Periodicals Committee, overseeing 190 journals and magazines.

Luh was a tireless worker, known for sending emails in the middle of the night, leaving the daytime to focus on his research.

"While we have lost a great colleague and friend, and renowned scientist, we pay tribute and celebrate a life that was well lived," says Kazem Kazerounian, Dean of the School of Engineering. "Over the last few decades, Peter was a mentor and role model to me personally and to so many of my colleagues."

Luh was also a leader in the UConn and Storrs community. In the mid-1980s, Luh and other faculty members created the Asian American Cultural Center at UConn and the Asian and Asian American Studies Institute. He was also an avid fan of the UConn men's and women's basketball teams and frequently attended their games.

Luh will be remembered as a gentle soul, a true gentleman, and a dear friend. He was a great collaborator to all his colleagues and an outstanding mentor to his numerous graduate students and junior faculty. He is survived by his wife Chwen-hwa, daughter Corene, son Adrian, and four grandchildren.

AROUND CAMPUS

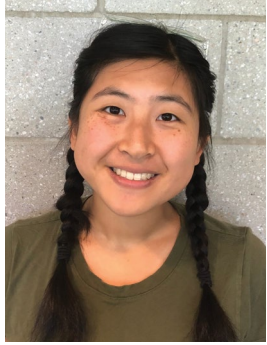
Students enjoy some socialization and idea sharing (and occasionally some chess) over a cup of coffee at Friday afternoon Coffee Hours.



UNDERGRADUATE STUDENT PROFILE

SERENE FENG

Serene Feng (EE'24) is a senior majoring in Electrical Engineering with minors in Math and Computer Science. Some of her favorite memories at UConn include waiving antennas with UREC (University Radio



Electronics Club) on top of South garage (and learning about radios), competing in Norwalk Havoc League with the FROST Robotics club, and assembling a data collection

device for a sounding rocket experiment in the RockOn program. Serene was one of the

founding members of FROST Robotics, UConn's Competitive Robotics Club, and served as the president in her junior year.

In her summers, she has taken on internships in industry and research that have helped her uncover more of her interests in the broad field of electrical and computer engineering. Serene was a research assistant in Carnegie Mellon University's MoonRanger Lab, where she aided in testing and developing a lunar rover's dark vision capabilities with physical experiments and simulation runs. She worked at Otis Elevators as an Electrical Engineering Intern starting in her junior spring semester and through the continuing summer where she worked on parts associated with elevator speed control systems and designed, prototyped, and programmed

a smart alphanumeric display. This past summer Serene worked in Dr. Qiangfei Xia's Nanodevices and Integrated Systems Laboratory at UMass Amherst where she researched diffusive memristors and developed an interest in memristive RAM.

Serene has dabbled a little bit in researching neuroengineering and is very grateful for the abundance of resources and learning opportunities that UConn offers for exploring her various interests. In her free time (very important) she enjoys reading nonfiction, playing frisbee with friends, and going on long exploratory bike rides.

Serene plans to go to graduate school for memristive RAM or edge devices. She hopes to ultimately apply her skills and interests towards biomedical applications.

UNDERGRADUATE NEWS

Undergraduate students **PETER CHARDOVAYNE** (EE'23), **ALLAN FEYGIN** (EE'23), and **UILLIAM KUTROLI** (EE'23), along with their advisor Asst. Prof. **ZONGJIE WANG**, received the 2nd best paper award for their paper "*Feasibility of Shiftable Loads: An Expansion of Deferrable Loads in Distribution Systems*" at the 2022 North American Power Symposium.

Undergraduate students, **JACQUES GOOSEN** (CMPE'23) and **TAO LIU** (EE'23), each won a best poster paper award at the 2023 CT Symposium on Microelectronics.

MALIK FRANCIS (CMPE'25) was selected as a 2023 CAPS/McNair Scholar.

In Fall 2022, Electrical and Computer Engineering welcomed its first Robotics Engineering cohort of 11 students. The number of applications for this Fall nearly doubled, and the department is on track for 18 freshman robotics engineering students enrolling in the Fall 2023.

UConn awards two \$2000 scholarships each year to incoming School of Engineering first-year (freshman) students who participated in the First Robotics Competition, and have a recommendation from a First Robotics team mentor. Congratulations to FIRST Robotics and FIRST Tech Challenge Scholarship Winners for 2023-2024:

- **AYUSH PATEL**, Computer Science and Engineering Major
- **KARAN RANA**, Robotics Engineering Major

Undergraduate students, **PAUL ZAMBRZYCKI** (EE'24) and **MALIK FRANCIS** (CMPE'25), were parts of teams that were selected to receive \$2500 grants from the UConn Eversource Clean Energy and Sustainability Innovation Program to work on their sustainability projects over the summer.



