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Welcome to the Department of Electrical and Computer Engineering at Rutgers

Welcome to the Electrical and Computer Engineering Department at Rutgers University. These are very exciting times for Rutgers University in general and the ECE Department in particular. With the full integration of the Robert Wood Johnson Medical School and membership in the Big Ten Academic Alliance, Rutgers is now positioned as one of the most comprehensive public research universities in the country. Indeed, Rutgers University consistently ranks among the top public universities in the country and the world according to several published rankings. Equally exciting is our departmental news. ECE at Rutgers is ranked third in the United States in terms of number of undergraduate degrees granted according to recent ASEE data. Our faculty and students have made ECE at Rutgers into one of the most vibrant departments, creating a community that fosters excellence in education and research. This excellence is reflected in the remarkable successes and outstanding achievements of both our students and faculty members alike.

Consistent with this excellence, our student enrollment has grown dramatically with the undergraduate student class size at around 900 students and the graduate student class size at around 200 students. In May 2022, the department hosted over record-high 60 Capstone student teams with entrepreneurship and exciting senior projects under the mentorship of ECE faculty and industry sponsors.

The ECE department offers B.S. (with Computer Engineering and Electrical Engineering options), M.S., and Ph.D. degrees, and boasts of world-class faculty who specialize in the areas of nano-electronic and optical materials; bioelectrical devices and sensors; machine learning and data science; cyber security and privacy; computer vision; cyber physical systems; neuro imaging and modeling; signal and information processing; advanced internet and wireless networks; human-computer interaction, virtual reality, and high-performance computing. The department also offers two Certificate Graduate Programs in Machine Learning and Cyber Security. The range of specialization spans from algorithms and theory to hardware and software, with technology that supports a wide spectrum of applications related to computing, communications, commerce, energy, medicine, safety and transportation. As such, the department is geared towards providing a holistic education and research experience for our students, including interdisciplinary opportunities.

Excellent facilities are available for collaborative research opportunities with local industry through the School’s nationally recognized centers such as the Wireless Information Network Laboratory (WINLAB), the Micro-nanofabrication and Characterization Facility, and the Center for Advanced Infrastructure and Transportation (CAIT). There also exist collaboration opportunities at Brookhaven National Laboratory and with clinicians at Rutgers Biomedical and Health Sciences (RBHS).

Our senior faculty members are consistently recognized with several prestigious national and international honors, including Fellow of the Institute of Electrical and Electronics Engineers (IEEE), Fellow of National Academy of Inventors (NAI) and ACM Distinguished Scientist. The department currently houses 15 IEEE Fellows, 1 AAS Fellow, 1 NAAS Fellow, 1 PFF Award, 15 NSF Career Awards, 3 DARPA Faculty Fellows, 1 ONR YIP, and 1 ARO YIP. Our faculty members are incredibly successful in winning investigator awards from NSF, NIH, DARPA, ARL, ARO, ONR, MURI, and other research agencies. The annual research expenditure of the department is around $10 million. The work of our faculty also attracts substantial media attention, such as Rutgers News, the journal Science Advances, Fortune Magazine, the Wall Street Journal, and CNN news, further highlighting the broader impact of our work. Our faculty members have been awarded prestigious competitive honors such as Radia Weintraub Chair, Presidential Outstanding Faculty, and Susman Award for their excellence in teaching and training works.

Our faculty and graduate students have garnered several Best Paper Awards at highly reputed conferences, including IEEE Signal Processing Society Young Author Best Paper Award, M. Barry Carlton Best Paper Award, and International Conference on Computer Communications and Networks (ICCCN) Best Paper Award. The department also successfully hosted International Women’s Day with women students to celebrate the social, economic, cultural, and political achievements of women on this day. Our graduate students have received prestigious IEEE Communications Society Phoenix ESS Awards for their remarkable success in research and received ECE Best TA awards for their excellent teaching works. Our undergraduate students received the Ashok & Yohavalli Sethu Electrical and Computer Engineering Annual Scholarships. To cope with the pandemic, our department hosted online Open House and information sessions for accepted students and their families. The success of ECE is complemented by the world-renowned WINLAB, Engineering Research Center (ERC) on Smart Streetscapes (CSS), and research groups related to high performance computing, security and privacy, data science, computer vision, neuroimaging, biosensing and cyber physical systems, is marked by a large number of external research grants from the NSF, NIH, and defense research agencies as well as corporate grants.

Our connection with industry has grown stronger, with multiple companies providing student internships as well as partnering and mentoring the ECE senior capstone design program. ECE also remains one of the most sought-after majors for employers from a broad spectrum of industry, with the fundamentals that ECE students are exposed to here making them versatile and productive employees from day one. The success of our alumni who continue to excel in their chosen careers be it as scholars, industry leaders or entrepreneurs, serves as a source of inspiration to our students and faculty. I am very proud of the accomplishments highlighted in the following pages. Based on the trajectory, our department is on a path for even greater achievements in the coming years.

Yingying (Jennifer) Chen
Department Chair and Associate Director of WINLAB Electrical and Computer Engineering

ECE News

Welcome to the Department of Electrical and Computer Engineering at Rutgers

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Advisory Board

Thank You

ECE News is an annual publication of Rutgers ECE.

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ECE News is also available at www.ece.rutgers.edu or can be received by mail by sending a request to ece-help@soe.rutgers.edu

Visit us at www.ece.rutgers.edu
Hana Godrich
Associate Teaching Professor-Retired
Research Interests: Distributed power systems, energy resources management and storage, energy efficiency, statistical and array signal processing, resource allocation optimization, distributed detection and estimation with application to smart grid, microgrids, and active sensor networks.

Marco Gruteser
Visiting Professor at WINLAB
Professor, Department of Computer Science
Research Interests: Location-aware systems, pervasive computing systems, privacy and security, mobile networking, sensor networks and performance evaluation.

Sasan Haghani
Visiting Professor and Undergraduate Director
Research Interests: Applied signal processing with applications in biomedical and environmental domains, network science, smart cities, renewable and smart grid microgrids, home automation systems for smart grid, wireless sensor networks, and broadband communications.

Umer Hassan
Assistant Professor
Research Interests: Biosensing, point of contact medicine, microfluidics, global health.

Shirin Jalali
Assistant Professor
Research Interests: High-dimensional inference and inverse problems, computational imaging, machine learning, information theory, statistical signal processing.

Mehdi Javanmard
Associate Professor
Research Interests: Nanobiotechnology, bioMEMS, point of care diagnostics, miRNA detection, Microfluidics, Electrokinetics, Applications of nanotechnology to medicine and biology.

Shantenu Jha
Professor
NSF CAREER Award
Research Interests: High-performance and distributed computing, computational and data-intensive science and engineering, large-scale cyberinfrastructure for science & engineering.

Yao Liu
Assistant Professor
NSF CAREER Award
Research Interests: Immersive streaming mobile/cloud and edge computing, and distributed systems.

Yicheng Lu
Distinguished Professor
NSF Innovation Award, Rutgers Monroe Faculty Scholar, Faculty of the Year Award (2019)
Research Interests: MRI- and nano-electronics multifunctional oxides - based devices.

Dominic Pompili
Professor Emeritus
National Academy of Inventors
Research Interests: Communications pattern recognition, neural networks, signal processing, technology commercialization, processes involved with the innovation of new technology.

Shirin Jalali
Assistant Professor
Research Interests: Digital signal processing, digital signal processing, speech recognition, speech analysis, speaker recognition, and machine learning.

