UC San Diego
JACOBS SCHOOL OF ENGINEERING
Center for Wireless Communications

CWC NEWSLETTER

Spring 2022

Message from the Director

Hello CWC Community,

The last six months have been exciting and eventful at CWC.

In November 2021, CWC hosted its first ever hybrid event, the annual 5G and Beyond Forum. It was a pleasure seeing our industry colleagues, board members and faculty in person after almost two years, in addition to engaging remotely with speakers and attendees. The Forum was designed to discuss not only the progress and challenges associated with 5G, but to also debate and identify the key technology challenges and drivers for 6G. A planning session at the end of the Forum with our industry partners and Board members further identified key research problems that need to be addressed to take us towards a 6G world.

With further discussions and inputs from our Board members and faculty, we successfully defined a new round of projects for “Beyond 5G towards 6G” research, including circuits research in High Efficiency Power Amplifiers and 140 GHz Phased Arrays, and a flagship project “AI-Centric NextG Wireless”, which will explore developing a full stack, secure, wireless intelligence in pursuit of the NextG. We will also continue our research in robust GHz networking, hybrid V2X connectivity and computing for future mobility solutions, and the use of innovative sensing, connectivity, AI and machine vision for future connected health applications.

Recently we welcomed GlobalFoundries to the CWC family of companies and board members Peter Gammel and Anirban Bandyopadhyay. In addition, we are pleased to announce that Yves Beayens and Shariar Shahramian have joined the CWC board from Nokia Bell Labs.

Our Spring Newsletter includes stories about recent research, awards and accomplishments of CWC faculty, as well as stories highlighting collaborations between our member companies. We hope you will enjoy reading more about our activities.

Warmest regards,
Sujit Dey
Director
Center for Wireless Communications

CWC News and Events

This Technology Could Bring the Fastest Version of 5G to Your Home and Workplace

Consumers of today’s 5G cellphones may have experienced one of the following tradeoffs: impressive download speeds with extremely limited and spotty coverage, or widespread and reliable coverage with speeds that aren’t much faster than today’s 4G networks. Bharadia and his team, who are part of the UC San Diego Center for Wireless Communications, came up with a clever solution: split the one laser-like millimeter wave beam into multiple laser-like beams, and have each beam take a different path from the base station to the receiver. The idea is to improve the chances that at least one beam reaches the receiver when an obstacle is in the way.

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5G and Beyond Forum, Innovating 5G - Envisioning 6G

CWC at UC San Diego held its ninth annual "5G and Beyond Forum, Innovating 5G - Envisioning 6G”, November 18-19, 2021. Considering the current circumstances due to COVID-19, the Forum was organized as a hybrid combination of online and in-person events. The Forum discussed innovations and challenges in a variety of areas, including circuits, sensing, communication, and networking, as well as the role big data and AI will play in the next generations of networks and devices.The Forum also discussed how user experiences and new applications, like connected health, smart transportation, smart manufacturing and immersive multimedia, can inform and benefit from current 5G innovations and lead to future 6G advancements.

$6M IARPA Grant To Secure Wireless Data Communication

A team co-led by the University of California San Diego has been awarded a $6 million grant from the Intelligence Advanced Research Projects Activity (IARPA) to secure classified data transmissions using smart radio technology. The researchers will partner with JASR systems, a San Diego-based company focused on advanced remote sensing and navigation technologies. The grant is part of a new program by IARPA—dubbed Securing Compartmented Information with Smart Radio Systems (SCISRS)—that aims to protect sensitive data communications from being breached in government facilities and “in the wild.”

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AI-Powered Personalized Recommendation System Helps Lower Blood Pressure

Engineers at UC San Diego have developed an artificial intelligence platform that fuses data from disparate health and lifestyle sensors, wearables and apps into one site, using this combined data stream to paint a broader picture of a user’s health, and make personalized recommendations for them to improve a specified health outcome. In a clinical trial with hypertensive patients, those using the P3.AI platform saw their systolic and diastolic blood pressure decrease by 3.8 and 2.3 points respectively, compared to 0.3 and 0.9 points for subjects in the control group who did not receive personal recommendations.

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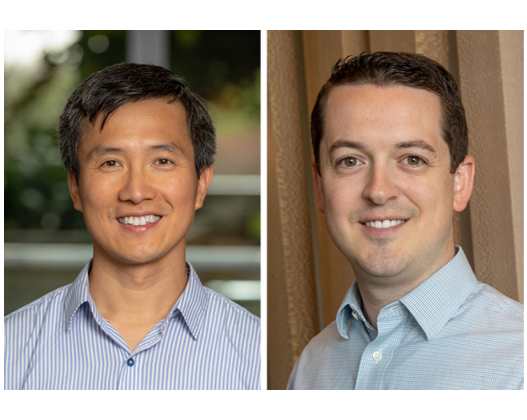
UCSD Joins Dartmouth in Industry-University Collaboration to Take Power Electronics to the Next Level



Smartphones that last for days on a single charge and are still thin, compact and lightweight. Electric vehicles that drive further with their existing batteries and are affordable. Data centers that meet the growing demands of seven billion internet-connected devices and counting while cutting down their carbon emissions and use of space. For these to become reality, electrified systems need cutting-edge upgrades in the hardware that manages and distributes the power in these systems. Such innovations will be transformative for a wide range of applications such as battery-powered mobile and IoT devices; electrified transportation; renewable energy systems; 5G and 6G communications; and artificial intelligence and machine learning.

