



# 10 Quick Reads From NSF.gov

February 27, 2017

## 01

### Surgeons can now use a low-cost mechanical device for minimally invasive surgery

A lower cost approach to robot-assisted surgery? Thanks to researchers and small business entrepreneurs funded by NSF, surgeons can now use a new type of mechanical instrument to perform complex, minimally invasive procedures, also known as laparoscopic surgery. According to its creators, the handheld instrument provides the same sorts of benefits as robot-assisted surgery, such as greater precision and functionality, but at a lower cost compared to existing robotic surgical systems. That lower cost could result in new capabilities for rural hospitals and other medical centers that can't afford more expensive systems. The technology is based on NSF-funded engineering research and is being commercialized by FlexDex Surgical, which has received seed money from NSF's Small Business Innovation Research program. See this [video](#) in the NSF Multimedia Gallery.



## 02

### NSF Director reflects on broadening participation through NSF INCLUDES

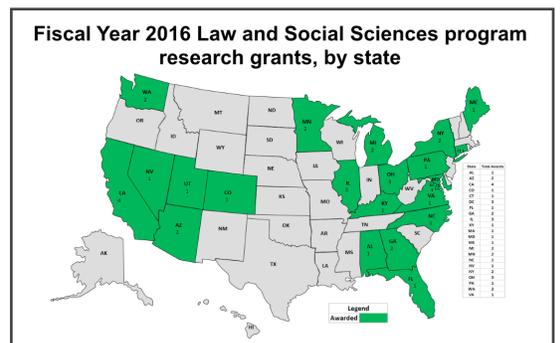
In January, NSF Director France Córdova met with the recipients of the first awards made by NSF INCLUDES (Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science), a major addition to the agency's portfolio of programs seeking to broaden participation in science and engineering (S&E). In writing about the meeting, the Director noted: "INCLUDES seeks to identify proven, innovative ideas that create access to S&E for groups traditionally underrepresented in those fields, and then scale up those ideas to help more people." She pointed to the significance of the first awards. "We took our first big step with NSF INLCUDES in 2016, awarding 40 Design and Development Launch Pilots. The launch pilot awardees will play a critical role in laying the foundation for NSF INCLUDES, setting the standard for how this program moves forward," Córdova said. Find out more in this NSF [Discovery](#).



## 03

### NSF Law and Social Sciences program issues new awards

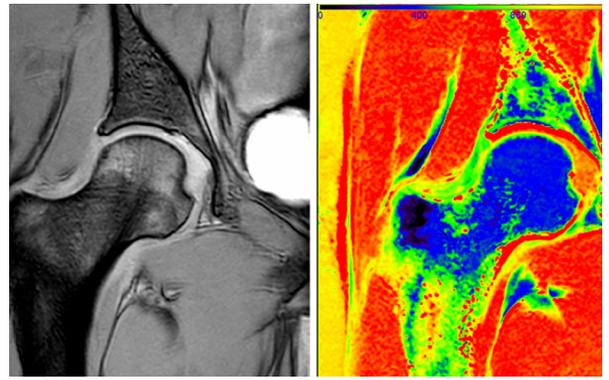
Critical societal issues ranging from violent crime to the operation of the U.S. legal system demand the best available data and analysis for effective policymaking and an informed citizenry. NSF has awarded more than \$5 million to fund 23 projects and four workshops through its Law and Social Sciences (LSS) program. LSS focuses on scientific exploration of law and law-like systems of rules. In the past, program funding has produced breakthrough discoveries in crime causation, violence, victimization, procedural justice, regulatory enforcement and other areas. Read about the new projects receiving awards in this NSF [press release](#).



# 04

## Real-time MRI analysis powered by supercomputers

Magnetic resonance imaging (MRI) is one of the main tools used by doctors to detect diseases such as multiple sclerosis, and injuries such as broken bones. But the analysis of an MRI can take hours or days. That might be about to change. Researchers at the Texas Advanced Computing Center, the University of Texas Health Science Center and Philips Healthcare have developed a new, automated platform capable of returning in-depth analyses of MRI scans in a matter of minutes, rather than hours or days. The system has the potential to minimize patient callbacks, save millions annually and advance precision medicine. Find out more in this News From the Field [story](#) about NSF-funded research that links to the university's press release.



# 05

## New approach to curbing dengue fever outbreaks

Contact tracing--a process of identifying everyone who has come into contact with those infected by a particular disease--combined with targeted, indoor spraying of insecticide can greatly reduce the spread of the mosquito-borne dengue virus. That's the finding of a study led by Emory University researchers funded by NSF. The new approach of using contact tracing to identify houses for targeted insecticide spraying was between 86 and 96 percent effective in controlling dengue fever during the 2009 outbreak in Cairns, Australia, according to the research. By comparison, vaccines for the dengue virus are only 30 to 70 percent effective, depending on the type of virus--or serotype--involved. Dengue fever is spread by the same mosquito species, *Aedes aegypti*, that infects people with the Zika virus. Find out more in this NSF [press release](#).



