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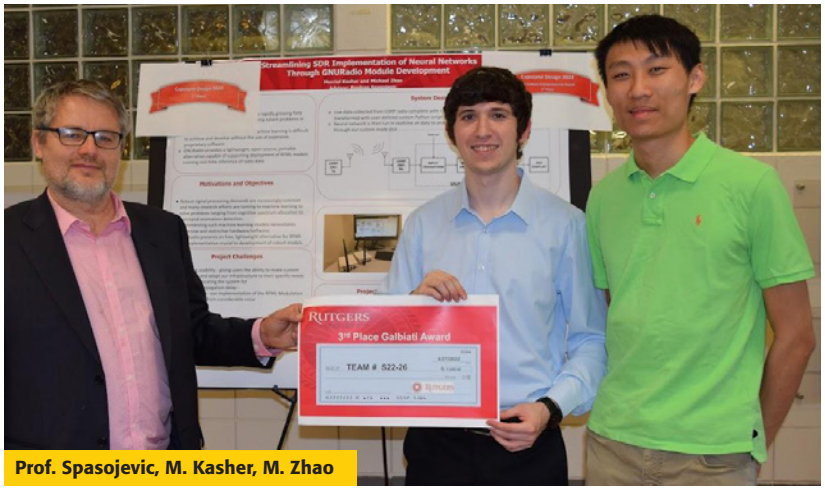
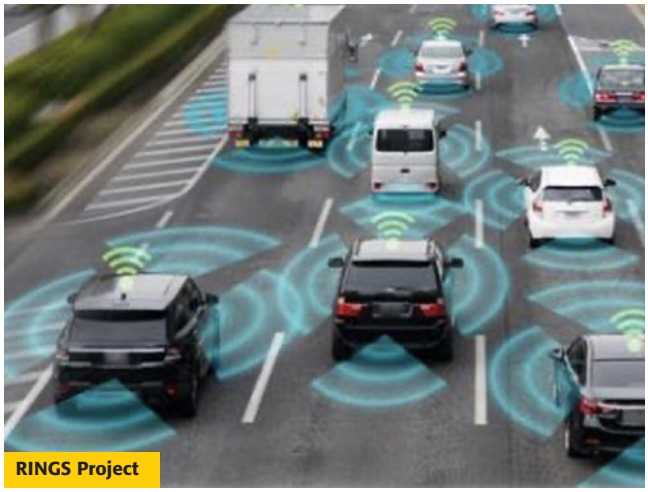
Rutgers University School of Engineering | Department of Electrical and Computer Engineering | 2022



Prof. Spasojevic, M. Kasher, M. Zhao


RINGS Project


Prof. Bajwa and Rutgers University President Holloway

iVest Smart Vest Capstone team


Geographical Solar Tracker Capstone team

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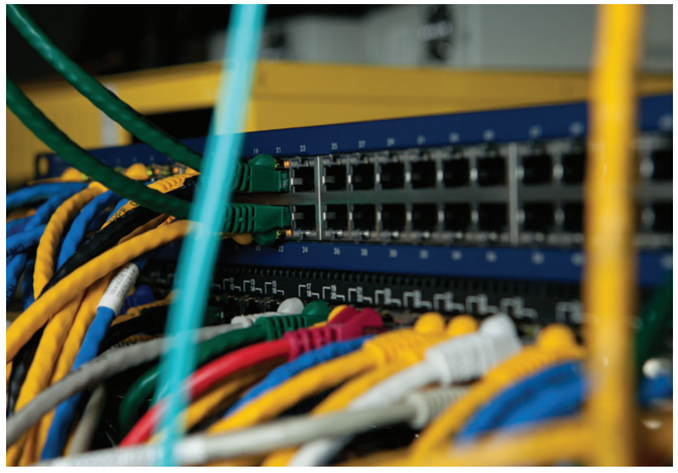

ECE News is an annual publication of Rutgers ECE.

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message from the chair

Y. Chen

ECE Numbers

36
Faculty

5
Part-Time Lecturers

956
Undergraduate Students

199
Graduate Students

105
PhD Students

94
MS Students

New Research Grants:
$10M

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 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 entrepreneuring 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 offer 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 13 IEEE Fellows, 1 AAAS Fellow, 1 NAI 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, MxD, 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 Rodkin-Weintraub Chair, Presidential Outstanding Faculty, and Susman Award for their excellence researching and teaching 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 ISS 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 centers such as the world-renowned WINLAB, Engineering Research Center (ERC) on Smart Streetscapes (CS3), 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

ecefaculty

Waheed U. Bajwa
Professor and Graduate Director
NSF Career Award, ARO YIP Award
Research Interests: Statistical signal processing, high-dimensional statistics, machine learning, and networked systems.

Daniel Burbano Lombana
Assistant Professor
Research Interests: Dynamical systems and control theory with an emphasis on distributed network systems, collective animal behavior, swarm intelligence, and robot autonomy.

Grigore Burdea
Professor Emeritus
NSF Initiation Award
IEEE Virtual Reality Career Award
Research Interests: Virtual rehabilitation, telerehabilitation, haptics virtual reality.

Yingying (Jennifer) Chen
Professor & Department Chair
IEEE Fellow, Peter D. Cherasia Faculty Scholar, NSF Career Award, Google Faculty Research Award, NJ Inventors Hall of Fame Innovator Award, Fellow of National Academy Inventors, ACM Distinguished Scientist
Research Interests: Smart healthcare, internet of things (IoT), smart safety systems, cyber security and privacy, applied machine learning, hardware-software co-design.

Kristin Dana
Professor
NSF Career Award
Research Interests: Computer vision, robotics, pattern recognition, machine learning, convex optimization, novel cameras, camera networks, computer graphics, computational photography, illumination modeling.

Salim El Rouayheb
Associate Professor
NSF Career Award, Google Faculty Research Award
Research Interests: Information Theory, Distributed Storage Systems and Networks, Distributed Coded Data, Data Secrecy and Wireless Networks.

Zoran Gajic
Professor
Research Interests: Power control of wireless networks.

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
Peter D. Cherasia Faculty Scholar, NSF Career Award, ACM Distinguished Scientist
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 energy 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
NSF Career Award
Research Interests: Nanobiotechnology, BioMEMS, Point of care diagnostics, Biomarker 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 Initiation Award, Rutgers Monroe Faculty Scholar, Faculty of the Year Award (2019)
Research Interests: Micro- and nano-electronics multifunctional oxides - based devices.

Richard Mammone
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.

Narayan Mandayam
Distinguished Professor
Peter D. Cherasia Faculty Scholar and Associate Director of WINLAB, IEEE Fellow, Distinguished Lecturer of IEEE
Research Interests: Cognitive radio networks and spectrum policy radio resource management for smart city, privacy in IoT.

Ivan Marsic
Professor
Research Interests: Mobile computing, software engineering, computer networks.

Sigrid McAfee
Associate Professor Emeritus
Research Interests: Defects in semiconductors, nanotechnology, financial engineering.

John McGarvey
Associate Teaching Professor
Research Interests: Design and simulation of power electronic systems, control system modeling via both the classic and modern state-space techniques, and the design and testing of motor control systems.

Peter Meer
Distinguished Professor Emeritus
IEEE Fellow, AMiner Most Influential Scholar
Research Interests: Statistical approaches to computer vision.