Undergraduate senior, **NICHOLAS SATTA** (EE'23), was part of a team that placed third at the CoMIS competition, an opportunity for future IT leaders to test their business acumen, problem solving, teamwork, and presentation skills against those of their peers in a case competition designed to simulate real-world business conditions.

(L-R) Tyler Goodwin (BUS), Julie Somma (MEM), Nick Satta (ECE)

Newly Founded IEEE Joint PELS/PES Chapter at University of Connecticut Organizes a Kick Off Reception!

The new IEEE Power Electronics Society (PELS) & Power and Energy society (PES) joint student branch chapter has been established at University of Connecticut as a part of IEEE R1 within Connecticut section. On October 21, 2022, the chapter hosted a kickoff reception and networking event for invited students, faculty and industry. The founding branch chapter chair, **ARSHIAH MIRZA** delivered a welcome note, shared the chapter plans and introduced the executive board as shown in the photo below. It was followed by an informative invited talk by Dr. Xinsheng Lou from GE Steam Power on “*Dynamic Simulation for Boiler Fault Detection and*

Diagnosis Using AI.” The floor was then open for networking and reception. Over 35 students, faculty and professionals from industry attended the event over great food and fall weather at the University of Connecticut main campus.

Until now, the chapter has organized:

- Four events including PELS day, IEEE day, logo release, fall celebrations
- Four invited technical talks by Dr. Yiqi Liu, Dr. Xinsheng Lou, Dr. Sheldon Williamson, Dr. Chetan Mishra

- Five general body meetings and 10+ E-board meetings and has plans for many events next semester!

The chapter would like to thank all the mentors, IEEE PELS leadership, IEEE CT executive committee and the UConn Electrical and Computer Engineering Department for their incredible support!

The **UConn IEEE PES** student chapter was selected as one of the three best performing PES student branch chapters in all IEEE regions.



(L-R) The founding executive board of the chapter - Muhammed Ali Gultekin (Webmaster), Sergio Dorada (Treasurer), Dr. Lisa Wang (Co-advisor), Leila Chebbo (Vice Chair), Arshiah Mirza (Chair), Alaa Selim (Secretary), Altan Unlu (Co-secretary), Shabit Bhatt (Outreach head), Dr. Ali Bazzi (Advisor).



Kickoff event by newly founded IEEE Joint PELS/PES Chapter at University of Connecticut

Graduate Student News continued

JASON PHILHOWER, advised by Prof. **JUNBO ZHAO**, received the IEEE PES Connecticut chapter 2022 Outstanding Chapter Volunteer Award.

BENDONG TAN, advised by Prof. **JUNBO ZHAO**, has been recognized as 2022 Outstanding Reviewer for IEEE Transactions on Power Systems.

Grad student, **HAOYI WANG**, was part of a team that was selected to receive a \$2500 grant from the UConn Eversource

Clean Energy and Sustainability Innovation Program to work on a sustainability projects over the summer. In this project, he will work on development of a real-time solar power forecasting system.

YITONG LIU, who began in Fall 2023 as a new advisee for Prof. **JUNBO ZHAO**, received a 2023 IEEE PES Outstanding Student Scholarship award, one of only six selected around the world.



Ryan Harvey

RYAN HARVEY won the ECE Fall 2022 TA award, and **AYAH ABDALLAH** and **ZACH DIMEGLIO** tied for the ECE Spring 2023 TA award.



(L-R) Ayah Abdallah and Zach DiMeglio

COMMUNITY RELATIONS

UConn Professor, Students Help Connecticut Towns Make Smart Energy Choices with SmartBuildings Program

An excerpt from UConn Today by Jaclyn Severance

As a professor-in-residence at UConn in the Electrical and Computer Engineering Department, **AMY THOMPSON** has helped to guide students through the interdisciplinary field of systems engineering and engineering management. But at the same time, through the SmartBuildings CT program, she has helped to educate Connecticut municipal leaders and school administrators on how technologies can help improve energy efficiency and sustainability efforts in their towns. The SmartBuildings CT program is supported by Energize CT – the state’s energy efficiency fund, which is administered by the public utility companies Eversource and Avangrid. Tracking energy use for cities and towns can be more complex than it is for a single homeowner. Separate town buildings have their own electric service and other energy usage factors, all using varying amounts and types of energy depending on their design and the time of year.

Dr. Thompson has worked with municipalities to build “energy portfolios” that can aggregate the type of information

needed to make energy decisions. The data provided by the portfolios can help target underperforming buildings that might be in need of energy improvements – telling towns where to invest resources and best use limited tax and grant dollars. The portfolios also help to identify best practices from efficient buildings that can be replicated in other facilities. Having the right data facilitates good decision-making, and will ultimately lead to improvements in sustainability as well as cost savings.