Shiram Ramanathan
Professor & Rodkin Weintraub Chair in Engineering
NSF Career Award, DoD Young Investigator Award
Research Interests: Odoo quantum materials and devices; electronic, magnetic materials, brain-inspired electronics.

Dipankar Raychaudhuri
Distinguished Professor Emeritus
IEEE Fellow, ACM Distinguished Scientist
Research Interests: Dynamic spectrum access and network security.

Wade Trappe
Associate Director of WINLAB, IEEE Fellow, National Academy of Engineering, Alexander Graham Bell Medal, National Academy of Inventors, Draper Prize
Expertise: Cellular Systems, Wireless Networks.

Dipankar Raychaudhuri
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IEEE Fellow, ACM Distinguished Scientist
Research Interests: Dynamic spectrum access and network security.

Wade Trappe
Associate Director of WINLAB, IEEE Fellow, National Academy of Engineering, Alexander Graham Bell Medal, National Academy of Inventors, Draper Prize
Expertise: Cellular Systems, Wireless Networks.

Guosong Yang
Assistant Professor
Research Interests: Switched and hybrid systems, network control systems, learning in game theory, cyber-physical systems (CPS), and network security.

Roy Yates
Distinguished Professor, Emeritus
IEEE Fellow
Research Interests: Resource management in wireless systems, dynamic spectrum access and spectrum regulation, information theory for wireless networks and future internet architectures.

Yujuan Zhang
Assistant Professor
Research Interests: Computer vision, machine learning, signal processing.

Jian Zhao
Professor Emeritus
IEEE Fellow, NSF Innovation Award
Research Interests: Simulation of digital systems, BIST, design and test of analog and mixed-signal circuits.

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Assistant Professor
Research Interests: Computer vision, machine learning, signal processing.
ECE senior Justine Catli receives the Champion of Teaching and Learning Award

The Rutgers ECE Department is proud to announce that graduating ECE senior Justine Catli will receive the Champion of Teaching and Learning Award at the 7th Annual Chancellor Provost’s Student Leadership Awards Gala on May 4th, 2022. This award is for “a student who has taken full advantage of their collegiate experience by engaging inside and outside of the classroom while creating learning opportunities for their peers.” Awardees are selected among all undergraduate students at Rutgers-New Brunswick.

Throughout her time at Rutgers, Justine has been deeply involved in peer learning and mentoring. She is a leader and tireless advocate for all students in the ECE Department and in the School of Engineering more broadly. In addition to working extensively with the Rutgers Learning Centers as a Learning Assistant, she has organized new extracurricular workshops with industry sponsors and developed the IEEE Social Good Hackathon, now in its second year. Justine is currently the President of Rutgers EIEEE, leading their many activities. She previously created and held the new position of External Vice President to build bridges with other student groups, the ECE Department, and industry. She has also been active in recruiting students to EIEEE through our Open House, Admitted Students’ Day, and Intro to Engineering. The impact of her work will last long after she graduates: due to her advocacy, the School of Engineering is working with the Learning Centers to create an anti-bias training workshop for all Learning and Teaching Assistants that will be implemented beginning in Fall 2022.

As stated in the criteria for the award, Justine has made a strong impact in the area of teaching and learning while fostering learning opportunities through peer mentoring or leadership, dedicated time, resources, or efforts beyond what is expected of her position, upheld the values of peer instruction such as student-centered active learning, an inclusive and safe learning environment, and a well-developed pedagogical approach to peer instruction. The ECE Department is lucky to have such a committed advocate and educator among our students.

IEEE Robotics SKAR Robot wins VEXU competition

The Rutgers IEEE VEXU robotics team competed in Fairmont, West Virginia, and Salisbury, Maryland. The team earned both the Judges’ Award as well as the Design Award for excellent performance both in the competitions and in the design process. After becoming a finalist in the Salisbury competition and earning 2nd place in the Skills Competition, the team earned a spot in the 2022 VEXU World Championship held in Dallas, Texas. At the 2022 VEXU Robotics Championship, Rutgers placed 10th out of 56 engineering schools.

The Rutgers University Student Branch of the Institute of Electrical and Electronics Engineers is devoted to inspiring a new generation of innovators in technology. Rutgers IEEE is open to any student passionate about technology, not only engineers. Rutgers IEEE hosts a wide variety of programs and divisions to cater to different areas of technological innovation.

The Rutgers University Student Branch of the IEEE has many divisions. In addition to the VEXU Robotics group, there is also the Electronics group, the Machine Learning/Artificial Intelligence group, the Microwave group, and the Novice to Expert Coding (N2E) group. In addition, Rutgers IEEE hosts technical workshops such as soldering, Arduino development, and the Tektronix Lunch & Learn seminar.

ECE Seniors receive Air Force Research Laboratory (AFRL) recognition for Capstone Project on RF Machine Learning

Graduating ECE Seniors Michael Zhao and Morriel Kasher have been selected for their Capstone Design project “Radio-Frequency Machine Learning (RFML): Streamlining SDR Implementation of Neural Networks Through GNU Radio” to compete in the U.S. Air Force Research Laboratory (AFRL) Beyond 5G University Challenge 2021/22, a nation-wide competition that includes both graduate and undergraduate student teams. AFRL also provided funding for the project with high end software defined radio (SDR) equipment that helped significantly in project execution. Michael and Morriel’s work advised by ECE Associate Professor Predrag Spasojevic was one of only 11 invitees to the AFRL Beyond Showcase this May 2022.

The RFML project achieves advanced signal processing operations on experimental, real-world radio data in an off-line manner, while post-processing previously collected or simulated data. Application examples include
I am currently a first-year graduate student pursuing a Master’s degree in Electrical and Computer Engineering. I grew up in Old Bridge, NJ, and decided to attend Rutgers in 2018, where I began working towards my Bachelor’s degree in Electrical Engineering. After graduation, I decided to complete my education in the field because my undergraduate classes made me realize how much I enjoy learning about electrical engineering. I was fortunate to be accepted into the Master’s program in ECE and I am beginning my journey as a graduate student.

My biggest piece of advice for new engineering students is to get involved with organizations on campus. Rutgers is a big university, and there are plenty of engineering organizations that can teach you technical and social skills as well as help you meet students that are invaluable for obtaining internships, jobs, and research opportunities. Getting involved with organizations also allowed students to apply the skills learned from courses to real-world applications. There are plenty of opportunities to JOIN from, but for me, it was Rutgers Formula Racing.

Rutgers Formula Racing (RFR) is a student-run organization that designs and builds race cars that compete against hundreds of other teams across the country every year. I joined RFR in 2019 with the goal of leading the team’s transition from a gas-powered prototype to an all-electric one. The transition has involved thousands of combined hours in research, design work, and testing. Some of the projects that I have worked on involved designing and implementing sensor data acquisition units using low-cost microcontrollers, designing a high-power battery capable of outputting almost 40 kW of power, and my current work in designing a wireless telemetry system to display and record the vehicle’s sensor data in real-time on a remote computer. These projects require fundamental knowledge from most core ECE courses such as Electronics Devices with Professor Jovanovac, as well as electives like Analog Electronics with Professor Najafi-Kazazad. Our team has been handling the EV transition very well, and it would not have been possible without the dedication of our team members and the support from the faculty and staff at Rutgers. We expect to debut our first electric vehicle during the Spring of 2023.