Laleh Najafizadeh
Associate Professor
Research Interests: Functional brain imaging, brain connectivity, diffuse optical brain imaging, electroencephalography, cognitive rehabilitation, circuit design and microelectronics, ultra-low-power circuits for biomedical applications, data converters, system on chip, wireless IC design.

Sophocles Orfanidis
Associate Professor
Research Interests: Statistical and adaptive signal processing, Audio signal processing, Electromagnetic waves and antennas.

Jorge Ortiz
Assistant Professor
Research Interests: Machine Learning for cyber-physical systems, Intelligent infrastructure systems, smart health applications

Athina Petropulu
Distinguished Professor
IEEE Fellow, NSF Presidential Faculty Fellow, Distinguished Lecturer of IEEE
Research Interests: Statistical signal processing, blind source separation, cooperative protocols for wireless networks, physical layer security, MIMO radar, compressive sensing.

Dario Pompili
Professor
IEEE Fellow, ACM Distinguished Scientist, Rutgers-NB Chancellor's Scholar, NSF Career Award, ONR Young Investigator Award, DARPA Young Faculty Award
Research Interests: Wireless networking, underwater communication, mobile edge computing, Internet of Things, autonomy.

Lawrence Rabiner
Distinguished Professor Emeritus
IEEE Fellow, National Academy of Engineering, National Academy of Sciences, IEEE Kilby Medal, IEEE Piore Award, IEEE Millennium Medal
Research Interests: Digital signal processing, digital signal processing, speech recognition, speech analysis, speaker recognition, and multimedia.

Shriram Ramanathan
Professor & Rodkin Weintraub Chair in Engineering
NSF Career Award, DoD Young Investigator Award
Research Interests: Oxide quantum materials and devices; electromagnetic materials; brain-inspired electronics

Dipankar Raychaudhuri
Distinguished Professor & Director of WINLAB
IEEE Fellow
Research Interests: Future network architectures and protocols, wireless systems and technology, dynamic spectrum access and cognitive radio, experimental prototyping and network research testbeds.

Peddapullaiah Sannuti
Professor Emeritus
IEEE Fellow
Research Interests: Simultaneous internal and external stabilization of linear time-invariant systems in the presence of constraints.

Anand D. Sarwate
Associate Professor
NSF Career Award, A. Walter Tyson Award, Rutgers Board of Trustees Research Fellowship for Scholarly Excellence
Research Interests: Machine learning, distributed systems and optimization with a focus on privacy and statistical methods.

Sumati Sehajpal
Assistant Teaching Professor
Research Interests: Electrical circuit theory and analysis, Class E and Class G RF power amplifiers, modern state-space based approach used to both model and analyze electronic circuits.

Deborah Silver
Professor & Executive Director PSM Program
Research Interests: Scientific visualization, computer graphics.

Emina Soljanin
Professor
IEEE Fellow and Distinguished Lecturer
Research Interests: Efficient, reliable, and secure storage and transmission networks, coding, information, and queuing theory.

Predrag Spasojevic
Associate Professor
Research Interests: Communication and information theory, signal processing and representation, cellular and wireless Lan systems, adhoc and sensor networks.

Maria Striki
Assistant Teaching Professor
Research Interests: Analysis/design/optimization of data algorithms, statistical analysis, mathematical modeling, big data, data analytics, social networks, information systems, cybernetics, wireless-mobile-ad-hoc-cellular networks, (secure) routing, mobile computing, network-computer security.

Matteo Turilli
Assistant Research Professor
Research Interests: Parallel and distributed Computing, software design for distributed infrastructures, computer science computer ethics.

Wade Trappe
Associate Dean for Academic Programs, Professor & Associate Director of WINLAB
IEEE Fellow
Research Interests: Multimedia security, wireless security, wireless networking and cryptography.

Sheng Wei
Assistant Professor
NSF Career Award
Research Interests: Hardware and system security, Multimedia systems.

Chung-Tse (Michael) Wu
Associate Professor and Associate Undergraduate Director
NSF Career Award, DARPA Young Faculty Award
Research Interests: Microwave and millimeter wave components and circuits, passive and active antennas and arrays, electromagnetic metamaterials, wireless sensors and RF systems.

Guosong Yang
Assistant Professor
Research Interests: Switched and hybrid systems, networked 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.

Bo Yuan
Assistant Professor
Research Interests: Algorithm and hardware co-design, machine learning, signal processing systems, embedded and IoT systems.

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

Jian Zhao
Professor Emeritus
IEEE Fellow, NSF Initiation Award
Research Interests: Silicon Carbide (SiC) semiconductor devices, SiC JFETs, BJTs, MOSFETS, GTOs, high efficiency smart power integrated circuits, SiC sensors, UV and EUV detectors, SiC inverters/converters.

Michael Caggiano
Professor Emeritus
Expertise: Electrical Packaging, microwave packaging, analog circuit design, digital circuit design, digital circuit and logic design.

Richard Frenkiel
Part-time Lecturer
National Medal of Technology, Alexander Graham Bell Medal, National Academy of Engineering, National Academy of Inventors, Draper Prize
Expertise: Cellular Systems, Wireless Networks.

Phil Southard
Part-time Lecturer
L3Harris Technologies
Expertise: Field programmable gate arrays (FPGA's), computer hardware, digital design, programmable logic, application specific integrated circuits.

studentnews

ECE senior Justine Catli receives the Champion of Teaching and Learning Award

J. Catli

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 IEEE, 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 ECE 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.

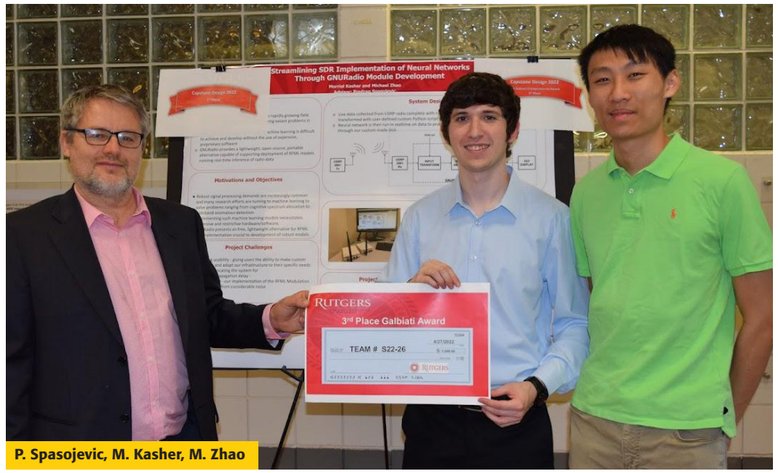
IEEE Robotics SKAR Robot wins VEXU competition

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 VEX Robotics Championship, Rutgers placed 10th out of 36 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 Micromouse 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