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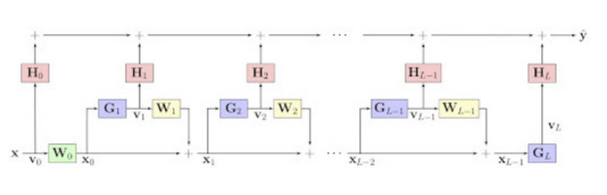

ResNEsts: Deep learning with Improved Estimation Guarantees

Although constructing deep models has unlocked many fields and led to many new state-of-the-art results in computer vision and natural language processing, their successes are barely replicated or translated to communication systems and signal processing due to the lack of guarantees and understanding. To improve communication systems with deep learning, researchers at the Center for Wireless Communications (CWC) led by Professor Bhaskar D. Rao are developing estimation guarantees for deep learning models to push the boundaries of our understanding in deep neural networks (DNNs).

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CWC Faculty Highlights

CWC congratulates our esteemed faculty for their hard work and achievements.

Gabriel Rebeiz

- Tatsuo Itoh Prize of the IEEE Microwave Theory and Technology Society (2022)
- IEEE Microwave Prize (2020)

Pamela Cosman

- Inaugural holder of the Dr. John and Felia Proakis Chancellor Faculty Fellowship (2019)

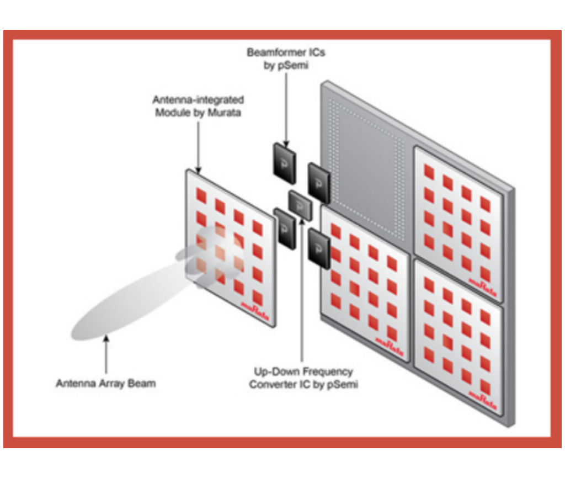
Patrick Mercier

- San Diego County Engineering Council Outstanding Engineer Award (2020)

Hanh-Phuc Le

- NSF CAREER Award (2021)
- Appointed a Distinguished Lecturer of the IEEE Solid-State Circuits Society (SSCS) DL Program 2022-2023

CWC Industry Affiliates In The News



pSemi Introduces Complete 5G mmWave RFFE Solution

pSemi® Corporation announced the expansion of its mmWave RF front-end (RFFE) portfolio for 5G wireless infrastructure applications. The new pin-to-pin compatible products, including three beamforming ICs and two up-down converters, offer flexibility to interchange ICs for full IF to RF coverage across the n257, n258 and n260 bands. This modular approach, combined with on-chip calibration and digital correction, allows system teams to simplify their design cycles and quickly adapt to different active antenna design configurations.

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Keysight, Samsung Sign Memorandum of Understanding to Advance Research and Development of 6G Technology

Keysight Technologies, Inc. (NYSE: KEYS), a leading technology company that delivers advanced design and validation solutions to help accelerate innovation to connect and secure the world, announced that the company has signed a memorandum of understanding (MoU) with Samsung Research to advance research and development of 6G technology, the next generation of wireless communication.Keysight joined forces with Samsung, a pioneer in the delivery of end-to-end solutions for wireless infrastructure and mobile devices across multiple generations, to support the company's 6G vision of a hyper-connected world.
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GlobalFoundries and Qualcomm Sign Agreement to Deliver Advanced 5G RF Front-End Products

GlobalFoundries (GF), a global leader in feature-rich semiconductor manufacturing, and Qualcomm Global Trading PTE. Ltd., a subsidiary of Qualcomm Technologies, Inc., announced today that they are extending their successful RF collaboration on 5G multi-Gigabit speed RF front-end products for delivering the high cellular speeds, superior coverage, and outstanding power efficiency in the sleek form factors users expect from the newest generation of 5G-enabled products.

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Keysight Introduces Radar Scene Emulator Solution to Accelerate Path to Full Vehicle Autonomy

Keysight Technologies has introduced the Radar Scene Emulator which enables automakers to lab test complex, real-world driving scenarios, accelerating the overall speed of test. Full-scene emulation in the lab is critical to developing the robust radar sensors and algorithms needed to realize advanced driver assistance systems (ADAS)/autonomous driving (AD) capabilities. Keysight’s full-scene emulator combines hundreds of miniature radio frequency (RF) front ends into a scalable emulation screen representing up to 512 objects and distances as close as 1.5 meters.
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