

Case Western Reserve and Cleveland State universities received a \$1.75-million grant from the Cleveland Foundation to launch the IoT Collaborative—a concerted effort to advance innovations in the industrial Internet of Things (IoT).

The goal: to transform Northeast Ohio into a national model of collaboration, research, technology transfer, workforce development and community infrastructure in the emerging area of the IoT.

According to the initiative's leaders, Cleveland's strong manufacturing resources, thriving health care sector and booming startup landscape make it well-positioned to lead innovations in IoT in manufacturing, energy, infrastructure and health.

Research efforts are already underway across all four pillars, from examining how implementing a smart grid could drive economic growth in Cleveland, to efforts to improve infrastructure monitoring and traffic flow to advancing tele-health capabilities. On the manufacturing front, Robert Gao, the Cady Staley Professor of Engineering and chair of the Department of Mechanical and Aerospace Engineering, is leading an NSF-funded effort to help small- to mid-sized manufacturers adapt to IoT connectivity.

Learn more at engineering.case.edu/IoT-Collaboration.

FROM THE CASE SCHOOL OF ENGINEERING
AT CASE WESTERN RESERVE UNIVERSITY

SPRING 2018

next



Engineering researcher receives \$1.3M from NASA to develop battery systems for electric air vehicles.

Flying cars have been on the future's wish-list for decades, and a mechanical and aerospace engineering researcher is working to bring them closer to reality.

Vikas Prakash, professor of mechanical and aerospace engineering, received a \$1.3-million grant from NASA to develop battery systems for next generation electric air vehicles as part of a \$10-million grant shared by a consortium of U.S. universities.

Electric air vehicles carry even more challenges than their land-based counterparts in terms of onboard space and weight limits, which drastically impacts performance. According to Prakash, today's batteries pack much less energy per unit of weight than jet fuel, making them too heavy for efficient flight. Scientists need battery packs with about 40 times more energy density to close this gap.

Prakash is exploring ways to build multifunctional battery systems that are part of the vehicle's structure and can carry structural load so they won't add additional weight.

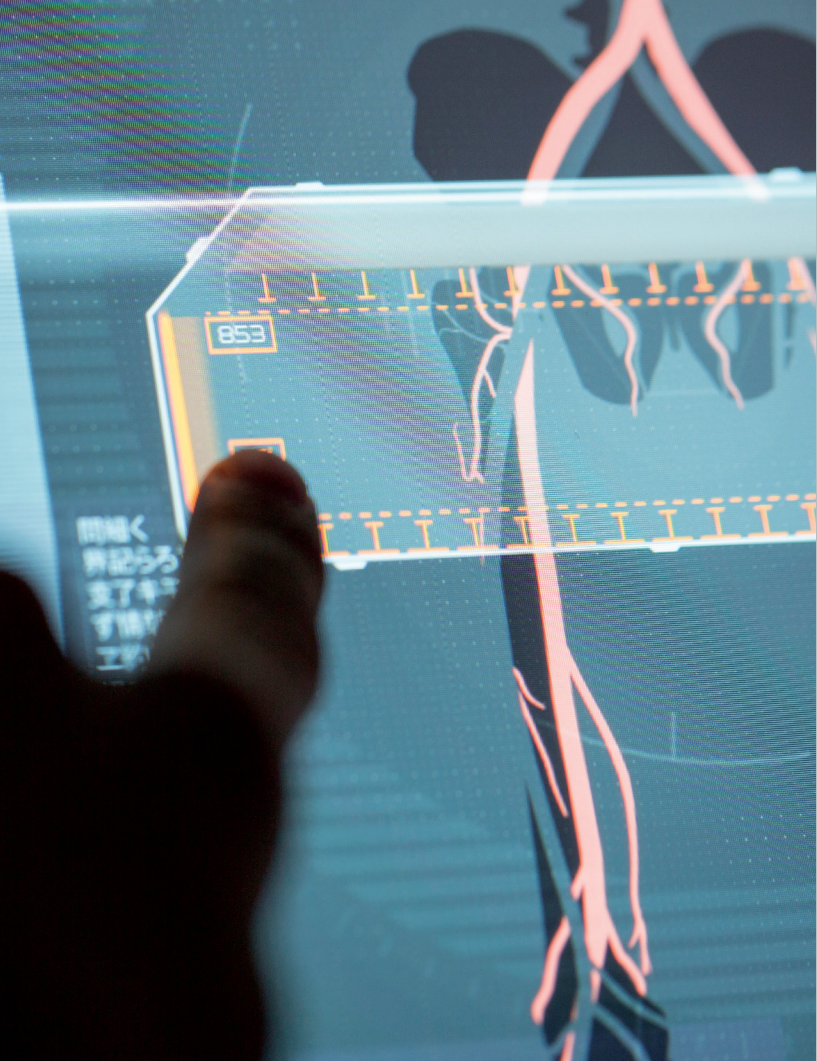
Prakash's project is an extension of his current research and commercialization efforts under the Partnership for Research in Energy Storage and Integration for Defense and Space Exploration, part of Case Western Reserve's Great Lakes Energy Institute.

