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NSF AT WORK

Dusty Snow Impacts Colorado River Runoff and Water Availability

Slow and steady snowmelt from the Colorado River Basin is a key contributor to the regional water supply. However, a recent NSF-supported study reveals that windborne dust falling on the snow contributes to an overall decrease in available water.

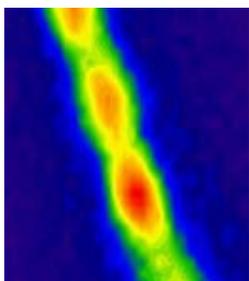
Since dark surfaces attract sunlight, increased amounts of dust on the snow will speed up melting. Scientists from Colorado, California and Utah analyzed deep samples of snow to determine how dust accumulation impacts Lee's Ferry, Ariz., the dividing line between the upper and lower Colorado River Basins. The researchers found that peak spring runoff from the Colorado River occurs an average of three weeks earlier due to the more recent five-fold increase in such dust. This in turn leads to changes in total annual runoff; water at Lee's Ferry and the Colorado River Basin as a whole has been reduced by about 5 percent per year.



Colorado scientist and study co-author Chris Landry analyzes snow samples. Credit: Center for Snow and Avalanche Studies

Fortunately, there may be ways to relieve this water loss. Researchers think increased dust levels are linked to farming activity as grazing animals in the Southwest kick up dust. Soil stabilization strategies could help curb windborne dust levels, and thereby mitigate water loss. For more information, read **more** or watch the **video**.

Solar Energy Harnessed Through Nanotube "Funnels"



Energy density image of a filament

Currently, one constraint of solar panel technology is space; large arrays of panels are often needed to harness the power of the sun. In order to maximize the opportunities to use solar technology, a team of researchers led by NSF Career Award recipient Michael Strano have developed carbon nanotube filaments that can be used to funnel energy from the sun.

Two New Dino Species Found in Utah



Utah researcher Scott Sampson with the skull of *Kosmoceratops richardsoni*, one of two new species of dinosaurs identified by Sampson and colleagues at the Utah

containing about 30 million carbon nanotubes that absorb energy from the sun. Credit: Geraldine Paulus

These nanotubes can concentrate solar energy 100 times more than a regular photovoltaic cell, and take up a smaller amount of space. In the future Strano, associate professor of chemical engineering at the Massachusetts Institute of Technology, proposes that these carbon tubes can be used to form solar antennas. Read more about this **work**.

Museum of Natural History and the Raymond M. Alf Museum of Paleontology. Read more about the **findings**. Credit: Scott Sampson, University of Utah

Technological Advances Improve Independent Mobility

Wheelchair users often rely on attendants and structurally modified van conversions for independent mobility. **Freedom Sciences**, LLC, and **Lehigh University**, funded through an NSF Partnerships for Innovation grant, have created the Automated Transport and Retrieval System (ATRS), a technology-based alternative to structurally modified vehicles. By seamlessly integrating robotics and automation technologies with existing mobility products, the system eliminates the need and cost of performing a vehicle conversion. Moreover, automating wheelchair stowage and retrieval and facilitating a seat-to-seat transfer between the vehicle and wheelchair eliminates the need for an attendant. The ATRS thus offers a new paradigm for wheelchair users: they can independently go to and from work and run errands necessary to daily living, and they can do so with enhanced safety, lower cost and greater freedom of choice. ATRS has received Food and Drug Administration approval, and is now available commercially.



Tom Palermo, a realtor in Ocean City, N.J., and paralyzed Bronze Star Vietnam Veteran, uses the Automated Transport and Retrieval System (ATRS) to participate in activities of daily living. Credit: Lehigh University

DID YOU KNOW?

When it comes to working in groups, intelligence is more complex and diverse than the sum of its parts. According to a new study co-authored by researchers at the Massachusetts Institute of Technology, Carnegie Mellon University and Union College, a group's intelligence may not be quantified as the sum or average of the cognitive abilities of its members.