# 06

## Terraformer wind tunnel takes hazards engineering research to a new level

With NSF support, Forrest Masters and a team at the University of Florida are developing a world-class facility with new technology to help engineers and scientists better understand high wind storms that batter communities along the U.S. coastlines. The facility is part of NSF's \$62-million investment in Natural Hazards Engineering Research Infrastructure (NHERI). New tools, such as the Terraformer wind tunnel that can dial up any type of terrain in 90 seconds and a second high-speed simulator that can generate winds over 230 miles per hour, draw researchers from all over the country. The research they conduct is aimed at saving lives and minimizing damage and economic loss. See more in this Science Nation [video](#).



# 07

## NSF: Discovering the fundamentals of future transportation

In the keynote address at the Public Policy/Media Day at the Washington Auto Show, NSF Director France Córdova talked about some significant breakthroughs in transportation resulting from NSF-supported basic research in the past and looked ahead to what the future holds, including how NSF investments in "Big Ideas" such as Human-Technology Frontier and Harnessing Data for the 21st Century will help make that future possible. "We are on the verge of the new frontier of mobility, and the automotive industry is in the process of undergoing a technological revolution that will transform transportation forever," she said. Read her full [remarks](#) on the NSF website.



# 08

## Flat-footed competitors have fighting advantage

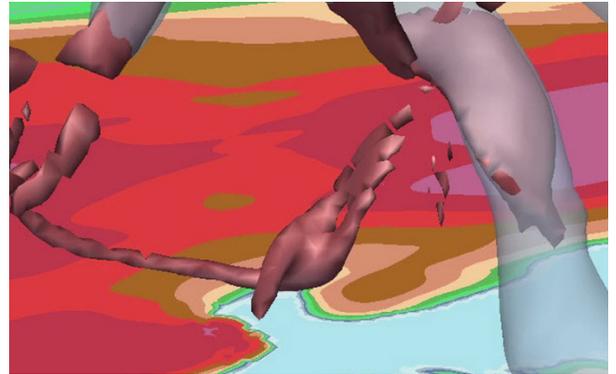
A heel-down posture--a feature that separates great apes, including humans, from other primates--confers advantages in fighting, according to a new study published recently in the journal *Biology Open*. Standing with heels planted allows more swinging force when fighting, says biologist David Carrier of the University of Utah, lead author of the study, which was funded by NSF's Division of Integrative Organismal Systems. In contrast, many other species of mammals, including most primates, stand, walk and run with their heels elevated, and on the balls of their feet or toes, a posture important for quickness. "Certain species tend to be good at fighting or fleeing, but not both," says NSF program director Emily Carrington. "This study provides insight into the basis for this trade-off. Animals that use their heels to plant their feet firmly to the ground, like bears, badgers and great apes, are able to deliver stronger blows to their opponents." Find out more in this NSF [press release](#).



# 09

## It's a twister – of data!

Here's a troubling statistic: On average, nearly 3 out of every 4 tornado warnings issued are false alarms, according to the National Weather Service. In this episode of the Science360 Extra series, hosts Charlie and Jordan talk about computer visualizations and look at the research of Amy McGovern who is trying to reduce the rate of false alarms and increase warning lead times. McGovern is a computer scientist at the University of Oklahoma who has been studying tornadoes for over eight years. She and her team want to make high-resolution simulations of supercell storms--rotating thunderstorms--to learn why some storms generate tornados and others don't. They want to find out how variables such as pressure, temperature and wind are involved in creating tornados. Find out how the team is using data-intensive storm simulations in this [video](#).



# 10

## Foundation for robotics

Welcome to the robotics age. Long-term federal investments in fundamental science and engineering research, and the researchers who pursue them, have led to novel machines that safely partner with people in nearly every environment. From robot sensing and mobility to cognition and resiliency, new discoveries by NSF-supported researchers are advancing the field. One area of research is looking at robot partners. Cooperative robots, or co-robots, increasingly interact with people in a variety of settings. These robot partners can increase the efficiency, productivity and safety of humans in areas from manufacturing and disaster response to health care and education. Learn more about NSF-supported scientists and engineers who are developing robots that can handle critical tasks--from disaster recovery to caring for the elderly--safely and with greater resilience than previous generations of intelligent machines in this NSF [Special Report](#).



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