National Science Foundation
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NSF Director Named Carnegie Mellon President; New Engineering Directorate Head Appointed

NSF Director Subra Suresh has been named president of Carnegie Mellon University, effective July 1. He will leave NSF at the end of March. He was appointed NSF director by President Barack Obama, and confirmed by the U.S. Senate, in 2010.

"It has been my extraordinary honor to lead the National Science Foundation, which is blessed with a marvelous cohort of highly talented and devoted staff, as well as hundreds of thousands of innovative grantees and investigators from every field of science and engineering," Suresh said in announcing his departure.

President Obama, commenting on Suresh's tenure at NSF, stated: "We have been very fortunate to have Subra Suresh guiding the National Science Foundation… [He] has shown himself to be a consummate scientist and engineer--beholden to evidence and committed to upholding the highest scientific standards."

Subra Suresh. *Credit: Sandy Schaeffer, NSF*

Pramod Khargonekar. *Credit: University of Florida*

In other NSF leadership news, the agency selected Pramod Khargonekar, professor of electrical and computer engineering at the University of Florida, to serve as assistant director for NSF's Directorate for Engineering. Khargonekar had been serving as deputy director for technology at the U.S. Department of Energy's Advanced Research Projects Agency-Energy. He starts at NSF in March.

Artificial Retina Receives FDA Approval

The U.S. Food and Drug Administration (FDA) granted market approval on Feb. 14 to an artificial retina--the first bionic eye to be approved for patients in the United States. One of the leaders of the prosthetic eye research, partially funded by NSF, was Mark Humayan of the Doheny Eye

Institute, University of Southern California, and director of the **NSF Engineering Research Center for Biomimetic MicroElectronic Systems**.

The eyeglass-mounted camera.
Credit: Second Sight

The Argus® II Retinal Prosthesis System wirelessly transmits images from a small, eyeglass-mounted camera to a microelectrode array implanted on a patient's damaged retina. The array sends electrical signals via the optic nerve, and the brain interprets the visual image.

The **FDA approval** applies to individuals who have lost sight as a result of retinitis pigmentosa, an ailment that affects one in every 4,000 Americans. The implant allows some individuals with the condition, who are completely blind, to locate objects, detect movement and discern shapes such as large letters.

The Argus II is manufactured by, and will be distributed by, Second Sight Medical Products of Sylmar, Calif.

Scientists Find Evidence That Magnetism Helps Salmon Return Home

Migrating sockeye salmon. *Credit: Tom Quinn, University of Washington*

Migrating sockeye salmon swim for thousands of miles in the ocean and, years later, navigate back to the rivers in which they were born to spawn their young. Scientists and the fishing community have long wondered how salmon find their way back.

New research suggests that the salmon find their way to the rivers where they were spawned by sensing the rivers' unique magnetic signature. The NSF-supported research team, led by **Nathan Putman** of Oregon State University, used data from more than 56 years of catches in salmon fisheries to identify the salmon's migratory routes. The data were compared with the intensity of Earth's magnetic field at locations along the way.

Earth's magnetic field differs slightly from year to year. However, **this study** showed that, in any given year, salmon seeking the Fraser River in British Columbia were more likely to take routes that had magnetic signatures closely matching the river's signature years before, when the salmon left the river for the ocean.

Though scientists have known that some animals use the planet's magnetic field to orient themselves and follow a straight course, this is the first time that researchers have documented an animal's ability to "learn" the magnetic field--a major discovery in behavioral biology.

Feature: Preventing Contamination While Sampling Antarctic Lake

Image from the borehole camera. *Credit: WISSARD*

In an unprecedented feat of science and engineering, an NSF-supported research team **successfully drilled** through 800 meters (2,600 feet) of ice to a subglacial lake in Antarctica in January. The team retrieved water and sediment samples, including microbial cells, from an ecosystem cut off from direct contact with the atmosphere for thousands of years.

The Whillans Ice Stream Subglacial Access Research Drilling

(WISSARD) project seeks to answer complex questions about the potential for the West Antarctic Ice Sheet to contribute to future sea-level rise, while also sampling Lake Whillans for life. First, however, the researchers had to develop tools and techniques to protect the isolated lake environment from outside contamination, and to prevent contamination of samples withdrawn from the lake.

To ensure "clean" access, a team of engineers and technicians led by Frank Rack, University of Nebraska-Lincoln, spent nearly two years developing a specialized hot-water drill and filtration system. The **drilling procedure** included filtering microscopic cells and particles and irradiating the borehole water with ultraviolet (UV) radiation to reduce microbial contamination.

Frank Rack helped develop the drill and filtration system. *Credit: Peter West, NSF*

The borehole water pressure was adjusted to be lower than in the subglacial water, so that, when the drill broke through, lake water would flow upward, eliminating entry of the borehole water into the lake.