Learn more at engineering.case.edu/battery-systems-personal-air-vehicles.

engineering.case.edu

CASE SCHOOL
OF ENGINEERING

CASE WESTERN RESERVE
UNIVERSITY



DATA-BASED DIAGNOSES

Researchers create deep-learning networks to improve detection of breast cancer, Alzheimer’s disease.

Anant Madabhushi, the F. Alex Nason Professor II in the Department of Biomedical Engineering and the director of the Center for Computational Imaging and Personalized Diagnostics, has developed machine-learning programs to improve diagnoses of breast cancer and Alzheimer’s disease.

In a study published in *Scientific Reports*, Madabhushi demonstrated how the computer-based program he developed with his team outperformed traditional methods for diagnosing Alzheimer’s. He has also developed a program that was 100-percent accurate in determining whether invasive forms of breast cancer were present in whole biopsy slides.

Learn more at engineering.case.edu/data-based-diagnoses.

WALKING THE WALK

Research team receives NSF funding for neuroprosthetic walking system.

An interdisciplinary team of engineering researchers has received a \$1-million National Science Foundation grant to develop control algorithms for a hybrid neuroprosthetic walking system that uses the wearer’s own electrically stimulated muscles and small assistive motors at the joints to help patients with spinal cord injuries maintain balance while walking and standing, without conscious effort from the patient.

The team includes Roger Quinn, the Arthur P. Armington Professor of Engineering in the Department of Mechanical and Aerospace Engineering, Ronald Triolo, professor of biomedical engineering and executive director of the Advanced Platform Technology Center, and Musa Audu, research associate professor of biomedical engineering.

FIRE FOCUS

Case Western Reserve hosted a Symposium on Advanced Fire Science and Technology on campus in June, attracting nationally recognized speakers from the FAA, NASA, NIST, the U.S. Air Force, UL, American University, North Carolina State University, the University of Dayton and more, who addressed topics such as the future of flame retardancy, the evolution of safety standards and building design requirements, and spacecraft fire safety.

EXPLORING 2-D OXIDES <<<<<<

Researchers receive \$1.2M to study 2-D oxides for next generation materials.

Alp Sehirlioglu, the Warren E. Rupp Assistant Professor in the Department of Materials Science and Engineering at Case Western Reserve, is leading a team that received a \$1.2-million grant from the Air Force Office of Scientific Research to explore the nanostructures of atomically thin 2-D oxides.

Oxide nanosheets provide rich and varied electronic, structural and physical properties, making them valuable tools to enable breakthroughs in electronics, spintronics, energy conversion and storage, gas and biological sensors, and more.

The project aims to clarify and establish processing requirements for 2-D metal oxides to access these materials down to the smallest level—mono- and nano-layers—and control their lateral size, crystallographic structure and electrical properties.

Collaborators include Case Western Reserve faculty members Emily Pentzer, assistant professor of chemistry; Walter Lambrecht and Xuan Gao, professor and associate professor of physics; as well as Marie-Helen Berger, a professor at the Ecole de Mines in Paris.