Through the department and involvement in student organizations, I was able to connect with industry professionals for engineering advice as well as professional career advice. Specifically, a connection I made at RFR gave me the opportunity to complete an internship at Marata Controls last summer, where I helped design power electronics for military use. This allowed me to use the knowledge I learned from my Power Electronics course taught by Professor Caggiano to design systems that were used in the real world.

During my graduate studies, I would like to focus on signal and information processing with the hopes of joining one of the many research labs associated with the ECE department. Two research labs that specifically align with my interests are the WNNLAB and INSPIRE labs. One of the research topics of interest to me is work with low-cost, low-power microcontrollers and implement signal processing techniques on devices with limited computational power. I plan on applying to the PhD. program next year with the intention of securing a research opportunity that aligns with my goals.

My undergraduate experiences, as well as my graduate ambitions have made me eager to see what the future holds for me within the ECE department. The education and opportunities that I have been provided have been very valuable, and I am very excited to see what the future has in store.
Meet an ECE Student (continued)

In my final semester as an undergraduate at Rutgers, my senior ECE capstone project was also supervised by Professor Spasojevic and completed in collaboration with senior Michael Zhao. This was awarded First Place overall out of over 50 teams in addition to winning the $1000 third place Gallati Entrepreneurship award. Together with my collaborator and advisor, we demonstrated a novel method to deploy machine learning neural networks in real-time for over-the-air software-defined radio platforms, dramatically streamlining implementation of these technologies. This project was the culmination of a year of effort combining many of the radio frequency and wireless communication skills I had learned through my research with many of the practical machine learning and computer science tools I acquired through my industry experience.

Now that I transition to full-time research work as a Ph.D. student, I was fortunate to be awarded the National Science Foundation Graduate Research Fellowship (NSF GRFP), a highly selective award that provides financial support to a select number of elite Ph.D. students across many STEM disciplines nationwide. I also was awarded the Rutgers Presidential Graduate Fellowship, granted to a very small number of outstanding incoming graduate students by the School of Graduate Studies. Going forward I hope to leverage both of these while working with Professor Spasojevic to pursue my research interests in developing methods for the characterization, correction, and application of non-linear systems in wireless communication, a field where I strongly believe my research work has widespread potential application. I am greatly looking forward to my graduate studies at Rutgers and I acquire skills that I hope to use throughout a long career in communications engineering research while growing into a capable and adept researcher in the process.

Shivangi Rohilla
Hi everyone! My name is Shivangi Rohilla and I am from the ECE department at Rutgers. I did my Bachelor’s in Engineering from National Institute of Technology, India. I entered Rutgers in the Fall of 2020 after a lot of research and visits. I found that the Electrical and Computer Engineering program solving and analytical skills involved. To be an engineer means spending every second working on creating solutions and collaborating with others to share a wealth of knowledge. The first time I wrote some code I fell in love with it and so many years later I found myself enrolling into the Rutgers School of Engineering immediately knowing that it was the best decision that I could make to explore my passions.

Rutgers has always been on my radar. As a person who spent a large chunk of her childhood in Piscataway New Jersey, I have watched Rutgers grow into the institution that it is today. And when I stood there as a bright-eyed seventeen-year-old I could see myself becoming the person I always wanted to be.

When fall rolled around again, I entered my junior year and I was determined to continue building and growing. I was elected as the External Vice President of RIEEE. This meant that I handled major and general events throughout the year. This experience taught me how to branch outside of my comfort zone and learn how to network with others, while beginning to build relationships that will help me in the future. I also began to work on Computer Compiler Optimization with Prof. Nairaya in the Computer Science department. There I broke down code into assembly and compared different optimizations to understand what makes code run faster. While succeeding academically I also accepted an internship offer from TD Securities as a Technology Intern in their Innovation Hub. While there I worked to create dashboards and metrics to track growth in the company, learning a larger breadth of the field.

I am so excited to see what the future holds; and what my last year at Rutgers will bring me! I am excited to explore my field and seize new opportunities. I will also be leading RIEEE as President and I am grateful for the trust put on me. I am excited for the future!

Jorge Ortiz (Site PI) receives NSF Engineering Research Center (ERC) grant

The annual Rutgers Workshop was held on September 30, 2022, at the Edward J. Bloustein School of Planning and Public Policy. The workshop is part of the NSF National Research Traineeship SOCRATES (Socially Cognizant Robotics for a Technology Enhanced Society). Site: Kristin Dana. ERC: SOCRATES is a cross-disciplinary training program aimed at establishing methods for effective collaboration among researchers from computer science, physics, and engineering with the goal of designing socially-cognizant robotic systems. SOCRATES core faculty include Kristin Dana (ERC), Carl Andrews (Bloustein), Kostas Bekris (CS), Jacob Feldman (Psychology), Jingfang Yi (MAE), Pernille Hemmer (Psychology), Aaron Mazzesi (MAE), Hal Salman (Bloustein), Matthew Stone (CS).

The Robotics Workshop is held for faculty, students, and industry representatives. Faculty and students from Rutgers Electrical and Computer Engineering, Computer Science, Mechanical & Aerospace Engineering, Psychology, Planning & Public Policy, and participated. Students from these departments presented posters on their research during a poster session. Undergraduate and graduate students from university as well as students from Mason School of Arts participated in the day’s activities. Industry representatives from JP Morgan Chase, Nokia Bell Labs, SRI, and Siemens Healthineers were guest speakers and participated in a panel discussion. SOCRATES faculty members also took part in a panel of discussion on the relationship of robotic to the future of work and the social impacts of the technology. The workshop wrapped up with a tour of the CS Robotics Lab for robot demonstrations.

For more information on the SOCRATES NRT, https://robotics.rutgers.edu/

Jorge Ortiz

Jorge Ortiz (Site PI) receives NSF Engineering Research Center (ERC) grant

The Rutgers University Wireless Information Network Laboratory (WINLAB) and the School of Engineering have been awarded a major National Science Foundation (NSF) Engineering Research Center (ERC) with Columbia University, Florida Atlantic University, the University of Central Florida, and Lehman College. The new Engineering Research Center for Smart Streetscapes (CS3) will be supported for five years with $26 million, renewable for an additional five years, for a total of up to $512 million. The ERC program is NSF’s flagship engineering program to catalyze convergent research to address large-scale societal challenges. As one of the most competitive research programs in the country, CS3 was selected from among hundreds of candidate centers.

Currently, more than 80% of Americans and over half of the world’s population live in urban areas. High-density cities are transforming how people live, work, travel, and manage urban infrastructure. With the nation’s urban areas facing challenges that threaten livability, safety, and inclusion, it is streetscapes – neighborhood streets, sidewalks, and public spaces – that are at the center of public and commercial activities, where data can be harnessed for the public good. Under the auspices of the CS3 ERC, Rutgers will work in close collaboration with the National Science Foundation (NSF) to meet the goals of the Center and improve road safety, respectively. Rutgers’ funding share is ~$2.2M.