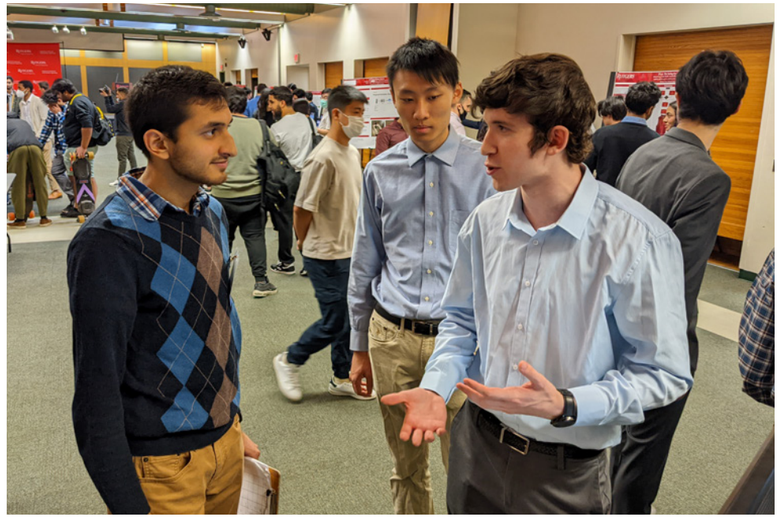


P. Spasojevic, M. Kasher, M. Zhao

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 GNURadio" to compete in the US Airforce Research Laboratory (AFRL) Beyond 5G SDR 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 Wideband Anomaly Detection, Radiometric Fingerprinting, and Modulation Recognition, problems of increasing importance due to extreme proliferation of wireless devices. In their work, Michael and Morriel designed and demonstrated a working prototype that can take arbitrary RFML Neural Networks algorithms and signaling formats directly from Software Defined Radios and execute advanced signal processing algorithms in an on-line manner, while the data is received. Their solution is revolutionary in the design and difficulty of achieving and will open many new applications in the field of RFML with very significant implications for current and future wireless systems.

The project was also awarded first place in the ECE Capstone Design competition and third place in the Galbiati Entrepreneurial competition, which recognized those capstone projects with immediate potential for commercialization.



studentnews

Meet an ECE Student

Mazen Abdalla

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 continue 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 now I am beginning my journey as a graduate student.

M. Addalla

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 create connections that are invaluable for obtaining internships, jobs, and research opportunities. Getting involved with organizations also allows students to apply the skills learned from courses to real-world applications. There are plenty of organizations to choose 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 gasoline-powered powertrain 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 custom-designed circuit boards with 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 **Javanmard,** as well as electives like Analog Electronics with Professor **Najafizadeh.** 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 Marotta 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 would be 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 WINLAB and INSPIRE labs. One research topic of interest is to continue my work with low-cost, low-power microcontrollers and implement signal processing techniques on hardware with limited computational power. I plan on applying to the Ph.D. 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.

Anisha Barde

Hello! My name is Anisha, and I am a senior majoring in Electrical and Computer Engineering, specifically on the Computer Engineering track. My involvement at Rutgers includes my participation as a Scholar in the Engineering Honors Academy, President of the Rutgers Engineering Honors Council (REHC), Captain of the Women's Ultimate Frisbee Team (Rutgers Nightshade), and Member of Omega Phi Alpha (National Service Sorority).

A. Barde

Currently, I serve as the President of REHC, supporting and overseeing Honors engineering communities such as the Honors Academy, Honors College, and Honor Societies through educational, professional, and social opportunities for students. I previously served as the External Vice President/Engineering Governing Council Representative, First Year Mentorship Program Co-Chair, and Freshman Representative, all roles that have shaped me into a more open-minded and passionate leader. I also have the opportunity to lead others as one of the Captains for Rutgers Nightshade, the women's ultimate frisbee team. Serving as a captain includes guiding and motivating players, leading practices and tournaments, being a liaison between the coaches and players, and communicating with external teams/organizations. Ultimate frisbee is a sport that I have been passionate about since sophomore year of high school. Since joining, I have met hundreds of players throughout the East Coast during school tournaments and summer leagues. I am grateful for the role as co-captain, as I am able to help the team grow and challenge one another to improve as players. The Ultimate community is full of positive energy and a high level of diligence. In Ultimate Frisbee the spirit of the game is greatly emphasized, especially because all games are self-officiated, even at the national level, which is an interesting fact.

With regards to academic experiences, the Department of Electrical and Computer Engineering reinforced my interest in working with hardware and software. Although I tinkered with electronic circuits prior to attending college, the first time I was introduced to entire projects was in Dr. **Hana Godrich**'s Principles of Electrical Engineering I course. Despite needing to take the course online due to COVID, I was able to obtain the hands-on experience that I was looking forward to since I selected my major. The course was organized in a way that allowed me to learn basic terminology and analysis methods, test my knowledge in hands-on labs, and enrich my knowledge with topics that interested me personally. Additionally, Dr. Godrich went above and beyond in assisting students both inside and outside of lecture time to clarify and explain the material. After the course, I was also fortunate enough to learn about the professional journey of Dr. Godrich. Hearing about her success and that of other female engineering professors/students further inspired me to continue my studies as a woman in ECE.

Industry experience has been just as valuable as my academic pursuits. My courses helped me build foundational technical knowledge and skills, while my professional projects provided me with real-world situations to apply them to. The summer after my sophomore year, I worked at the medical technology corporation Stryker, as a Software Design Engineering Intern within the Research and Development Department of the Instruments Division. I was exposed to embedded software and graphical user interface development while working with a mechanical engineering intern and an electrical engineering intern on the design and build of a demo unit of a medical technology sterilizer. I experienced the full software development life cycle, starting with gathering requirements from stakeholders and ending with establishing maintenance needs that will be considered after the end of my internship. Throughout the internship, I met various types of seasoned engineers with backgrounds in different technical and non-technical fields, all of whom shared their experiences and skills to help me excel with my project. I also had the chance to present at a software forum and to different teams within the division. The marketing unit is still being used for tradeshows and conferences, and knowing that engineering projects (even led by interns) can make an impact on any industry is incredibly rewarding. During the following summer, I worked as an Amazon Software Development Engineer Intern within the Robotics AI Department of their Operations organization. This internship introduced me to the field of machine learning (ML), one that has recently become increasingly popular. Amazon also provided me with an abundance of training and resources, including a supportive team, to understand new ML concepts and internal Amazon tools. For my project, I designed and developed a semi-supervised learning tool with the purpose of reducing human annotation efforts and costs. This tool will soon be used to make processes more efficient for the robots in Amazon fulfillment centers. Once again, it felt rewarding seeing the role that engineers, including interns, play in accelerating work in the real world.

Morriel Kasher

I am a first-year Ph.D. student in the Rutgers University ECE department, specializing in Communications Engineering. I just completed my B.S. degree from Rutgers last May, also in Electrical and Computer Engineering. I first became drawn to Rutgers and introduced to research through the NJ Governor's School of Engineering & Technology in Summer 2018, in which I stayed at Rutgers for a month and wrote my first research paper. Since then, I have developed a passion for research work that has guided my undergraduate focus and laid the foundation for my future graduate studies.

M. Kasher

In Fall 2019 as a first-semester undergraduate student I began working closely with Professor **Predrag Spasojevic** in his Wireless Communications Lab. With his guidance I spent the next three years developing research skills in a wide variety of areas, ultimately publishing four technical papers in first-tier conferences covering topics that include ultrasonic acoustics, machine learning, and optimization of wireless communication systems. Professor **Spasojevic** was instrumental in my growth as a student and researcher, providing me with countless resources along the way to learn new research capabilities and offering many opportunities for personal growth.

In Summer 2020 I was entrusted by Professor Spasojevic as the lead researcher on a major Rutgers project funded by the U.S. Office of Naval Research, collaborating with defense industry researchers to provide both a rigorous theoretical mathematical background to the work while also utilizing practical lab equipment to design and implement experiments. This is an ongoing effort which I plan to continue to support throughout my graduate studies.

