



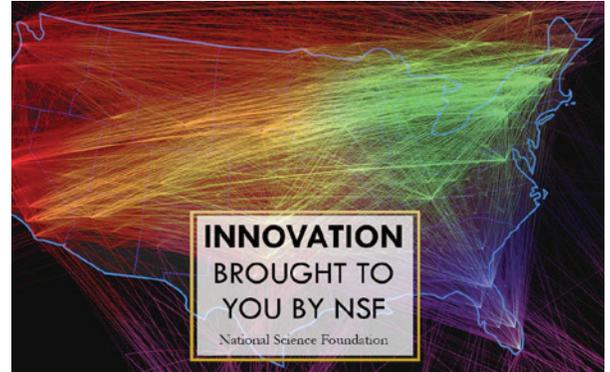
June 3, 2019

## 01

### Game-changing technologies brought to you by NSF

In the lead up to NSF's 70th anniversary in May 2020, OLPA launched "Brought to you by NSF," another way to message the invaluable contributions to people's lives that NSF funding has made possible. Before the internet was commercialized, before your phone was smart, before there was a picture of a black hole, there was an NSF-funded researcher pursuing curiosity. NSF-funded research has laid the foundation for many of the groundbreaking discoveries and game-changing technologies we know today. Starting on May 10, OLPA began highlighting familiar innovations, made possible by NSF funding, as a way to talk about the importance of basic research. Each month will focus on a different topic -- from research vessels to multi-messenger astronomy to STEM education -- and highlight the work of multiple disciplines. Follow

along on NSF social media at #BroughtToYouByNSF and find out more in this NSF [Special Report](#).

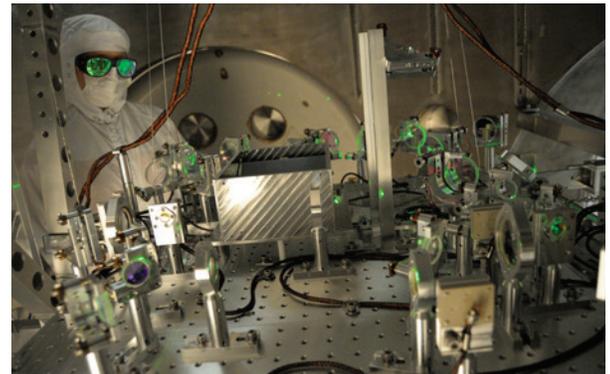


## 02

### LIGO and Virgo detect neutron star smash-ups

On April 25, NSF's Laser Interferometer Gravitational-Wave Observatory (LIGO) and the European-based Virgo detector registered gravitational waves from what appears to be a crash between two neutron stars. One day later, the LIGO-Virgo network spotted another candidate source with a potentially interesting twist: it may have resulted from the collision of a neutron star and a black hole, an event never before witnessed. "The universe is keeping us on our toes," said LIGO scientific collaboration spokesperson Patrick Brady, a physics professor at the University of Wisconsin-Milwaukee. "We're especially curious about the April 26 candidate. Unfortunately, the signal is rather weak. It's like listening to somebody

whisper a word in a busy café; it can be difficult to make out the word or even to be sure that the person whispered at all. It will take some time to reach a conclusion about this candidate." Learn more in this NSF [Research News](#).



## 03

### Dataset bridges human vision and machine learning

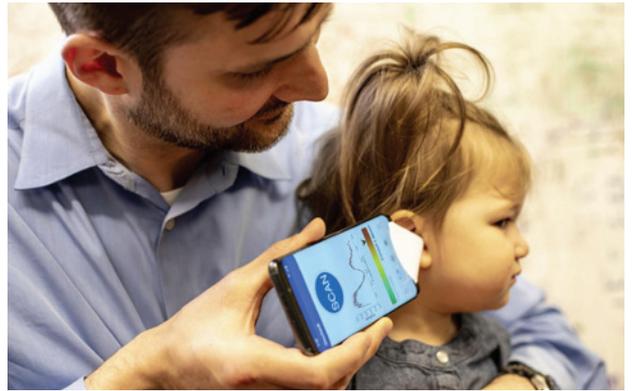
Neuroscientists and computer vision scientists say a new dataset of unprecedented size -- comprising functional brain scans of four volunteers who each viewed 5,000 images -- will help researchers better understand how the brain processes images. Each volunteer participated in 20 or more hours of fMRI (functional magnetic resonance imaging) scanning. The decision to run the same individuals over so many sessions was necessary for disentangling the neural responses associated with individual images. Find out more in this NSF [Research News](#).



# 04

## First smartphone app that can hear ear infections in children

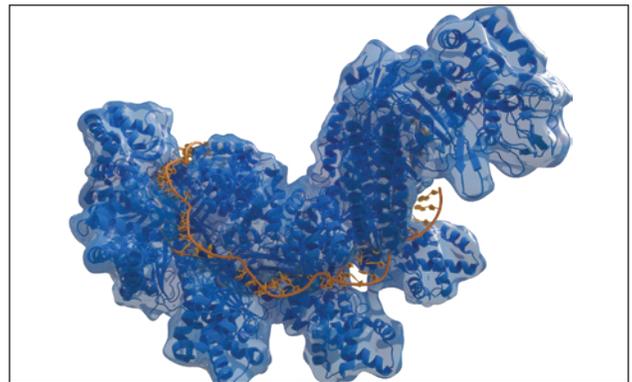
Ear infections are among the most common reasons parents bring their children to pediatricians. The condition can occur when fluid builds up in the middle ear behind the eardrum and becomes infected. This buildup is also common in a condition called otitis media with effusion. Both conditions are hard to diagnose because they have vague symptoms. Now, with support from NSF's Directorate for Computer and Information Science and Engineering, researchers at the University of Washington have created a new smartphone app that can detect fluid behind the eardrum by simply using a piece of paper and a smartphone's microphone and speaker. The smartphone makes a series of soft audible chirps into the ear through a small paper funnel and, depending on the way the chirps are reflected back to the phone, the app determines the likelihood of fluid present with a probability of 85%. Read more in this NSF [Research News](#).