The Rutgers team, led by site PI Prof. Jorge Ortiz of Electrical and Computer Engineering, will work on several efforts for the center. The first effort will be overseen by Prof. Dipankar Raychaudhuri and Prof. Ivan Seskar. They will work on enhancements to the Wireless infrastructure based on COSMOS and smart city applications research designed and implemented by Prof. Jorge Ortiz. Prof. Jorge Ortiz will focus on application-driven research in human-streetscape interaction, expanding the interaction surface by combining multi-modal sensing, sensor fusion, and interactive machine learning that improves situational awareness. He will also examine systems aspects for enabling a shared API substrate (i.e., an operating system) to enable applications across different streetscapes. The Rutgers team also includes Prof. Peter Jin from Civil Engineering and Prof. Mubbasir Kapadia from the Computer Science department; they will work on cloud-based modeling and real-time traffic modeling for improved road safety, respectively. Rutgers’ funding share is ~$2.3M.
2022 ECE Capstone Expo Award Winners

FIRST PLACE (awarded $100 per student, sponsored by 7x24 Exchange, Metro NY Chapter) 
Project S22-26: Streaming SDR Implementation of Neural Networks Through GNU Radio Module Development 
Team members: Morrett Kashler and Michael Zhao 
Advisers: Dr. Predrag Spasojevic and Dr. Hana Godrich

SECOND PLACE (awarded $75 per student) 
Project S22-35: Solar Powered Heliostat 
Team members: Darshil Patel, Nikhil Patel, and Khushal Patel 
Adviser: Dr. Sreekala C. Muralidharan

THIRD PLACE (awarded $50 per student) 
Project S22-40: Autonomous Ocean Cleanup 
Team members: Tien Ung, Jason Nitti, and Vatsal Patel 
Advisers: Dr. Hana Godrich

FOURTH PLACE (awarded $25 per student) 
Project S22-16: IGARE 
Team members: Nitya Satish, Saheen Kaur, Kyle Boyce, Seyma Ceylan, and Angelica Correa Castro 
Adviser: Dr. Hana Godrich

FIFTH PLACE (awarded $25 per student) 
Project S22-24: Project V.I.S.I.O.N 
Team members: Justine Catt, Arni Patel, Sumant Potempale, and Kevin Zhang 
Adviser: Dr. Hana Godrich and Dan Bachman (Siemens)

SIXTH PLACE (awarded $25 per student) 
Project S22-40: Autonomous Ocean Cleanup 
Team members: Esteban Salazar, Vaishnavi Gandhi, Kanesha Aghah, Amber Gubiner, and Anthony Apostolides 
Adviser: Dr. Dario Pompili

BEST IN IMPACT AWARD (awarded $75 per student) 
Project S22-35: Portable Electronic System for a Microfluidic Impedance Cytometer 
Team members: Danwin Anwar-Luzano, Talya Erblich, Emily Gubiner, and Nicolas Rubert 
Adviser: Dr. Umer Hassan

BEST IN COMMERCIALIZATION (awarded $75 per student) 
Project S22-40: Autonomous Ocean Cleanup 
Team members: Esteban Salazar, Vaishnavi Gandhi, Kanesha Aghah, Amber Gubiner, and Anthony Apostolides 
Adviser: Dr. Dario Pompili

THE Gialiati Entrepreneurial Award Winners

FIRST PLACE (awarded with $2,500) 
Project S22-07: POWER MOVE 
Team members: Tien Ung, Jason Nitti, and Vatsal Patel 
Advisers: Dr. Hana Godrich

SECOND PLACE (awarded with $1,500) 
Project S22-08: Smart Car Control System based on EMG Signal 
Team members: Tanyu Qin, Jacheng Wang, Jia Xu, and Zhayan Qin 
Advisers: Dr. Bo Yuan

THIRD PLACE (awarded with $1,000) 
Project S22-04: Smart Car Control System based on EMG Signal 
Team members: Tanyu Qin, Jacheng Wang, Jia Xu, and Zhayan Qin 
Adviser: Dr. Predrag Spasojevic

Congratulations to class of 2022 for an exceptional capstone year! 
A full list of projects is available on the ECE site under http://www.ece.rutgers.edu/

Sheng Wei voted 2021-22 EGC Professor of the Year in ECE

Sheng Wei has been voted by the Rutgers SOE Undergraduate Student Body to receive the 2021-22 Engineering Governing Council (EGC) Professor of the Year Award from within the Department of ECE. This award is annually given to one faculty member from each department in Rutgers SOE who best exemplifies the SOE mission of Education, Research, and Service. Dr. Wei has been an outstanding teacher in ECE covering courses in the computer engineering curriculum and has established a successful research program in hardware security. Sheng Wei’s research has been mainly focused on Hardware Security, which aims to protect the security and integrity of low-level hardware systems (namely “security of hardware”), as well as employ hardware-based techniques to enhance system and software security (namely “hardware for security”). He is a recipient of the NSF CAREER Award in 2018 under the Secure and Trustworthy Cyberspace (SaTC) program. Also, his recent research work has been recognized by the community with a Best Paper Award at IEEE ICXML 2016 and Best Paper Nominations at IEEE HOST 2018, ACM MMW 2016, and DMC 2018.

ECENews}

ECE Assistant Professor Sheng Wei has been voted by the Rutgers SOE Undergraduate Student Body to receive the 2021-22 Engineering Governing Council (EGC) Professor of the Year Award from within the Department of ECE. This award is annually given to one faculty member from each department in Rutgers SOE who best exemplifies the SOE mission of Education, Research, and Service. Dr. Wei has been an outstanding teacher in ECE covering courses in the computer engineering curriculum and has established a successful research program in hardware security. Sheng Wei’s research has been mainly focused on Hardware Security, which aims to protect the security and integrity of low-level hardware systems (namely “security of hardware”), as well as employ hardware-based techniques to enhance system and software security (namely “hardware for security”). He is a recipient of the NSF CAREER Award in 2018 under the Secure and Trustworthy Cyberspace (SaTC) program. Also, his recent research work has been recognized by the community with a Best Paper Award at IEEE ICXML 2016 and Best Paper Nominations at IEEE HOST 2018, ACM MMW 2016, and DMC 2018.
Sasan Haghani has joined the ECE Department as a Non-Tenure Track Visiting Professor. He received his M.Sc and Ph.D. in the Electrical Engineering from the University of Alberta, Edmonton, Canada in 2002 and in 2007, respectively. In 2021, Sasan was awarded LDC Founder’s Day Dr. Marjorie Holloman Parker Distinguished Educator’s Award. His research interests include applied signal processing with applications in biomedical and environmental domains, network science, smart cities, renewable energy and smart grid, home automation, human-automation systems for smart grid, wireless sensor networks, and broadband communications. On September 1, 2022, Sasan started serving as the ECE Undergraduate Director and the ECE Capstone Coordinator.

Shirin Jalali has joined the ECE Department as an Assistant Professor. She received her M.Sc in Statistics and Ph.D. in Electrical Engineering from Stanford University. Prior joining Rutgers, she worked as a research scientist at AI lab at Nokia Bell Labs. Her research interests span a range of problems related to (i) developing theoretically-founded computationally-efficient solutions to understand and address various issues rising in modern computational imaging, such as sparsity and non-negative imaging, (ii) online learning, (iii) structure learning, and (iv) developing an information theoretic understanding of neural networks and deep learning.

Daniel Burbano Lombana has joined the ECE Department as a new Assistant Professor. Daniel received his Ph.D. in Electrical Engineering from the University of Naples Federico II, Italy in 2015, and his M.Sc degree in Industrial Automation from the National University of Colombia. His research interests include dynamical systems and control theory with an emphasis on distributed network systems, collective animal behavior, swarm intelligence, and robot autonomy. Daniel is interested in understanding and engineering the mechanisms enabling the emergence of collective behavior in complex network systems, such as teams of co-robots or schools of fish. His interdisciplinary research integrates and advances dynamical systems theory, controls, and data science to study pressing problems in biology and engineering, such as collective navigation and learning in animal groups and distributed inference and control in engineered network systems.