Throughout my undergraduate career I also spent several summers working in industry and learning to apply those engineering skills to further my own research. These include working in digital design engineering at L3Harris, wireless systems and networks at Peraton Labs, radio frequency systems at Qualcomm, and network sciences at the Army Research Lab (where I won the distinction of #1 overall undergraduate intern across all research competencies).

In Spring 2022 I completed my Bachelor of Science in just three years and as one of three ECE seniors with a perfect 4.00 GPA. In the process I earned the Rutgers Academic Excellence award and graduated with the Honors College distinction (given to students who were accepted into the Honors College and completed the Honors program of coursework, community service, and senior capstone of whom there are only ≈60 in the School of Engineering each year). During this time, I was also awarded the New Brunswick Chancellor-Provost's Research Excellence Award, granted to only three Rutgers undergraduate students each year who demonstrate measurable evidence of academic enrichment outside of the classroom utilizing new methods of discovery and critical thinking skills and whose research was published, presented and recognized as influencing the Rutgers or outside community. Throughout my senior year I also worked as Resident Assistant, supervising 60+ on-campus first-year undergraduate engineering students by providing them with guidance and mentorship.

CONTINUED ▸

Meet an ECE Student (continued)

In my final semester as an undergraduate at Rutgers my senior ECE capstone project, also supervised by Professor Spasojevic and completed in collaboration with senior Michael Zhao, was awarded First Place overall out of over 50 teams in addition to winning the $1000 third place Galbiati 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 over 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 was also 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 as 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 a senior in the ECE department with a Major in Computer Engineering and a minor in Computer Science.

What drew me the most about my major and computer engineering in general was the problem solving and analytical skills involved. To be an engineer means spending every second working on creating solutions and collaborating with others to share a large 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.

S. Rohilla

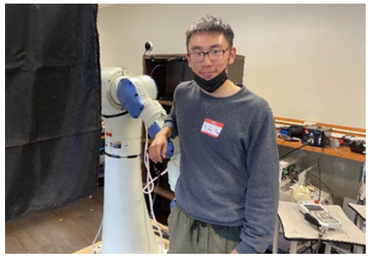
I entered Rutgers in both the School of Engineering and as a member of the Honors Academy of Engineering. Through this program I found a group of like-minded people with whom I created a community through some of our most difficult changes. I also looked for a community outside of my programs and in the larger engineering community. Through student-led organizations like SWE (Society of Women Engineers) and RIEEE (Rutgers Institute of Electrical and Electronics Engineers) I got the opportunity to meet amazing upperclassmen that I could rely on for help and support. Academically I found myself challenged as my professors and peers pushed me in a way that I have never been before. The highlight of my year was when my team and I built a self-warming thermos as our final project for our Intro to Engineering class. I worked with the ARDUINO UNO and a collection of resistors to make a heating mechanism that could easily be installed in a metal bottle. That year, I also became the Social Media Manager of RIEEE and worked to organize events as a part of the PR Committee, an experience that would prepare me for the opportunities to come.

Sophomore year brought a whole host of new opportunities that I used to grow and develop as a person. My sophomore year was completely online and I found myself struggling with online classes and at the time it was difficult to rely on the community I had spent the last year building. This year was the first I needed to be truly independent and that experience pushed me to be more. I spent my time focusing on my classes, applying to internships, and finding a way to grow into the person that I want to be. I also worked as an Operations Intern at CrossTower a Bitcoin and Cryptocurrency exchange. This is where I took my first leap into the unknown. I worked with Postgres databases and REST API's to collect a vast amount of data and store it for further analysis. It was an experience that I would never forget and it showed me how far I could go as I followed my passions.

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 Professor Narayana in the Computer Science department. There I broke down code into assembly and compared different optimizations to understand what makes code better and 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 breath 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!

Rutgers Robotics Workshop 2022



The annual Rutgers Robotics 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), PI: **Kristin Dana**, ECE. SOCRATES is a cross-disciplinary training program aimed at establishing methods for effective collaboration among researchers from computer science, psychology, and public-policy and planning with the goal of designing socially-cognizant robotic systems. SOCRATES core faculty include **Kristin Dana** (ECE), Clint Andrews (Bloustein), Kostas Bekris (CS), Jacob Feldman (Psychology), Jingang Yi (MAE), Pernille Hemmer (Psychology), Aaron Mazzeo (MAE), Hal Salzman (Bloustein), Matthew Stone (CS).

The Robotics Workshop is held for faculty, students, and industry representatives. Faculty and students from 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 robotics to the future of work and the social impacts of the technology. The workshop wrapped up with a tour of the CS Robotics Research Lab for robot demonstrations.

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

WINLAB

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

J. Ortiz

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 $52 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 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. Understanding complex streetscapes in real-time require progress in fundamental engineering knowledge and enable exciting opportunities for deploying public interest technology: A smart streetscape of the future can instantly sense human behavior and guide disabled pedestrians, collect refuse, control pests, amplify emergency services, and protect people against environmental and health threats. In addition, it can address unmet needs in road and public safety, traffic efficiency, assistive technologies, outdoor work, and hyper-local environmental sensing.

The Rutgers team, led by site PI Prof. **Jorge Ortiz** of Electrical and Computer Engineering, will work on two main 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 WiEdge 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 crowd-based modeling and real-time traffic engineering for improved road safety, respectively. Rutgers' funding share is ~$2.2M.

2022 ECE Capstone Expo Award Winners

H. Godrich

Congratulation to this year's senior students who participated in the ECE capstone program and their advisers for a job well done!

The Capstone Expo was back in person this year and was held in the BSC. Capstone Expo Day demonstrated our students' exceptional capabilities.

A panel of judges joint us to identify the top ten projects, recognized 3 special awards (best in research, best in impact, best in commercialization) and award three Galbiati Entrepreneurial awards (total of $5,000). Our judges were very impressed with the quality of the projects and commended our students' capabilities and enthusiasm. The capstone teams did a fantastic job and made us all proud!

Before we announce the winning projects, I would like to thank everyone involved with this year's capstone program:

Many advisers undertook students' guidance this year. We would like to thank the ECE faculty who supported the program and advisers inside and outside of Rutgers who contributed their time and effort to help our students. Their efforts and support are key to the success of our capstone program and the students' learning experience.

We would like to acknowledge the support of the following industry sponsors:

- **Don Bachman,** Head of Strategy, Russelectric, a Siemens Business, and board member at 7x24 Exchange Metro New York Chapter;
- **Joe Rambala,** President, Electronic Warfare, Space & Airborne Systems, L3Harris;
- **BlackRock;**
- **Galbiati family.**

Many thanks to our panel of judges for their effort and time taken to support and celebrate our students' achievements. The panel included: Minning Zhu (Rutgers ECE), Soyab Khatumbra (L3Harris), Alexander Loh (BAE Systems), Adam Novak (General Dynamics Mission Systems), Yaniv Myszkin (Audible), Don Bachman (Siemens), Milap Shah (Microsoft), Niral Shah (Apple), Will Cheng, Sabian Corrette (Rutgers), Pragati Sharma (Rutgers), Darshan Singh (Intel), Aditi Satish (Rutgers), Umama Ahmed (L3Harris), Roshni Shah (American Express), Scott Yappen (Foley Power Systems), Swetha Angara (TD Securities), Xuemeng Li (Hunter College), Marina Eskander (Concord Engineering Group), James Bibby (Schindler Elevator Corp), Steven Wu (Nuro Inc), Bhargav Tarpara (Capable Health), Parth Kanani (Empire Circuits), Anish Seth (Rutgers), Pavan Desai (Johnson & Johnson), Tim Petersen (L3Harris), Frank Hoffman (Lockheed Martin), Akash Nayak (Fidelity Investments)

Their expertise, care, and insights where priceless in making the hard decisions as for the top projects.