# 05

## Teaching CRISPR and antibiotic resistance to high school students

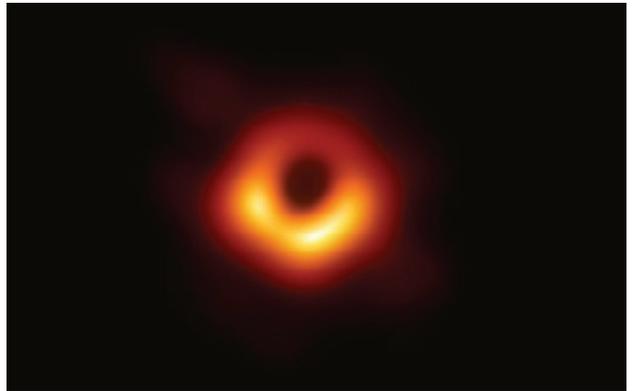
A Northwestern University-led team funded by the NSF has developed BioBits, a suite of hands-on educational kits that enable students to perform a range of biological experiments by adding water and simple reagents to freeze-dried cell-free reactions. The kits link complex biological concepts to visual, fluorescent readouts and students know -- after a few hours and with a single glance -- the results of their experiments. Find out more in this NSF [Research News](#).



# 06

## NSF announces new Diamond Achievement Award

NSF has announced a new award -- the NSF Diamond Achievement Award -- which was presented for the first time to the international team of researchers who recently captured the first-ever image of a black hole. On April 10, in coordinated press conferences across the globe, the Event Horizon Telescope collaboration announced that its planet-scale array of eight ground-based radio telescopes, which was forged through international collaboration, had succeeded in imaging the black hole at the center of Messier 87, a massive galaxy in the nearby Virgo galaxy cluster. This black hole resides 55 million light-years from Earth and has a mass 6.5-billion times that of the sun. Learn more in this NSF [News Release](#).



# 07

## Shipwrecks off North Carolina coast harbor tropical migrants

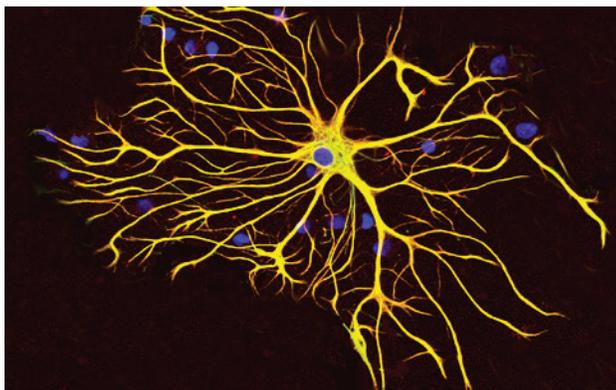
Tropical and subtropical fish are taking up residence on shipwrecks and other sunken structures off the North Carolina coast. This pattern may continue or even accelerate in coming years given predictions of warming oceans, a new study co-led by Duke University scientists suggests. "The artificial reefs created by these structures may be acting as stepping stones for fish that are moving northward and living at the edge of their geographic range, or beyond it, in search of suitable habitat," said Avery B. Paxton, a visiting scholar at the Duke University Marine Laboratory. Find out more in this NSF [Research News](#).



# 08

## Research on repetitive worm behavior has implications for understanding human diseases

Repetition can be useful if you're trying to memorize a poem, master a guitar riff, or just cultivate good habits. When this kind of behavior becomes compulsive, however, it can get in the way of normal life -- an impediment sometimes observed in illnesses such as Tourette's syndrome and autism spectrum disorders. Now, with partial support from NSF's Physics of Living Systems Program, scientists at Rockefeller University have identified a brain circuit that underlies repetition, a finding that may shed light on compulsive behavior in humans. Read more in this NSF [Research News](#).



# 09

## Arsenic-breathing microbes discovered in the tropical Pacific Ocean

For most living things, arsenic is a deadly poison, but new research shows that microorganisms are breathing arsenic in a large area of the Pacific Ocean. A University of Washington team has discovered that this ancient survival strategy is still being used in low-oxygen parts of the marine environment. "This study demonstrates that there are many secrets still to be discovered about how life in the ocean interacts with elements like arsenic," says Mike Sieracki, a program director in NSF's Division of Ocean Sciences, which funded the research. "Applying state-of-the-art genome sequencing methods has revealed these novel metabolisms." Find out more in this NSF [Research News](#).



# 10

## Innovative mechanobiology technique expands understanding of cells

Researchers have developed a new technology that allows them to probe cell changes without disturbing the cell's physiology -- an advancement that helps scientists look more closely at cell changes to understand human health, according to a newly published paper. The technology, known as deformation microscopy, allows more accurate study of the interplay between the nuclei of heart and skeletal muscle cells and their mechanical environment. In the future, the technology can also be used to investigate the response of other cell types, including cartilage and cancer cells. Find out more in this NSF [Research News](#).