Shriram Ramanathan has joined the ECE Department as a new Assistant Professor and Robert Weinstub Chair in Engineering. Shriram received his Ph.D. in Materials Science Engineering from Stanford University in 2002. His research interests include oxide quantum materials and devices, electromagnetic materials, and brain-inspired electronics.

Yicheng Lu joined Rutgers as an assistant professor of Department of Electrical and Computer Engineering in July 1, 1988. He retired on July 1, 2022. Before his retirement, he was a Distinguished Professor and a Paul S. and Mary W. Monroe Faculty Scholar in ECE. He was also a member of the graduate faculty in the Department of Materials Science and Engineering (MSE) and Biomedical Engineering (BME).

Dr. Lu is a well-recognized researcher in the oxide semiconductor, in particular, zinc oxide (ZnO) research field. His team has pioneered various ZnO-based materials, nanostructures, and devices, including Schottky diodes, UV light modulator, wireless UV photodetector, monolithic integrated RF tuning devices for smart sensors, 3D electrodies enhanced LED and solar cells, as well as thin film transistors for biosensors and micro-inventors of self-powered wearable systems. Prof. Lu has published over 160 refereed journal papers and holds 27 US patents awards. Since 2014, he has served as Chair of the International Advisory Board of the International Workshop of ZnO and Related Materials (WZO).

Dr. Lu is an enthusiastic and dedicated educator, who “seamlessly integrated his teaching and research activities to the great advantage of his many students” (quoted from his Rutgers Scholar Educator Award at ECE, he taught over 5,000 undergraduate students in classroom. As advisor, he graduated 33 Ph.D. students (27 from ECE and 5 from MSE). Under his mentoring, many of his students received prestigious national awards, including Rhodes Scholar, NSF Graduate Fellowship, National Research Council Fellowship, National Defense Science and Technology Graduate (NDSEG) Fellowship, USA-FOEY All-American College First Academic Team and the Third Academic Team. Prof. Lu served as ECE Department chair in 2006-2010. He also served as the director of Rutgers’ Microelectronics Research Laboratory (MERL) over 20 years. Under his leadership, MERL hosted ~30 faculty users from 7 departments and over 50 students conducted thesis projects there and received Ph.D. degrees.

Due to his excellent record to serve Rutgers, Prof. Lu received many awards, including ‘Russian Teaching Award, Research Fellowship award, Scholar-Teacher Award, and 2019- SOE Faculty of Year’ award.

Yicheng Lu

Shriram Ramanathan

Daniel Burbano Lombana

Sasan Haghani

S. Haghani

R. Yates

T. Lu

G. Yang

Guosong Yang has joined the ECE Department as a new Assistant Professor. Guosong received his M.S. and Ph.D. in Electrical Engineering from the University of Illinois at Urbana-Champaign, IL in 2013 and 2017, respectively. His research interests include switched and hybrid systems, networked control systems, learning in games, and their applications to cyber-physical systems and network security. His work has won the ACM SIGBED HSCC Best Paper Award in 2019.

Due to his excellent record to serve Rutgers, Prof. Lu was retired over the summer. Joining Rutgers in 1990 as an Assistant Professor, he was a member of the ECE faculty for 32 years. His teaching was focused on undergraduate and graduate probability, leading to three editions of the textbook “Probability and Stochastic Processes,” Friendly Introduction for Electrical and Computer Engineers”. Prof. Lu, noted, “it’s always nice to hear from students that they didn’t hate my book. Sometimes they even found it to be helpful.” His research career revolved around WINLAB where he also served as an Associate Director for 20+ years. From 1990-2010, his research was on wireless communication networks with a focus on transmitter power control. Since 2016, his research transitioned to Edge of Information (Afik) methods for the analysis of low-latency status updating systems. In 2021-22, Prof. Yates served as the Undergraduate Director. “It was surprising by how thankful the students were when I could help solve their problems with registration and graduation requirements.” When asked about his other contributions to the department, he observes “Perhaps my most useful departmental service was participating in the faculty search committees that led to the hiring of many of our outstanding faculty.” Going forward as an emeritus faculty member, Prof. Yates plans to continue his Aol research with WINLAB students and faculty.

Prof. Hana Godich, who served as the Undergraduate Director of the ECE department at Rutgers University from 2016 to 2019, entered her retirement in June 2022. Prof. Godich was an associate teaching professor, and she coordinated the department Capstone (senior year) design program, which helps students gain project design experiences through team-oriented projects involving multiple areas in ECE and industry. The ECE Capstone design program led by the leadership of Prof. Godich has reached its record-high student numbers of 216 in 2022. Prof. Godich provided valuable advice to students through ECE Capstone design program and also as the Undergraduate Director. She has contributed significantly to shaping the growing undergraduate program in ECE.

Prof. Godich received the B.S. degree from the Technion-Israel Institute of Technology in 1987, the M.S. degree from Ben-Curion University in 1989, and the Ph.D. degree from the New Jersey Institute of Technology in 2010, all in electrical engineering. Her research interests are in indoor and outdoor localization using multiple-input multiple-output (MIMO) systems, energy management, and sustainability. From 2010 to 2012, she was a Research Scholar with Princeton University, Princeton. From 1993 to 1995, she was with Soteix inc. (currently H-F). From 1996 to 2003, she was a Partner and a Consultant with Enetpower Inc., Israel, where she focuses on power systems design for mission-critical facilities.

Dr. Lu is an enthusiastic and dedicated educator, who “seamlessly integrated his teaching and research activities to the great advantage of his many students” (quoted from his Rutgers Scholar Educator Award at ECE, he taught over 5,000 undergraduate students in classroom. As advisor, he graduated 33 Ph.D. students (27 from ECE and 5 from MSE). Under his mentoring, many of his students received prestigious national awards, including Rhodes Scholar, NSF Graduate Fellowship, National Research Council Fellowship, National Defense Science and Technology Graduate (NDSEG) Fellowship, USA-FOEY All-American College First Academic Team and the Third Academic Team. Prof. Lu plans to retire on July 1, 2022. Before his retirement, he was a Distinguished Professor and a Paul S. and Mary W. Monroe Faculty Scholar in ECE. He was also a member of the graduate faculty in the Department of Materials Science and Engineering (MSE) and Biomedical Engineering (BME).

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Shriram Ramanathan

Guosong Yang

S. Haghani

R. Yates

D. Lombana

S. Jalali

Yicheng Lu

G. Yang

Guosong Yang

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Smartphone app to examine effects of cannabis use on driving behavior

Psychoactive components of cannabinoids are associated with real-world aberrant driving behavior (e.g., weaving). (2) Examine how ecological momentary assessment report of subjective cannabis intoxication, “effort put into driving” and chronicity of cannabis use, are associated with real-world aberrant driving behaviors (e.g., weaving).

The proposed system detects not only abnormal driving behaviors but also identifies specific types of abnormal driving behaviors. It only uses smartphone built-in sensors. Through empirical studies of the 6-month driving traces collected from real driving environments, we found that there are six types of abnormal driving behaviors, including weaving, swerving, sideslipping, fast U-turn, turning with a wide radius and sudden braking. We found that all of these 6 behaviors have the unique patterns of time duration, acceleration, and orientation, which can be captured in motion sensor readings. For example, normal driving usually has acceleration g-force near 0, and a small orientation standard deviation and range. In contrast, the standard deviation of acceleration or orientation rises and remains high until the event ends for aberrant driving. Based on these findings, we derive effective features that can differentiate the various driving behaviors, including maximum, minimum, value range, mean, and standard deviation of time duration, acceleration, and orientation.