To date, SmartBuildings CT has worked with more than 70 towns, school districts, and other agencies. More than 2,885 buildings in the state have been benchmarked through the program.

In September 2023, Dr. Thompson transitioned from a faculty member at UConn to a leadership role at Connecticut Center for Advanced Technology, however she has stayed on as a UConn affiliate to continue to advise grad students and participate in Ph.D. committees.

Read the full story at [UConn Today](#).

(L-R) SmartBuildings CT program members Andre Jin, Eric Venables, Amy Thompson, Mohammed Albayati and Julia DeOliveira pose for a photo in the Innovation Partnership Building at UConn Tech Park. (Sydney Herdle/UConn Photo)



AROUND CAMPUS

SHINE ON: UConn Dedicates Solar-Powered STEAM Tree

An excerpt from UConn Today by Mike Enright

During UConn’s Earth Day Spring Fling, a ribbon-cutting ceremony was held for a solar-powered STEAM tree that will allow community members to charge their personal devices at the Student Union Mall. The “tree” consists of a metal base that supports solar panels to look like an actual tree. The solar power generated from the panels is stored in batteries, which allows users to charge devices, like phones and laptop computers.

The UConn project is known as a “STEAM” tree because it combines the skills of University members from the fields of science, technology, engineering, arts, and mathematics.

Chris Sancomb, an assistant professor in the Industrial Design program in the School of Fine Arts said, “One of my goals for this project has been to share how art and design can contribute to research beyond beautification.” In addition to Sancomb, other faculty members involved were: Associate Prof. of Engineering **SUNG-YEUL PARK**, Assistant Prof. of Materials Science and Engineering **JASNA JANKOVIC**, Prof. of Ecology and Evolutionary Biology Cynthia Jones, and Prof. of Urban and Community Studies Stacy Maddern.

UConn undergraduate and graduate students were involved in the project along with high school students.

Development of the tree was funded by a STEAM Innovation Grant at UConn, which is administered by the Office of the Vice President for Research and the School of Fine Arts to encourage innovative collaborations between the arts and STEM disciplines. Funding was also provided by the Krenicki Arts and Engineering Institute at UConn and the solar panels and batteries were donated by Renogy solar. The Center for Clean Energy Engineering was also instrumental in supporting the project.

Read the full story at [UConn Today](#).

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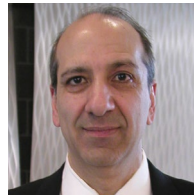
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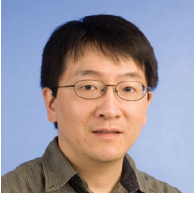
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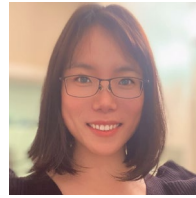
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David Tonn, Adjunct Lecturer
Marten van Dijk, Research Professor

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UNDERGRAD STUDENT PROFILE

LEO GOLD

Leo Gold (ECE '24) is a senior majoring in both Electrical and Computer Engineering with a minor in Mathematics. You often find Leo meandering about ITE and donning a fedora around campus. His introduction



to the ECE department came before he started at UConn; in April 2020, Leo alongside Serene Feng (EE '24) founded UConn

Electrons, a Discord server for the incoming ECE undergraduates to connect during the COVID-19 pandemic.

Not long after arriving on campus, Leo co-founded FROST Robotics serving as Treasurer and Chief Engineer. He has been giving back to the ECE Department serving as a TA for ECE 3411 and as President of Eta Kappa Nu, where he is working to provide tutoring and develop helpful guides for

ECE students. Leo also participates on the Formula SAE team, serves as Deputy Chief Justice of USG, is on the executive board of UConn Model UN, and served as Secretary of Tau Beta Pi.

For six years, Leo has interned at The Cigna Group in the Technology Early Career Development Program where he worked on a variety of applications with the Software Innovations team to bring new ideas and technologies into the healthcare industry. Most recently he has been developing mixed reality projects to aid in meditation and boost employee mental health.

Since starting at UConn, Leo has developed a strong interest in Computer Architecture, Digital Systems Design, and Embedded Systems. He is delving further into these subjects as he begins research in Professor Omer Khan's Computer Architecture Group. While Leo's post-graduation plans are in a constant state of flux, he is currently planning to pursue a graduate degree specializing in those areas.

In Leo's nearly non-existent free time, you can find him hanging out with friends, playing a variety of card, board, and video games, and trying to track down \$2 bills.

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