## 

# CWRU teams with NASA and fire departments to protect firefighters.

Researchers from Case Western Reserve will work with the NASA Glenn Research Center and fire departments across the country to develop hightech sensors to help keep firefighters safe from airborne toxins.

Firefighters often remove their masks once a fire is out, based on readings from carbon monoxide detectors. But studies show they still could be exposing themselves to a number of harmful particulates and gases, including formaldehyde and acrolein gases, even after the flames have been extinguished.



Professor of Mechanical and Aerospace Engineering Fumiaki Takahashi is leading a team, which includes Chung-Chiun Liu, the Wallace R. Persons Professor of Sensor Technology and Control in the Department of Chemical and Biomolecular Engineering, in adapting fire sensors used by NASA on the International Space Station and developing new sensors to detect these lingering toxins for use by fire departments.

#### Learn more at engineering.case.edu/firefighter-sensors.





### <<<< INNOVATION SUMMIT 2015<<<<<

# University hosts exploration of innovation — spotlights think[box].

Case Western Reserve University brought together an international cast of entrepreneurs, business and academic leaders, researchers, economic development professionals, policy makers and others to explore how innovation thrives at the Innovation Summit 2015: Models of Innovation, Oct. 26-28.

The list of high-profile panelists and presenters was made up of top names in industry, community development, tech wizardry, venture capitalism and academia, including some of the minds behind Atari, Gallup, Priceline.com, *Make: Magazine*, Samsung, America Makes, Microsoft, the Smithsonian, Goldman Sachs, the National Science Foundation, ARPA-e and many more.

Speakers included: Nolan Bushnell, founder of Atari and Chuck E. Cheese; Jim Clifton, CEO of Gallup, Inc.; Jeff Hoffman, co-founder of Priceline.com; Dale Dougherty, founder and CEO of *Make: Magazine*; Curt Carlson, former president and CEO of SRI; Ellen Williams, director of ARPA-e; Craig Maxwell, corporate vice president of technology and innovation for Parker Hannifin; and Susan Helper, chief economist for the U.S. Department of Commerce.

And, as a special spotlight during the summit, the university celebrated the move of its Sears think[box] innovation center into its new, 50,000-square-foot home, the newly renovated Richey Mixon Building.

Learn more at engineering.case.edu/innovationsummit.

engineering.case.edu



OF ENGINEERING CASE WESTERN RESERVE UNIVERSITY

## **BUILT TO LAST**

#### Researcher shows rocking frames outperform traditional designs in earthquakes.

All buildings are designed to withstand vertical forces—namely gravity. But when it comes to earthquakes, the horizontal forces can topple even the strongest of structures if they're not properly designed.

Case Western Reserve civil engineering professor Michael Pollino is among a growing number of researchers who support a design that lets a building roll with the seismic forces. He developed a computer model that compares these "rocking steel-braced frames" to current earthquake standards for low- to mid-rise buildings, and found that they better withstand the shaking and could be more rapidly and cheaply repaired after a seismic event.

In addition to these findings, published in *Engineering Structures*, Pollino is developing a more holistic design/retrofit strategy for steel buildings to withstand demands from various hazardous events—earthquakes, blasts, tornados and more—with the support of a Milek Fellow award from the American Institute of Steel Construction.

Learn more at engineering.case.edu/Pollino-rocking-frame and engineering.case.edu/Pollino-Milek-fellow.

# >> ADVANCED >>>> MANUFACTURING

#### CWRU partners on new manufacturing initiatives.

Case Western Reserve University has announced new collaborations on two federal manufacturing initiatives: a new project through America Makes, the National Additive Manufacturing Innovation Institute, and a national effort to advance the commercialization of flexible electronics.

Case Western Reserve, in collaboration with the University of Notre Dame, won an award during the third round of America Makes funding to address the economic production of next-generation orthopedic materials through powder reuse in additive manufacturing.

The university will also serve as a regional partner in the Midwest node of the Department of Defense's Flexible Hybrid Electronics Manufacturing Innovation Institute. Case Western Reserve joins 32 other institutions and companies as part of the research consortium that will explore expanding markets and improving technology for flexible electronics.

Learn more at engineering.case.edu/ additive-manufacturing-and-flexibleelectronics.



Hit Lenname aler

## A 3-D REVOLUTION CWRU partners with Microsoft to bring HoloLens into classrooms.

Case Western Reserve University has partnered with Microsoft to bring the company's new augmented reality technology, HoloLens, to bring this innovation into the classroom.