Based on the developed features, our system performs driving behavior detection and identification. It consists of an offline part (Modeling Driving Behaviors) and an online part (Monitoring Driving Behaviors), as in the figure. In the offline part (Modeling Driving Behaviors), the system trains a classifier model using machine learning and deep learning techniques (e.g., SVM, and RNN). It could detect six representative types of aberrant driving behaviors. Specifically, our system first collects sensor reading through the acceleration and orientation. It then extracts effective features from specific types of driving behavioral patterns on acceleration and orientation. Finally, we train a classifier model based on the extracted features using machine learning and deep learning methods to realize fine-grained identification. The online part (Monitoring Driving Behaviors) senses real-time vehicular dynamics to detect and identify abnormal driving behaviors.

Specifically, our system first senses the vehicles’ acceleration and orientation through smartphone sensors. Next, the Coordinate Reorientation module aligns the smartphone’s coordinate system with the vehicle’s, and the Aberrant Driving Behavior Detection module segments the beginning and ending of driving behavior from the accelerometer and orientation sensor’s readings. Afterwards, Identification module extracts features from patterns of the driving behaviors and identifies whether one of the abnormal driving behaviors occurs based on the classifier model trained. Finally, the system would prompt an alert when identifying any abnormal driving behaviors.

We plan to collect real-world data by recruiting participants from medical cannabis patients. In particular, participants will complete a baseline lab assessment (e.g., psychiatric status, driving history), a daily smartphone data collection for up to 28 days, and a post-data collection assessment. We will analyze the qualitative results and modify the system features to prevent the influences of cannabis accordingly in the future.

Our driving behavior detection and identification system, which innovatively combines ecological momentary assessment and biological assay of psychoactive components among cannabinoids, will identify and prevent the influence of cannabis in real-world driving with high accuracy.
Will 5G Networks in the Future make Weather Forecasts Inaccurate?

The demand for increasingly higher speed services in 5G networks has led to the opening up and utilization of newer spectrum in the mmWave bands (above 24 GHz) that had not been previously allocated for commercial wireless applications. Such new spectrum opportunities often come with concerns, speculations, and even controversy, when it relates to impacting collocated or adjacent portions of spectrum that are utilized for other services. Specifically, the 5G band allocated in the 26 GHz spectrum referred to as 3GPP services in 5G networks has led to the opening of remote sensing. The 5G community believes an acceptable leakage level is -20 dBW while the meteorological community believes it should be -20dBW. Clearly there is a wide gap in this disagreement and has led to a spate of sensational articles in the popular press as well hearings in U.S. congressional committees.

An interdisciplinary team of Rutgers researchers led by ECE and WINLAB Distinguished Professor Narayam Mandayam (PI) along with co-PIs, Chuang-Chih-Li Michael Wu (Assistant Professor, ECE), Ruo-Qian Wang (Assistant Professor, CEE) and Joseph Brodie (Director of Atmospheric Sciences) are the recipients of an award from the National Science Foundation under the “Enabling Spectrum Coexistence of Future Technologies (SWIFT) program for joint work. The project “Enabling Spectrum Coexistence of Passive Sensors in 5G mmWave and Passive Weather Sensing.”

ECE/WINLAB faculty team awarded $1M NSF RINGS project on real-time machine learning in distributed edge cloud environments

A team of four Rutgers WINLAB/ECE faculty, led by Prof. Anand Sarwate as the PI, recently received a three-year, $1 million grant entitled RINGS: REALTIME: Resilient Edge-cloud Autonomous Learning with Time-critical Inferences from the National Science Foundation (NSF) as part of NSF’s recent multi-million-dollar investment aimed at the development of intelligent, resilient, and reliable next generation — or NeC — networks. More details about this NSF investment, termed RINGS—short for Resilient and Intelligent Next-Generation Systems, can be found in the NSF press release here. The Rutgers team, comprising Profs. Roy Yates, Dipankar Raychaudhuri, Anand Sarwate and Waheed Bajwa, will design and experimentally validate a mobile edge cloud (MEC)-based distributed machine learning (ML) system.

Machine learning (ML) is the enabler of emerging real-time applications ranging from augmented reality and smart cities to autonomous vehicles that are changing how people live and work (see visual #2 showing the vehicular scenario). Low-latitude interactive (referred to as latency) is a key requirement for a broad class of these emerging real-time services. Emerging virtual reality (VR) and augmented reality (AR) applications will need assistance from close-in computing infrastructure known as the “mobile edge cloud (MEC)” for real-time operation because of the limited computing power on mobile devices such as smartphones and tablets. This emerging AR/VR application scenario introduces significant new design challenges: mobile devices are heterogeneous, ranging from energy-harvesting sensors to automobiles, but storage and compute resources are limited; real-time deployment of trained MLC models requires autonomous computation and decision making that is adaptive to heterogeneous time-varying environments; devices need to make accurate inferences on high-dimensional data in real-time; devices continually gather new data that must be processed, aggregated, and communicated to the MEC in a timely way; mobile users have heterogeneous privacy preferences that require privacy-sensitive use of the band and the applications and services on the mobile devices must be resilient to changes in both the cyber and physical worlds to ensure personal safety.

The RINGS RealTime project is aimed at the design and experimental validation of an MEC-based distributed ML system that accounts for all these factors. The research program has four facets: (1) Edge-centric distributed MLC models to enable both real-time inferences at mobile devices and fast distributed semi-supervised training are being developed and evaluated. (2) Based on age-of-information (AoI) metrics, real-time inference methods and system operation are optimized to balance mobile computing against network resources. (3) Differential privacy and other privacy metrics for real-time and online operation of MEC-assisted ML are being developed and incorporated in the distributed algorithms for system adaptation. (4) The project integrates these design approaches in a proof-of-concept prototype on the NSF COSMOS testbed in NY City (see www.cosmos-lab.org for more information about COSMOS) to validate feasibility and evaluate device and system resilience for representative applications.
Developing Networked Neuroprosthesis for Spinal Cord Injuries

“Lifeline” device, which senses health-related parameters, including temperature, electrocardiogram (ECG), photoplethysmogram (PPG), inertial measurement, and acoustic signals. The ultimate goal is to incorporate the device with “Networked Neuroprosthesis” (NNP), creating a comprehensive health monitoring system for patients with spinal cord injury (SCI). The NNP system offers significant processing capacity, wireless data transmission, data storage, and an array of existing modules (electrical stimulation, bio-potential recording, temperature sensing, inertial sensing), providing a platform for implementing and evaluating the benefits of implanted health monitoring, while minimizing the development costs and regulatory hurdles.

An exciting anticipated outcome of the Lifeline-enhanced NNP system is the capacity to provide advanced warning regarding the top causes of increased mortality in individuals with SCI, enabling earlier detection and medical intervention that may ultimately increase overall life expectancy. The causes of early mortality include pneumonia, urinary tract infection, pulmonary embolism, and autonomic dysreflexia, which are unique to, or more prevalent in, people with SCI. The addition of the Lifeline device to the NNP system is the first step towards an implantable “life-saving neuroprosthesis”. A key aspect of the predictive power of the Lifeline device is based on the potential of machine learning (ML) algorithms to extract information from disparate sources of data and identify features that are unarticulated. Dr. Najafizadeh will be working on utilizing the ability of the ML algorithms to learn complex and nonlinear interactions among variables and identify predictive patterns of data that would be an essential part of this project. Along these lines, recently, she and her Ph.D. student Weinan Wang, developed a new approach to estimate blood pressure from short segments of PPG signal using visibility graph and transfer learning (Figure 1).