A very warm thank you to our wonderful ECE staff: Arletta Hoscilowicz, Pamela Heinold, John Scafidi, Kevin Wine, and Christopher Reid. As always, their commitment and hard work made this event and others happen. Many thanks to Demetrios Lambropoulos who worked tirelessly to support the capstone program around the year and to all the undergraduate students who helps with capstone expo: Aayushi Kasera, Shreya Pandey, Ritika Rao, Anisha Barde, Anurag Vattipalli, Roshan Patel, Sreetulasi Mannepalli, Aaron Soner, Adam D'Souza, Rohan Rahalkar, Emma Heinold, Harvey Zhang and Arthur Patlewicz.

After hours of diligent work, here are the awards granted by our panel of judges:

FIRST PLACE
(awarded $100 per student, sponsored by 7x24 exchange, Metro NY chapter)
Project S22-26: Streamlining SDR Implementation of Neural Networks Through GNURadio Module Development
Team members: Morriel Kasher and Michael Zhao
Adviser: Dr. Predrag Spasojevic

SECOND PLACE
(awarded $75 per student, sponsored by L3Harris)
Project S22-35: Portable Electronic System for a Microfluidic Impedance Cytometer
Team members: Darwin Arias-Lizano, Talya Erblich, Emily Gruber, and Nicolas Rubert
Adviser: Dr. Umer Hassan

THIRD PLACE
(awarded $50 per student, sponsored by BlackRock)
Project S22-34: Internal Combustion Engine Heat Recovery & Conversion
Team members: Christina McLaughlin, Bryan Guaricela, and Edward Avkhukov
Adviser: Dr. Michael Caggiano

FOURTH PLACE (awarded $25 per student)
Project S22-16: iCARE
Team members: Nitya Sathish, Sahreen Kaur, Kyle Boyce, Seyma Guleryuz, and Angelica Corella Castro
Adviser: Dr. Hana Godrich

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

SIXTH PLACE (awarded $25 per student)

Project S22-40: Autonomous Ocean Cleanup
Team members: Esteban Salazar, Vaishnavi Gandhi, Ranea Alghawi, Amber Guthrie, and Anthony Apostolides
Adviser: Dr. Dario Pompili

Project S22-07: POWER MOVE
Team members: Tint Aung, Jason Nitti, and Vatsal Patel
Advisers: Dr. Hana Godrich

EIGHTH PLACE (awarded $25 per student)
Project S22-06: Monitoring Bus Capacity
Team members: Sowmya Balakrishnan, Carla Jaraplasan, Sachin Mathew, and Angela Shaw
Adviser: Dr. Hana Godrich

NINTH PLACE (awarded $25 per student)
Project S22-31: Solar Powered Heliostat
Team members: Justin Serrano, Andrew Retana, Patrick Lahey, and David Whiteman
Adviser: Dr. John McGarvey and Dr. Sumati Sehajpal

TENTH PLACE (awarded $25 per student)
Project S22-09: Smart Car Control System based on EMG Signal
Team members: Tianyu Qin, Jiacheng Wang, Jiaxi Xu, and Zhiyun Qin
Advisers: Dr. Bo Yuan

Special Award Winners

BEST IN RESEARCH AWARD
(awarded $75 per student)
Project S22-28: Transcript Coding for Mental Health Research
Team members: Jack Bessen, Christian Brito, Mohammad Said Kharboutli, and William Yubeaton
Adviser: Dr. Anand Sarwate

BEST IN IMPACT AWARD
(awarded $75 per student)
Project S22-35: Portable Electronic System for a Microfluidic Impedance Cytometer
Team members: Darwin Arias-Lizano, Talya Erblich, Emily Gruber, 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, Ranea Alghawi, Amber Guthrie, and Anthony Apostolides
Adviser: Dr. Dario Pompili

The Galbiati Entrepreneurial Award Winners

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

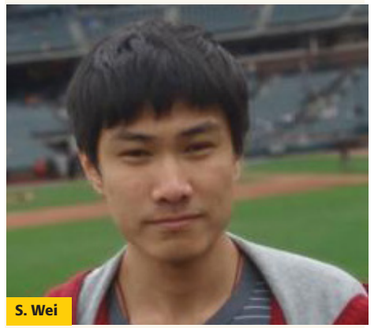
SECOND PLACE (awarded with $1,500)
Project S22-09: Smart Car Control System based on EMG Signal
Team members: Tianyu Qin, Jiacheng Wang, Jiaxi Xu, and Zhiyun Qin
Advisers: Dr. Bo Yuan

THIRD PLACE (awarded with $1,000)
Project S22-26: Streamlining SDR Implementation of Neural Networks Through GNURadio Module Development
Team members: Morriel Kasher and Michael Zhao
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


S. Wei

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 ICCD 2016 and Best Paper Nominations at IEEE HOST 2018, ACM MM 2016, and DAC 2014.

ECE Welcomes New Faculty Members


S. Jalali


S. Ramanathan


S. Haghani


D. Lombana


G. Yang

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 UDC 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, microgrids, home 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 speckle noise and snapshot 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.S.c degree in Industrial Automation from the National University of Colombia in 2012. 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 nterested 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 Professor and Rodkin-Weintraub 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.

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.

Retirements in ECE

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 semiconductors, 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, monolithically integrated RF tuning devices for smart sensors, 3D electrodes enhanced LED and solar cells, as well as thin film transistors for biosensors and micro-inverters of self-powered wearable systems. Prof. Lu has published over 160 refereed journal papers and holds 27 U.S patents awards. Since 2014, he has served as Chair of the International Advisory Board of the International Workshop of ZnO and Related Materials (IWZnO).

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 30 Ph.D. students (27 from ECE and 3 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-TODAY All-USA 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's Microelectronics Research Laboratory (MERL) over 20 years. Under his leadership, MERL hosted ~30 faculty users from 7 departments and centers. 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 Sussman Teaching Award, Research Fellowship award, Scholar-Teacher Award, and 2019- SOE "Faculty of Year" award.

Distinguished Professor **Roy Yates** retired from Rutgers 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: A Friendly Introduction for Electrical and Computer Engineers". Prof. Yates 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 2010, his research transitioned to Age of Information (AoI) methods for the analysis of low-latency status updating systems. In 2021-22, Prof. Yates served as the Undergraduate Director. "I was surprised 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 AoI research with WINLAB students and faculty.

Prof. **Hana Godrich**, who served as the Undergraduate Director of the ECE department at Rutgers University from 2016 to 2019, entered her retirement in June 2022. Prof. Godrich 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. Godrich has reached its record-high student numbers of 216 in 2022. Prof. Godrich provided valuable advice to students through ECE Capstone design program and also as the Undergraduate Director. She has contributed significantly to shaping up the growing undergraduate program in ECE.

Prof. Godrich received the B.Sc. degree from the Technion–Israel Institute of Technology in 1987, the M.Sc. degree from Ben-Gurion University in 1993, 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 Scitex Inc. (currently H-P). 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.


Y. Lu


R. Yates


H. Godrich

Smartphone app to examine effects of cannabis use on driving behavior


Y. Chen

ECE and WINLAB Professor **Yingying Chen** is the recipient of an award from the National Institute of Health R21 for the project "Smartphone App to Examine Effects of Cannabis Use on Driving Behavior." This is a two-year collaborative project with Robert Wood Johnson Medical School.