The WISSARD project outcome represents the successful development and use of infrastructure for exploring extreme and isolated environments such as those of the other lakes and rivers under the Antarctic ice.

National Medal of Science: Celebrating 50 Years

From astronomers to climate scientists to mathematicians, National Medal of Science awardees are recognized for substantial contributions to human knowledge and exemplary service to the nation.

The medal, administered by NSF for the White House, is the highest honor bestowed upon American scientists and engineers by the U.S. president. NSF and the White House are marking its **50th anniversary** in 2013.

Sandra Faber with President Barack Obama. *Credit: Sandy Schaeffer, NSF*

In February, President Barack Obama bestowed the honor on 12 individuals: Allen Bard, Sallie Chisholm, Sidney Drell, Sandra Faber, Sylvester Gates, Jr., Solomon Golomb, John Goodenough, M. Frederick Hawthorne, Leroy Hood, Barry Mazur, Lucy Shapiro and Anne Treisman. All but Drell received NSF support at some point in their research careers.

Philip Rubin of the White House Office of Science and Technology Policy joined NSF Director Subra Suresh and past medal winners for a commemorative event during the annual meeting of the American Association for the Advancement of Science (AAAS) on February 17 in Boston, Mass.


Philip Rubin (left), Sallie Chisholm (2011 awardee), Nina Fedoroff (2006), Subra Suresh, Shu Chien (2010) and Warren Washington (2009) at AAAS ceremony. *Credit: NSF*

"Science of Innovation" Videos Feature NSF Research Outcomes

Imagine a world of 3-D printers, huge synthetic diamonds and self-driving vehicles. OLPA partnered with NBC Learn and the U.S. Patent and Trademark Office to produce a series of educational videos highlighting these and other patented innovations that have received NSF

support.

The 11 videos in the "**Science of Innovation**" series, narrated by NBC's Ann Curry, feature researchers in areas ranging from health care to manufacturing to transportation. The researchers include, for example, State University of New York's Deborah Chung, who developed a "smart" concrete, and Arun Ross, who pioneered a personal identification technique using the veins of the human eye, at an NSF-funded Industry/University Cooperative Research Center in West Virginia.
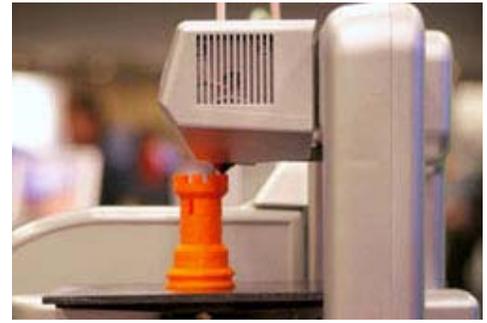
3-D printer. *Credit: NBC Universal*

The "Science of Innovation" series is a continuation of the Emmy Award-winning NSF-NBC Learn partnership that has previously produced five other "Science of…" **educational video series**, including the "Science of NHL Hockey" and "Chemistry Now." The videos are available free online.

NSF-funded Cyberinfrastructure Advances Computational Discovery

NSF will mark two milestones in March that further computational research. Two new, NSF-supported supercomputers will be dedicated: **Stampede** at the Texas Advanced Computing Center, University of Texas-Austin, on March 27 and **Blue Waters** at the National Petascale Computing Facility, University of Illinois-Urbana Champaign, on March 28.

Stampede, which is integrated into the NSF-funded **Extreme Science and Engineering Discovery Environment (XSEDE)**, makes supercomputing capabilities more broadly accessible to multidisciplinary science and engineering teams across the country. These capabilities will facilitate data-intensive research on global challenges across a range of disciplines.

Blue Waters, capable of sustained performance of more than a thousand trillion calculations per second, is one of the most powerful supercomputers in the world. It is designed for large-scale simulations and analysis by dozens of large teams across multiple scientific domains. Both supercomputers are already helping researchers with such tasks as predicting climate change, understanding complex biological systems, learning how the cosmos evolved after the Big Bang, and tracking the behavior of earthquakes, hurricanes and tornadoes.

National Science Foundation in the News

Better Science Makes Better Products *(Forbes)*--The company ATRP received NSF SBIR awards to commercialize technology and ingredients that improve products in the $56-billion personal care and cosmetics industry.

A Big Data Start-Up With a Long History *(New York Times)*--The data-analysis startup company Ayasdi builds on the career of an NSF-supported mathematics professor at Stanford University.

How Wireless Gadgets Are Breaking the Internet *(Mashable)*--New network designs are being developed under NSF's Future Internet Architectures Project, including networks that obtain data from the nearest location rather than from a fixed address.

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