The outcome of the NIH project is expected to result in a single module system that will be capable of providing both improved health, and improved function for anyone with SCI, thus prolonging life while, at the same time, increasing independence and quality of life.

Chip-Scale Metamaterial-Based mmWave Antenna and Array for Next Generation Sensing and Communications

Chung-Tse (Michael) Wu’s Microwave Research Lab focuses on microwave and millimeter wave components and metamaterial monolithic integrated circuit (MMIC) design. His lab explores novel microwave and RF technologies to make our lives better. It is expected that next-generation wireless platforms, i.e., 5G or 6G, will need to cover multiple or broad frequency bands in the mmWave regime in order to support various applications, such as high-resolution radar sensors, imaging systems and high-throughput mobile communication links that require a wide instantaneous bandwidth as the operating frequency increases. To this end, a key enabler of such mmWave platforms is the antenna system, which typically include antenna elements, feeding networks, along with their integration process.

At the mmWave frequency bands, the dimension of antennas needs to shrink proportionally with respect to the wavelength. For instance, an antenna array operating at 100 GHz requires a spacing of 1.5 mm between each adjacent antenna element. As such, conventional printed circuit board (PCB) technology may not be suitable to accommodate such small dimensions to allow for the desired design accuracy. While fully integrated antenna-on-chip structures using CMOS technology can serve as a possible solution, the substrate appears to be lossy, thereby increasing signal loss. On the other hand, the thin dielectrics between the CMOS metal layers also decreases antenna radiation efficiency. Moreover, such CMOS on-chip antennas still require a huge portion of expensive die area at the mmWave frequency band. To this end, by adapting the heterogeneous integration (HI) technique with the antenna-in-package (AiP) technology, the silicon-based integrated passive-device (IPD) technology can serve as a good antenna carrier, thanks to its thick beryllium-copper (BCB) dielectric layers, and high resistivity low-loss substrate.

The Microwave Research Lab has designed and developed various mmWave antennas using silicon-based IPD technology. By incorporating the concept of metamaterials into the antenna design, we can realize travelling-wave or multi-mode characteristics to achieve wideband or resonant antennas and arrays. Figure (a) shows a 5 x 5 metamaterial array AiP realized by IPD-PCB assembly with a core antenna footprint of around 8 x 8 mm2 exhibiting a bandwidth of 18.5-100 GHz with a differential voltage standing wave ratio (VSWR) smaller than 3.5. Furthermore, by utilizing the negative and zeroth modes of metamaterial substrate integrated waveguide (MMI) resonators, the antenna shown in Figure (b) demonstrates a return loss of 13.8 dB at 94 GHz with a bandwidth of 6.6 GHz. These prototypes indicate that the proposed design methodology and fabrication process for chip-scale metamaterial-based mmWave antennas and arrays have great potential to be deployed in wideband mmWave antenna systems for next-generation applications.

Figure 1. Illustration of the process of estimating blood pressure from short segments of PPG using visibility graph and transfer learning.
Average system utility versus task load.

Average system utility versus task load and input size.

Illustration of collaborative video caching and processing framework deployed on MEC network. The cache server implemented on MEC server acts as both RTMP/RTSP client and server.

Mobile-Edge Computing (MEC) is an emerging paradigm that provides a capability distribution of cloud computing capabilities to the edge of the wireless access network, enabling soft services and applications in close proximity to the end users. In this article, a MEC enabled multi-cell wireless network is considered where each Base Station (BS) is equipped with a MEC server that assists mobile users in executing computation-intensive tasks via task offloading. The problem of joint task offloading and resource allocation is studied to maximize the users' task offloading gains, which is measured by a weighted sum of reductions in task completion time and energy consumption. The considered problem is formulated as a Mixed Integer Non Linear Program (MINLP) that involves jointly optimizing the task offloading decision, uplink transmission power of mobile users, and computing resource allocation at the MEC servers. Due to the combinatorial nature of this problem, solving for optimal solution is impractical for a large-scale network. To overcome this drawback, the authors propose to decompose the original problem into a Resource Allocation (RA) problem with fixed task offloading decision and a Task Offloading (TO) problem that optimizes the optimal-value function corresponding to the RA problem. The authors address the RA problem using convex and quasi-convex optimization techniques, and propose a novel heuristic algorithm to the TO problem that achieves a suboptimal yet close to optimal solution in polynomial time.

Yingying (Jennifer) Chen, a professor in the Department of Electrical and Computing Engineering and an associate director of Rutgers’ Wireless Information Network Laboratory (WINLAB), has been named a fellow of the National Academy of Inventors (NAI) class of 2021. This is the highest professional distinction conferred solely to academic inventors.

“Tam honored to be elected an NAI fellow,” says Chen. “While I enjoy my research work, I always hope it can make direct contributions to society. This is the main reason why I’m working in the systems research area. I’m glad to see that my work can impact our daily lives in terms of both working and living. It is a great encouragement for me to keep the momentum moving forward.”

A Breakthrough in Wellbeing Monitoring

According to Chen, who holds three patents related to mobile computing and mobile security that have been licensed to industry and commercialized, many of her new research findings and results in smart healthcare, IoT, mobile sensing and computing, deep learning on mobile devices, security in AI systems, and cybersecurity also have the potential to be developed into products, she reports.

A Game-Changer for Public Safety

Chen’s patent for “In-Baggage Object Detection Using Commodity Wi-Fi” has been licensed to BulRun Capitol, which has funded more than 18 projects since 2008. Chen describes the invention as a “game-changer for public safety since it can detect hidden dangerous objects, such as weapons, explosives, and liquids, inside luggage by using low-cost wireless signals as opposed to the traditional x-ray and CT-based platforms.”

A World-Class Engineer

Chen describes her work as “often interdisciplinary and having a broad impact.”

As a member of the 2021 NAI fellow class, Chen joins a distinguished and diverse group of inventors hailing from 116 research universities and governmental and non-profit research institutes from around the world. Collectively, the class holds more than 4,800 issued U.S. patents and includes 33 members of the National Academies of Sciences, Engineering, and Medicine, and three Nobel Laureates.

Chen and other members of the NAI Fellows Class of 2021 were officially inducted at the Fellows Induction Ceremony at the 11th Annual Meeting of the NAI in Phoenix, Arizona in June 2022.

Professor Chen Named National Academy of Inventors Fellow

Wexed Bajwa

Promoted to Professor

Dario Pompili

Promoted to Professor

Faculty News

Promoted to Professor

 мероприятии
SoE Professors Receive 2021-2022 University-wide Faculty Year-End Excellence Awards

The ECE Department is pleased to announce that John McGarvey, Associate Professor, has been promoted to full Professor with tenure, effective July 1, 2022. Congratulations on this well-deserved accomplishment, Mike!

Chung-Tse Michael Wu
Promoted to Associate Professor with Tenure

We are happy to announce that the Board of Governors has approved Dr. Chung-Tse Michael Wu’s promotion to Associate Professor with tenure effective July 1, 2022. Congratulations on this well-deserved accomplishment, Mike!