Driving under the influence of cannabis has increased car crash risk by near doubles. A recent study found that people drove while "very high" when they took medical cannabis within 2 hours. The combined use of some primary psychoactive components (e.g., delta-9-tetra-hydrocannabinol and cannabidiol) further increases the risk of driving impairment. In this project, we aim to investigate this urgent health issue and reduce the risk of dangerous driving behaviors caused by cannabis. We develop an innovative driving behavior detection and identification system, which can be installed in smartphones to detect aberrant driving behavior (e.g., sudden braking, swerving) among medical cannabis patients. Specifically, our research aims to (1) determine the extent to which 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.

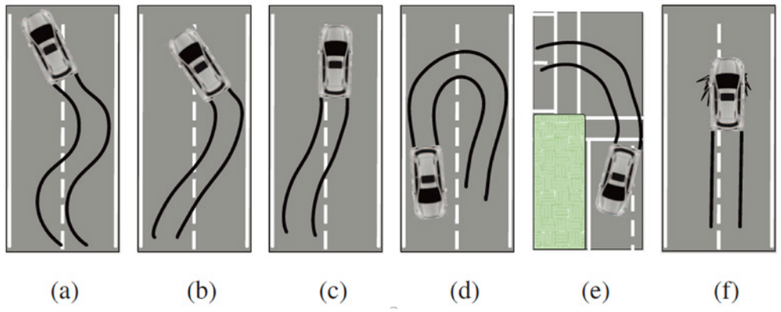


Fig. 1: Six types of abnormal driving behaviors: (a) Weaving, (b) Swerving, (c) Sideslipping, (d) Fast U-turn, (e) Turning with a wide radius, (f) Sudden braking.

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. Specificity, 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.

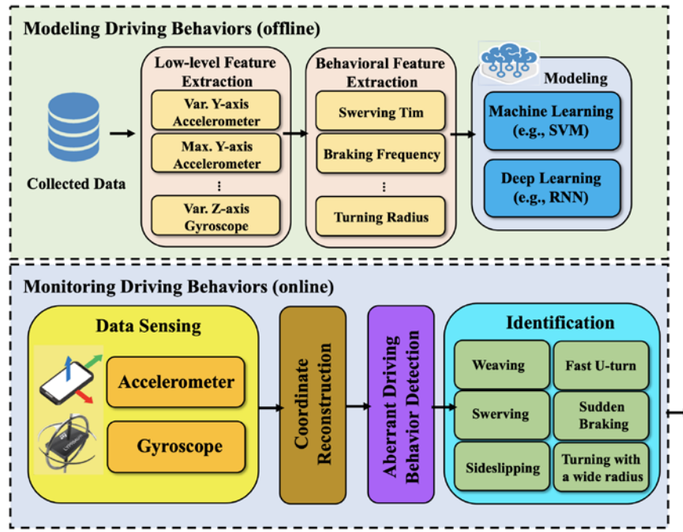


Fig. 2: System architecture

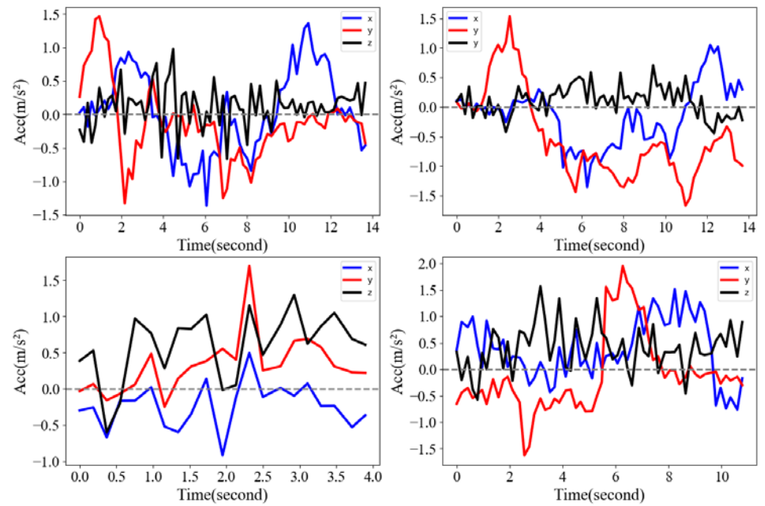


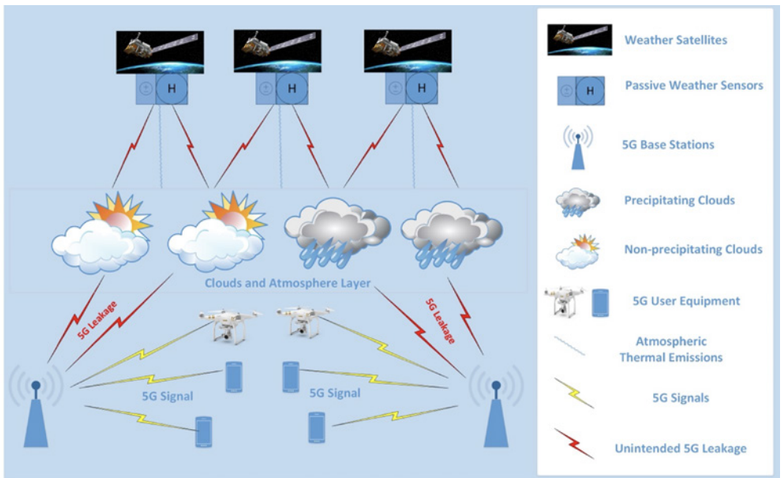
Illustration of the accelerometer data for four types of driving behaviors: swerving (top left), U-turn (top right), sideslipping (bottom left), and turning with a wide radius (bottom right).

Will 5G Networks in the Future make Weather Forecasts Inaccurate?


N. Mandayam

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, speculation 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 band n258 has generated a lot of anxiety and concern in the meteorological data forecasting community including the National Oceanic and Atmospheric Administration (NOAA). Unlike traditional spectrum coexistence problems, the issue here stems from the leakage of n258 band transmissions impacting the observations of passive sensors (e.g., AMSU-A) operating at 23.8 GHz on weather satellites used to detect the amount of water vapor in the atmosphere, which in turn affects weather forecasting and predictions. The controversy and speculation generated in this unique "spectrum coexistence problem" is exacerbated by the diversity of the expertise between core 5G telecommunications and atmospheric sciences and weather prediction. 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 **Narayan Mandayam** (PI) along with co-PIs **Chung-Tse 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 Spectrum and Wireless Innovation enabled by Future Technologies (SWIFT) program for the project "Enabling Spectrum Coexistence of 5G mmWave and Passive Weather Sensing."



