

# ECE Weekly

The Ohio State University | Department of Electrical & Computer Engineering



## CubeRRT: the little satellite that could

The debut data from The Ohio State University's first satellite transmitted back from orbit, and the results look promising for future scientists studying the Earth.

**Joel Johnson**, professor of electrical and computer engineering at Ohio State, said the CubeSat Radiometer Radio Frequency Interference Technology Validation satellite, or CubeRRT, contains advanced sensors for observing important information like soil moisture, sea temperature, sea ice coverage, weather, and much more. "The data we received on Sept. 5 confirmed successful real-time on-board removal of RFI from CubeRRT's measurements," Johnson said. "This was the primary goal of the mission, so it was a great feeling to know we had reached this important milestone and that our little satellite was making big accomplishments up in space."

Full story: <https://go.osu.edu/qbertdata>

## From student to entrepreneur, alumna Jessie Zhao



For engineering students, the pathway to entrepreneurship and innovation is full of unknowns. The Ohio State University may provide the foundation, but success requires the desire to look beyond the classroom.

Electrical and Computer Engineering alumna **Jessie Zhao** knows this well. After graduation, she followed the path toward business as lead

developer for the startup Soliton Reach. The company makes small, wireless, motion-tracking sensors for healthcare and rehabilitation applications. Originally from China, Zhao earned both her undergraduate and master's degree in ECE as a Buckeye.

Read the full story: <https://go.osu.edu/zhaostory-vid>

## Watch a video interview with Jessie Zhao:

<https://go.osu.edu/solitonvid>



It turns out that you don't wear your heart on your sleeve. You wear it on your face.

Without moving a muscle, people convey a great deal about their feelings through their faces.

That's according to a groundbreaking study into human expressions of emotion, conducted by researchers at The Ohio State University's Center for Cognitive and Brain Sciences and funded by the National Institutes of Health.

They found people are able to correctly identify others' feelings up to 75 percent of the time — based solely on subtle shifts in blood flow color around the nose, eyebrows, cheeks or chin. The study, published in the Proceedings of the National Academy of Sciences, demon-

strated a never-before-documented connection between the central nervous system and emotional expression in the face.

"We identified patterns of facial coloring that are unique to every emotion we studied," said **Aleix Martinez**, cognitive scientist and professor of electrical and computer engineering at Ohio State. He co-led the study with **C. Fabian Benitez-Quiroz**, a postdoctoral researcher, and **Ramprakash Srinivasan**, a doctoral student.

"We believe these color patterns are due to subtle changes in blood flow or blood composition triggered by the central nervous system. Not only do we perceive these changes in facial color, but we use them to correctly identify how other people are feeling."

The researchers are patenting the computer algorithms, and hope they will enable future forms of artificial intelligence to recognize and emulate human emotions.

This is the latest in a series of studies in which Martinez and his colleagues have identified unique forms of human facial expression. In prior work, they identified several, previously unknown facial expressions produced through unique patterns of muscle movements, including the "not face," or the frown understood universally as "no way" or "nope." Read more online: <http://go.osu.edu/aleixcolor>



## ECE MeetUp: deploying innovation at CDME

The difference between academia and industry? When academia invents a new technology to solve a problem in society, the goal is to move on to the next problem. Industry, however, looks for ways to capitalize on the solution. Leaders at the Center for Design and Manufacturing Excellence (CDME) at The Ohio State University see this gap as an opportunity to help both sides win. Industry and academia both benefit from its focus: continuously developing new technologies into business prototypes ready for manufacturing. On Nov. 1, approximately 20 faculty, alumni and students from Ohio State's Department of Electrical and Computer Engineering (ECE) gathered for an after-hours tour of CDME at 1314 Kinnear Road, Suite 1533 on West Campus, during the ongoing ECE Alumni Society MeetUp social/tech event series.

ECE/EE Alumni Society Treasurer **Vimal Buck**, now senior lead engineer with the Experiential Entrepreneurship Education (E3) Program at CDME, helped organize the evening. CDME Director **Nate Ames** said Ohio State wants to create a pathway for further developing technological inventions into functional prototypes for manufacturing. "It's one thing to invent the next best thing that is going to save the world, it's another to get it onto the shop floor," Ames said. "Our goal is to help deploy it."

Read more: <https://go.osu.edu/cdmerecap>

## IEEE AP-S/MTT-S Graduate Student Poster Competition

In a joint venture, the Antennas and Propagation Society and the Microwave Theory and Techniques Society of the IEEE Columbus Chapter held the 2018 Student Poster Competition at the ElectroScience Laboratory at The Ohio State University Nov. 15.



The research focus this year centered upon antennas (analysis, design, development, measurement, testing); radiation, propagation, and interaction of electromagnetic waves with media; circuits, sensors, devices and systems; applications pertinent to antennas, propagation, circuits, and sensing.

Electrical and Computer Engineering (ECE) graduate students, as well as students from surrounding universities and laboratories, presented their related research for review by faculty and peers.

This year, the first place doctoral presentation went to Ph.D. student **Wei Jian Foo** for "Compact, Conformal Wideband Phased Array for 5G Mobile Applications."

The first place Master's presentation was **Nicholas Everett** for the work, "Instantaneous Bandwidth Expansion Using Software Defined Radios."

Second place went to Ph.D. student **Yingyang Wang** for the work "Delta - Sigma Noise-Shaping in Multi-Dimensional Space-Time for Wideband Antenna Array Receivers."

**Lucas Newton**, Ph.D. student, earned third place for his presentation "Reconfigurable Multiband FarIR Notch Filter Employing Phase Change Material."

Best posters are identified by reviewers during the event based on their content, significance, originality, presentation and overall recommendation.

The ElectroScience Laboratory was established in 1942 and is one of the oldest and largest Radio Frequency (RF) /Optics laboratories in the United States.

Read more: <https://go.osu.edu/aps18>

Find pictures from the event:

<http://go.osu.edu/aps18pix>



## Ohio State ECE alumni celebrate 50+ years of success

From wartime defense systems, to pioneering computer and radar development, every table at the annual Department of Electrical and Computer Engineering alumni dinner holds a depth of stories. Fortunately, that's what the night is all about – telling stories, a shared history.

Originally organized as an evening to celebrate 50-year alumni of the Ohio State ECE/EE Alumni Society program, the dinner on Oct. 5 this year expanded to include graduates anywhere from 1968 to 1958. They represent an extended family of Buckeyes scattered around the world.

Read the whole story: <https://go.osu.edu/50yralums>

## Vilkhu wins HKN international award

For the first time since the 1960s, a student at The Ohio State University won the national 2018 Alton B. Zerby and Carl T. Koerner



Outstanding Electrical and Computer Engineering (ECE) Award.

The winner, alumnus **Raman Vilkhu**, completed his ECE undergrad studies in Spring 2018, and carried out his Honors Research Thesis at the ElectroScience Lab under the supervision of Assistant Professor **Asimina Kiourti**.

More: <https://go.osu.edu/vilkhuhkn>