Ashwin Ashok
Associate Professor

Ashwin Ashok is an Associate Professor in the Dept. of Computer Science at Georgia State University (CISI) and directs the Mobile and Robotic Systems through Experiential research lab (MORES Lab). His research group focuses on emerging technologies and spans work across communications and networking, environmental systems, sensors and robotic systems, and mobile computing. He has completed his postdoctoral research from Carnegie Mellon University in 2016 and Ph.D. from Wireless Information Network Lab (WINLAB) at Rutgers University in 2014. His thesis pioneered the concept of visual multi-input multi-output (MIMO) for camera-based communication. He has founded and continues to co-organize and steer the ACM Body-centric Computing Systems (BodySys, previously WearSys, 2015-2020) workshop. He serves on the program committee for several ACM and IEEE conferences and journals. Editor for Elsevier Vehicular Communications (VEHCOM), Guest Editor for the special issue on Visible Light and Camera Communications in MDPI Electronics Journal, and vice-chair for IEEE P1912.2 (Vehicle to Vehicle Communications for Unmanned Aircraft Systems) standard working group committee. He is the recipient of the NSF CAREER award in 2022, GSI’s 2021 University Distinguished Faculty Fellowship for Undergraduate Research and 2022 College of Arts and Science Outstanding Undergraduate Mentoring award.

My Experience at Rutgers ECE and WINLAB: Rutgers ECE department the Wireless Information Networking Lab (WINLAB) have played a major role in shaping my career and also my personality. I had the opportunity to be a TA for Prof. Orfanidis (Linear Systems) and Prof. Yates (Probability and Random Processes), both of whom are beyond par excellent teachers and individuals. I thoroughly enjoyed my TAship through which I strengthened my skills on these topics. The diversity of courses in the department and some of those that I took from outside the department, helped me a great deal in strengthening my knowledge on diverse fields aside from my main body of research work at WINLAB. In addition, I made a lot of friends in the department and interacted with many wonderful faculty. I vividly remember the Rutgers Day preparations and its events, and how ECE made it fun and informative. The new (relative to my years at Rutgers) format of ECE Capstone presentation day is a wonderful idea and it’s nice to see how well-planned and managed the event is executed.

My days (and many nights!) at WINLAB have set the foundation stones for my career and where I stand today. I owe a huge thanks to my advisor: Dr. Marco Gruteser, Dr. Narayan Mandayam and Dr. Kristin Dana, whose collaboration shaped me into getting into academia. I cannot forget the days of experimentation in the ORBIT lab with a bunch of fellow graduate and undergraduate students. The summer internship program at WINLAB is always fun with Han (Sesek) always surprising the cohort with a great deal of research toys and platforms to work with. The birth of my thesis idea is always a fascinating story that I share with my students and colleagues even today. What generated as a water cooler discussion among who would then become my doctoral advisors, came as an open invitation for me to explore and that’s how I took up optical wireless, particularly visible light communication (VLC) research. The research has been history, with the field becoming more popular, many conferences and workshops dedicated to this topic and grant agencies supporting funding such research. My first grant I received as a faculty member was the NSF CRII (pre-early career faculty award) and my most recent grant is the NSF CAREER (early career faculty award), and both these awards are for research on visible light communication (VLC), clearly showing how my work at WINLAB has shaped my interest in this space, for now and moving forward. I was more into theory when I started at WINLAB and my interest in systems research piqued and I picked up that. Today, I am thankful that I have been able to diversely across theory and systems and across different interdisciplinary areas of research; this is only thanks to all my teachers and advisors. I am truly thankful to WINLAB and Rutgers ECE for being a significant part of my life’s story I hope to (and will) visit you all soon.

John McGarvey
promoted to Associate Teaching Professor

I share with my students and colleagues even my PhD experience and the concept of visual multi-input multi-output (MIMO) for camera-based communication. I am very thankful for the opportunity I got to be a TA for Prof. Orfanidis (Linear Systems) and Prof. Yates (Probability and Random Processes), both of whom are beyond par excellent teachers and individuals. I thoroughly enjoyed my TAship through which I strengthened my skills on these topics. The diversity of courses in the department and some of those that I took from outside the department, helped me a great deal in strengthening my knowledge on diverse fields aside from my main body of research work at WINLAB. In addition, I made a lot of friends in the department and interacted with many wonderful faculty. I vividly remember the Rutgers Day preparations and its events, and how ECE made it fun and informative. The new (relative to my years at Rutgers) format of ECE Capstone presentation day is a wonderful idea and it’s nice to see how well-planned and managed the event is executed.

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School of Engineering faculty Waheed Bajwa and Chung-Tse Michael Wu were among the recipients of Rutgers’ 2021-2022 Faculty Year-End Excellence Awards, at the first in-person ceremony in two years.

“This is a moment we get to say thank you,” Rutgers University President Jonathan Holloway said at the ceremony. “Thank you for your dedication to excellence and thank you for your commitment to your students. Thank you for helping Rutgers change the world for the better.”

Bajwa, a professor in the Department of Electrical and Computer Engineering received the Presidential Outstanding Faculty Scholar Award. The award honors newly promoted or tenured faculty whose contributions to teaching and service to the Rutgers community and beyond.

“Rutgers is home to an amazing group of faculty, so to have been selected among this group is quite a surreal and humbling feeling for both me and my family. While the award is a confirmation of the fact that my research and teaching activities during my eleven-year stay at Rutgers have been in the right direction, I owe this award to my students, research mentees, and academic mentors who have helped me be the faculty that I am,” says Bajwa.

Department of Electrical and Computer Engineering Associate Professor Chung-Tse Michael Wu was the Board of Trustees Research Fellowship for Scholarly Excellence. It honors distinguished newly-promoted and tenured faculty whose contributions to teaching during their early years at Rutgers have been truly outstanding.

“I am truly humbled and honored to receive this prestigious award. First and foremost, I am grateful to Rutgers for providing us with great research environments that enable us to work on cutting-edge research projects in the field of electromagnetic,” said Prof. Wu.

“Moreover, I feel fortunate that we have brilliant, capable students and researchers on our team who work tirelessly to deliver their best research outcomes. This award is a wonderful recognition of the research carried out by our entire group.”

Cong Shi, who recently graduated from Rutgers ECE department as a Ph.D., joined the New Jersey Institute of Technology in August 2022 as a tenure-track assistant professor. Under the guidance of Dr. Yingqing Chen, Cong started his Ph.D. study at Stevens Institute of Technology in 2017, and he transferred to Rutgers University to continue his Ph.D. journey in 2019. During Cong’s Ph.D. years, he published extensively on core topics in cyber security and privacy, mobile sensing, smart healthcare and IoT, and security in machine learning/Artificial intelligence.

Cong’s research work focuses on exploring novel sensing, signal processing, and machine learning techniques to classify and model research problem related to security and privacy, human-computer interaction, and augment reality/virtual reality, with a strong emphasis on system implementation and validation in real-world scenarios. His research projects have been recognized by famous industrial companies, including Cisco System and Siemens Corporate Research, which lead to two fellowships and two collaborative research projects in 2019 and 2020, respectively.

Particularly, the Cisco-sponsored project aims to realize a human dynamic monitoring system to track users’ walking speed and direction via commodity WiFi, while the Siemens-sponsored project targets to develop a system that authenticates users in a contactless manner using IoT devices.

During his Ph.D. years, Cong’s research work has led to 28 publications, including many top-tier conferences such as ACM CCS, ACMA, ACM MobiCom, ACM Mobility, ACM MobileTo, ACM SenSys, and AND and selective journals/ magazines including IEEE JHF, IEEE S&P, IEEE TMC, ACM TIST, ACM WIMVAT. His research outcomes have drawn attention from the media and have been reported by BBC News, Yahoo News, NBC New York, Science Daily, etc.

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