This three-year project funded at $750,000 addresses this emerging topic of increasing interest, namely the opening up of newer and higher spectrum for communication uses and the unintended effects on passive devices and legacy services not directly related to communications such as weather sensors and prediction. The team has for the first time directly modeled the impact of 5G leakage on the accuracy of data assimilation-based weather prediction algorithms by using a first order propagation model to characterize the effect of the leakage signal on the brightness temperature (atmospheric radiance) and the induced noise temperature at the receiving antenna of the passive sensor (radiometer) on the weather observation satellite. The team has then quantified the resulting inaccuracies when using the Weather Research and Forecasting Data Assimilation model (WRFDA) to predict temperature and rainfall. For example, the impact of 5G leakage of -20dBW to -15dBW on the well-known Super Tuesday Tornado Outbreak (the 2nd worst weather disaster in U.S. history in the month of February) data set, affects the meteorological forecasting up to 0.9 mm in precipitation and 1.3 °C in 2m-temperature. The other major goals of the project are: (i) To design improved models for characterizing the 5G impact on radiance using both simulation and analysis based approaches; (ii) To map the spatial density of 5G transmitters, and the elevation and directionality of transmissions to geospatial sensitivity to leakage; (iii) To devise novel cross-layer approaches for mitigating the 5G impact on 23.8 GHz using antennas/circuit (filtenna) design and direct modulation based beam steering that is integrated with cooperative MAC and networking strategies along with power control. (iv) To develop improved weather prediction algorithms that are designed to be robust to 5G leakage; and (v) To experiment on the PAWR COSMOS testbed to study adjacent channel leakage from 5G transmissions. This pioneering effort in passive spectrum coexistence has laid the ground-work for more detailed studies of coexistence between active 5G transmissions and passive sensors in other mmWave bands that emerge as the push for using newer swaths of spectrum continues to support the increasing demand for data as well as trending space technology for remote 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 Timely 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 NextG — 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 delay interactivity (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 ML 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 continuously gather new data that must be processed, aggregated, and communicated to the MEC in a timely way; mobile users have heterogenous privacy preferences that require privacy-sensitive use of the MEC; 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 ML 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 timeliness metrics, real-time inference methods and system operation are optimized to balance mobile computation 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.





Profs. Roy Yates, Waheed Bajwa, Dipankar Raychaudhuri, and Anand Sarwate

Developing Networked Neuroprosthesis for Spinal Cord Injuries

L. Najafizadeh

ECE Associate Professor **Laleh Najafizadeh** is the recipient of a new NIH award for a project entitled "Augmenting Implanted Neuroprosthetics with Targeted Health Monitoring for Spinal Cord Injury - the LIFELINE" through the National Institute of Biomedical Imaging and Bioengineering. This is a 4-year $2.6 million grant to Case Western Reserve University (Kevin Kilgore, PI).

The project targets the development of an implanted health monitoring device, the "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, biopotential 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 unanticipated. 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 modular 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.

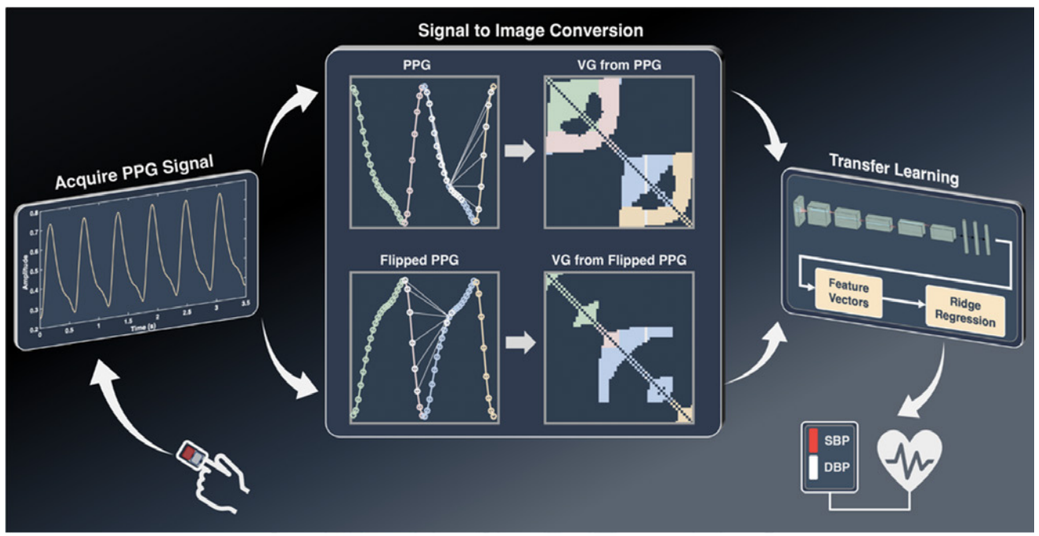


Figure 1. Illustration of the process of estimating blood pressure from short segments of PPG using visibility graph and transfer learning.

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

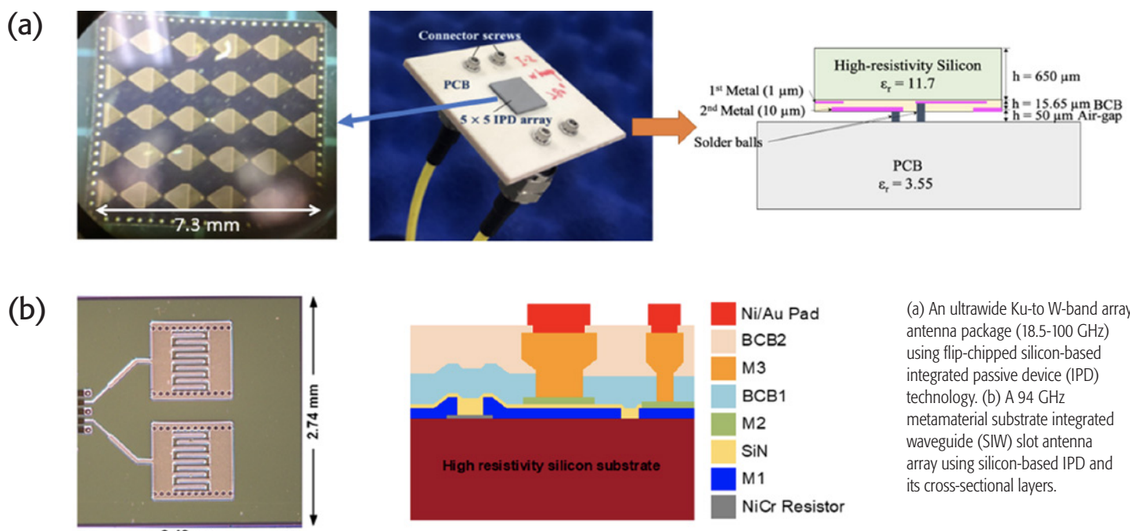
Chung-Tse (Michael) Wu's Microwave Research Lab focuses on microwave and millimeter wave components and microwave monolithic integrated circuit (MMIC) design. His lab explores novel microwave and RF technologies to make our lives better.

It is expected that next-generation wireless platforms, i.e., B5G 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. In addition, it is usually preferrable to have the antenna element spacing equal to half-wavelength in order to avoid so-called "grating lobes" when conducting beam-steering away from the broadside direction of antenna array. 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 adopting 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 benzocyclobutene (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 × 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 (SIW) 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.



(a) An ultrawide Ku-to W-band array antenna package (18.5-100 GHz) using flip-chipped silicon-based integrated passive device (IPD) technology. (b) A 94 GHz metamaterial substrate integrated waveguide (SIW) slot antenna array using silicon-based IPD and its cross-sectional layers.