The Microsoft HoloLens projects 3-D holographic images—giving users the opportunity to view and interact with 3-D digital content in real space. Mark Griswold, professor of radiology and biomedical engineering, is working with a team of researchers at Case Western Reserve, including electrical engineering and computer science associate professor Marc Buchner, and Cleveland Clinic to apply HoloLens first to medical education. The technology will allow students to explore human anatomy beyond medical illustrations, separating systems to study them independently and see how they all work together—and even isolate organs and zoom in to illuminate minute details.

The team is also exploring using HoloLens in other academic applications, including engineering.

Learn more and watch HoloLens in action at engineering.case.edu/HoloLens-video.



## >> SPOTTING CANCER FAST MRI contrast agent detects smallest tumors.

Biomedical researchers at Case Western Reserve University have created a new contrast agent that lets clinicians use MRI to spot tumors and micrometastases at unprecedentedly small sizes, allowing for faster detection, diagnoses and treatment.

The peptide gadolinium-based contrast agent developed by Zheng-Rong Lu, the M. Frank Rudy and Margaret Domiter Rudy Professor of Biomedical Engineering, and his team reveals tumors as small as 300 microns, or just a few hundred cells.

Learn more at engineering.case.edu/Lu-contrast-agent.



## 

The biomedical research community has hit the mother lode in terms of information, with the latest medical technology delivering so much biomedical data, researchers and physicians are struggling to keep up. And this ever-increasing pile of data often involves large and complex interactions and associations in the form of networks, which adds significant challenges to storing, processing and querying the information.

With the help of a \$1.3-million grant from the National Institutes of Health's Big Data to Knowledge (BD2K) grant, Mehmet Koyuturk, the Timothy E. and Allison L. Schroeder Associate Professor in Computer Science and Engineering at Case Western Reserve, is leading a team in building storage schemes and a system of algorithms that will help researchers sift through billions of biomedical data points and related networks and turn the unfathomable amount of information into a highly organized, searchable resource. The team plans to package these programs into user-friendly, open-source software, helping give fellow scientists a better handle on big data and put it to work developing the next generation of life-changing cures, treatments, medical devices and diagnostic tools.

Learn more at engineering.case.edu/Koyuturk-NIH.

### 

# Perovskite solar cell system directly charges lithium ion batteries.

There's a gas station on every corner, but charging stations for electric vehicles are still few and far between. Researchers at Case Western Reserve University have identified a way to efficiently charge lithium ion batteries using solar cells, a discovery which holds promise for cleaner transportation, home power sources and more.

Liming Dai, the Kent Hale Smith Professor in the Department of Macromolecular Science and Engineering, led a team that wired four perovskite solar cells in a series to directly photo-charge lithium ion batteries with 7.8-percent efficiency—the highest efficiency reported to date.

Similar experiments using polymer solar cells have failed to match the overall energy conversion and storage efficiency achieved with the perovskite solar cells, according to the research team.

#### Learn more at engineering.case.edu/perovskite-solar-charging.

THE CASE SCHOOL OF ENGINEERING BROKE ITS ALL-TIME FUNDRAISING RECORD FOR THE THIRD YEAR IN A ROW—RAISING A TOTAL OF \$33 MILLION.

#### STUDENT SPOTLIGHT

#### >> READY TO LAUNCH >>>>>>>>

### Student entrepreneur pitches POTUS, *Shark Tank* investors at White House.

Case Western Reserve University senior Felipe Gomez del Campo was one of five students from across the United States to pitch his startup company to President Obama and some of the biggest names in business, including investors from ABC's hit show *Shark Tank* at an entrepreneurship event held at the White House this spring.

The event was the latest in a string of successes for the student-entrepreneur. Born in Mexico and a newly minted U.S. citizen, Gomez del Campo has won more than \$135,000 in funding, including \$100,000 in two separate prizes from the U.S. Department of Energy and Boeing at this year's Clean Energy Challenge.



He's developed a device that shoots a precise amount of plasma into jet engine fuel. That plasma injection blows the fuel apart into its component molecules, allowing the engine to burn it more efficiently—reducing the fuel used per flight by up to 10 percent and reducing emissions by 25 percent.

Learn more about Felipe and his startup company FGC Plasma Solutions at engineering.case.edu/meet-our-innovators/fuel-injector.





# IEXT INSIDE THIS ISSUE

- Charging the future's solarpowered vehicles
- Studying in 3-D

- Big news in big data
- Standing up to earthquakes
- Record-breaking fundraising

#### engineering.case.edu

SI-01-68Z

Will you be at the Consumer Electronics Show in Las Vegas Jan. 6-9? So will we! Learn where you can find us and connect at find us and connect at

10900 Euclid Avenue Cleveland, Ohio 44106-7220



D A I A E & 8 I L X CV2E ME2LEBA BE2EBAE CV2E CV2E ME2LEBA