Nature named Case Western Reserve among the top 20 institutions for innovation impact, and the Brookings Institution ranked the university 13th in the country for commercialization.

PROTECTING CROPS

NSF CAREER award aims to fight plant infections.

Michael Hore, assistant professor of macromolecular science and engineering, received an NSF CAREER grant to unravel the specifics behind how nanoparticles move through a tight pore—a process known as translocation. Since some plant viruses can spread through translocation, Hore hopes a better understanding of how these tiny particles move will lead to a way to fight plant infections and prevent crop failures. The study could also have applications in water purification by informing the design of a membrane that could help filter out unwanted particles.

Learn more at engineering.case.edu/CAREER-2017.



LEADERSHIP UPDATES

James McGuffin-Cawley has been appointed **interim dean** of the Case School of Engineering. An alumnus of the school and member of the faculty since 1991, he assumed the role following the departure of former dean Jeffrey L. Duerk, who became executive vice president and provost at the University of Miami.

In addition, **Alexis Abramson**, the Milton and Tamar Maltz Professor of Energy Innovation in the Department of Mechanical and Aerospace Engineering and co-director of the university’s Great Lakes Energy Institute, has been named **interim chair of the Department of Electrical Engineering and Computer Science**. She succeeds Kenneth Loparo, who returned to the faculty after four years as department chair.

The electrical engineering and computer science department has also appointed two **associate chairs**: **M. Cenk Cavusoglu** and **Jing Li**.

Christian Zorman, professor of electrical engineering and computer science, has been named **interim associate dean of research**, taking over for McGuffin-Cawley who left the position to assume the role of interim dean.

And, **Rohan Akolkar**, associate professor of chemical and biomolecular engineering, has been appointed faculty director of the university’s **Great Lakes Energy Institute**.

STRONGER INFRASTRUCTURE

Civil engineering researcher will use Gulf Fellowship to protect against hydrocarbon release, including oil spills and gas leaks.

YeongAe Heo, assistant professor in the Department of Civil Engineering, has been selected as an early-career research fellow of the National Academies of Science, Engineering and Medicine’s Gulf Research Program.

Heo will use the fellowship to advance her work in preventing hydrocarbon release and other societal and environmental impacts that result from the failure of oil and gas infrastructure systems. Focusing on minimizing risks in on- and offshore systems that are exposed to severe weather and operating conditions and investigating the multi-hazard actions that trigger catastrophic cascading disasters, this work will contribute to advances making infrastructure and surrounding communities more resilient.

Learn more at engineering.case.edu/Heo-Gulf-Fellowship.



[illegible]

Biomedical engineering student uses Sears think[box] to build assistive device to help his mother with physical therapy.

Case Western Reserve University senior Turner Montgomery chose to major in biomedical engineering to help people—and he's starting close to home.

Shortly after Montgomery was born, his mother was diagnosed with a rare autoimmune disease. She struggled with the condition for decades, and when Montgomery launched a deeper search into her medical records with the help of physicians at Case Western Reserve, Johns Hopkins University and the University of Kentucky Medical Center, he made a startling discovery: his mother had been misdiagnosed.

Armed with this knowledge and a new diagnosis of muscular dystrophy, Montgomery used Sears think[box] at Case Western Reserve to build an assistive device called an EMG machine to help his mother with the physical therapy she's using to treat her condition.

Learn more and watch a video at engineering.case.edu/Turner-Montgomery-project.

>> MAKER MINDS MEET UP >>>>



Case Western Reserve University welcomed 350 attendees from around the world as the host of the 2017 International Symposium on Academic Makerspaces last fall. The five-day event included sessions on funding and sustaining a makerspace, design and workflow, management and staffing, and more. Attendees also got the chance to see high-tech prototyping and fabrication equipment in action and attend a special workshop on 10x thinking.

Learn more at engineering.case.edu/ISAM-2017.



Photos by Hilary Bovay



INSIDE THIS ISSUE

- Leading the IoT revolution
- First steps toward flying cars
- School leadership updates
- Disease-diagnosing computers
- Preventing oil spills

engineering.case.edu

Follow us @CaseEngineer

Don't miss all the news that's fit to tweet! >>>