Prof. Dario Pompili and his former PhD student Tuyen Tran won IEEE Vehicular Technology Society 2022 Newbauer Award

Prof. **Dario Pompili** and **Tuyen X. Tran** (Rutgers Ph.D. 2018) have won the IEEE Vehicular Technology Society 2022 Jack Neubauer Memorial Award recognizing the best systems paper published in the IEEE Transactions on Vehicular Technology for their paper entitled "Joint Task Offloading and Resource Allocation for Multi-Server Mobile-Edge Computing Networks". The award has been presented at the VTC2022-Fall conference in London, September 26-29, 2022. The award consists of a certificate and $1,000 divided equally among the authors.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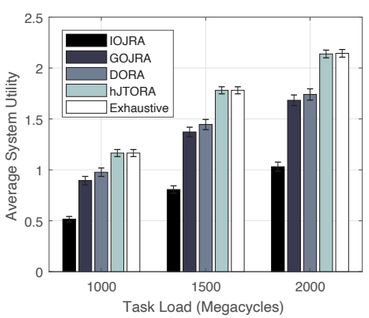
September 2022
Date

Mobile-Edge Computing (MEC) is an emerging paradigm that provides a capillary distribution of cloud computing capabilities to the edge of the wireless access network, enabling rich 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.



Average system utility versus task load.

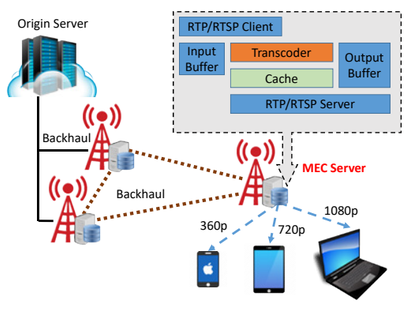
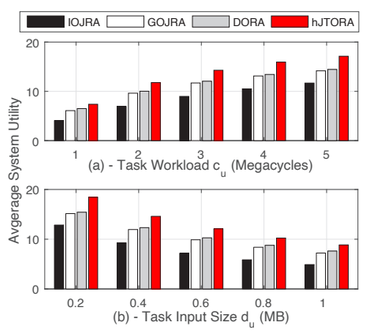


Illustration of collaborative video caching and processing framework deployed on MEC network. The cache server implemented on MEC server acts as both RTPRTSP client and server.



Average system utility versus task load and input size.

Professor Chen Named National Academy of Inventors Fellow


Y. Chen

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.

"I am 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 cyber security also have the potential to be patented and licensed to industry.

"My most significant invention is 'Device-free Activity Identification Using Fine-grained Wi-Fi Signatures,' Chen explains. "It addresses a fast-growing area in need of performing important location-oriented daily activity monitoring for elder care, well-being management, vital signs monitoring, and smart homes."

As the first invention to build a Wi-Fi enabled contactless activity identification and tracking framework, it has led to breakthroughs in continuous wellbeing monitoring, activity recognition, and gesture identification without needing additional hardware, wearables, or cameras. "The related patent has been licensed to Aerial Technologies – the pioneer in wireless motion analytics powered by artificial intelligence – and commercialized 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 Bullrun Capital, 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

A noted thought-leader and Institute of Electrical and Electronics Engineers (IEEE) fellow, Chen has published three books, four book chapters, and more than 200 journal and conference articles.

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 NIA Fellows Class of 2021 were officially inducted at the Fellows Induction Ceremony at the 11th Annual Meeting of the NIA in Phoenix, Arizona in June 2022.

Waheed Bajwa Promoted to Professor


W. Bajwa

Waheed Bajwa has been promoted to Professor in the Department of Electrical and Computer Engineering in the School of Engineering. Waheed also won the the Presidential Outstanding Faculty Award and serves as the ECE Graduate Director.

Dario Pompili Promoted to Professor


D. Pompili

Dario Pompili has been promoted to Professor in the Department of Electrical and Computing Engineering in the School of Engineering, effective July 1, 2019. As Dario will continue to build his career at Rutgers, our warmest thanks go for what he does at Rutgers and we look forward to his continuous excellent contributions to the ECE department and the School of Engineering.

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


W. Bajwa, J. Holloway

School of Engineering faculty **Waheed Bajwa** and **Chung-Tse Michael Wu** were among the recipients of Rutgers' 2021-2021 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 awards ceremony. "Thank you for your dedication to excellence and thank you for your commitment to your students. Thank you for your exemplary research and 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 outstanding portfolios reflect outstanding research, scholarship, or creative work, as well as outstanding contributions to teaching and service to the Rutgers community and beyond.

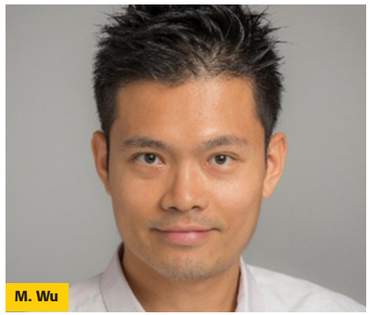
"Rutgers is home to an amazing group of faculty, so to have been selected among this group as one of the five awardees this year for the Presidential Outstanding Faculty Scholar Award is quite a surreal and humbling feeling for both me and my family. While the award is a confirmation of the fact that 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 won 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 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 electromagnetics," said Prof. Wu.

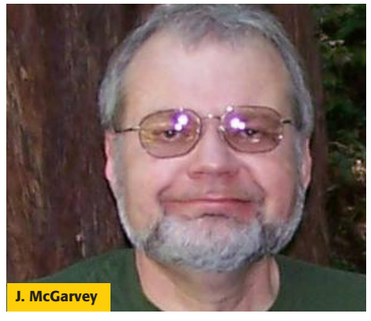
"Moreover, I feel fortunate that we have brilliant, capable students and researchers on our team who work tirelessly to deliver their best research outcomes. This award is a wonderful recognition of the research carried out by our entire group."

Chung-Tse Michael Wu Promoted to Associate Professor with Tenure


M. Wu

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!

John McGarvey promoted to Associate Teaching Professor


J. McGarvey

The ECE Department is pleased to announce that **John McGarvey** has been promoted to the non-tenure track rank of Associate Teaching Professor in the School of Engineering, effective July 1, 2022. As John will continue to build his career at Rutgers, we look forward to his continuous excellent contributions to the ECE department and the School of Engineering.


A. Ashok

Ashwin Ashok is an Associate Professor in the Dept. of Computer Science at Georgia State University (GSU) and directs the Mobile and Robotic Systems through Experiential research lab (MORSE Studio). His research group focuses on emerging technologies and spans work across communications and networking, environmental systems, sensors and robotic systems, and mobile computing. He 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 P1920.2 (Vehicle to Vehicle Communications for Unmanned Aircraft Systems) standard working group committee. He is the recipient of the NSF CAREER award in 2022, GSU's 2021 University Outstanding Faculty for Undergraduate Research and 2022 College of Arts and Science Outstanding Undergraduate Mentoring awards.

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 great deal to my advisors 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 Ivan Seskar 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 option for me to explore and that's how I took up optical wireless, particularly visible light communication (VLC) research. The rest has been history, with the field becoming more popular, many conferences and workshops dedicated to this topic and grant agencies 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 upon that. Today, I am thankful that I have been able to diversify 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 :)


C. Shi

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. **Yingying 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, ACSAC, ACM MobiCom, ACM MobiSys, ACM MobiHoc, ACM SenSys, and AAAI, and selective journals/magazines including IEEE J-ERM, IEEE S&P, IEEE TMC, ACM TIOT, ACM IMWUT. 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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Don Bachman
Head of Strategy
Russelectric,
A Siemens Business

Dorin Comaniciu
Senior Vice President
Artificial Intelligence and Digital Innovation
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Ed Cordero
Director
Protiviti

Anindo Dutta
Partner
Ernst & Young, Asia Pacific

David Famolari
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