Social scientists have long contended that a measurable level of intelligence in each individual is a predictive measure of that person's ability to fare well on diverse cognitive tasks. This study, however, paints a different picture for predicting successful performance of groups.

By studying small teams of randomly assembled individuals, researchers discovered that groups featuring the right kind of internal dynamics perform well on a wide range of assignments, regardless of the sum or average individual cognitive abilities of the group's members. Further, a group's intelligence--or its ability to complete a series of demanding multi-functional tasks--is positively linked to several factors, such as higher levels of "social sensitivity," a more equal distribution of member participation levels, and the number of women in a group. Watch videos of the researchers discussing their **work**.



A team working on one of the tasks used in the study involving detailed instructions and Legos®. Credit: MIT

FACES OF NSF RESEARCH

Subra Suresh Confirmed as NSF Director

The U.S. Senate has confirmed Subra Suresh, President Barack Obama's nominee for director of the National Science Foundation, for a six-year term.

Suresh, 54, served as dean of the engineering school and as Vannevar Bush Professor of



Subra Suresh.
Credit: Justin Knight

Engineering at the Massachusetts Institute of Technology. A mechanical engineer who later became interested in materials science and biology, Suresh has done pioneering studies on the biomechanics of blood cells under the influence of diseases such as malaria.

Suresh earned his doctorate from MIT in 1981, and joined the school in 1993, holding joint faculty appointments in the Departments of Mechanical Engineering and Biological Engineering, as well as the Division of Health Sciences and Technology.

NSF-supported Researchers Win 2010 MacArthur Foundation "Genius Awards"

Of the 23 MacArthur Fellowships awarded this year, nine went to NSF-supported researchers whose works span the science and engineering fields. Nicknamed the "genius awards," these prestigious fellowships have been sponsored by the John D. and Catherine T. MacArthur Foundation since 1981. Fellows are chosen through nominations and review by an anonymous selection committee, and each fellow will receive \$500,000 in funding over five years. Awardees are honored for their creativity, originality and their potential to make important contributions in the future.

The NSF-supported 2010 MacArthur fellows are: marine biologist Kelly Benoit-Bird, population geneticist Carlos Bustamante, biophysicist John Dabiri, anthropologist Shannon Lee Dawdy, optical physicist Michal Lipson, quantum astrophysicist Nergis Mavalvala, economist Emmanuel Saez, computer security specialist Dawn Song and entomologist Marla Spivak.



Kelly Benoit-Bird, Carlos Bustamante and John Dabiri (L to R) are 2010 MacArthur Fellows supported by NSF American Recovery and Reinvestment Act (ARRA) awards. Credit: Courtesy of the John D. & Catherine T. MacArthur Foundation, Distributed under the **Creative Commons license**.

NSF IN THE NEWS

Re-thinking the Internet With Security and Mobility in Mind (*Scientific American*) The NSF-funded Future Internet Architecture program builds a foundation for a stable and secure Internet in the years ahead. The *Scientific American* editors' blog, *Observation*, describes how NSF awardees tackle anticipated technology challenges such as emerging security threats and the increased demand on data services for mobile devices.

The Nobel Divide and the Climate Divide (*The New York Times*) Recent results from an NSF-funded study describe the factors that shape public interpretations of scientific findings. The *Times*' *Dot Earth* blog highlights this study in the context of climate change discussions.

The 24-Hour Science Cycle (*The Huffington Post/HDNet*) In a post on *Dan Rather Reports*, Rather describes the work of a NSF-supported scientist and her rapid response study of the effects of the Gulf oil spill.

Could a Touch-Based Navigation System Make Driving Safer? (*BusinessWeek*) A new technology supported by NSF funding could help drivers navigate without distraction. Researchers announced a touch-based navigation system integrated into a car's steering wheel that can effectively deliver directions to the driver.

THE RIPPLE EFFECT

New Video Series Teaches Science Through Football

Are you ready for some ... science? NSF has teamed up with the National Football League and



Running back Deuce McAllister's moves are captured by a state-of-the-art, high-speed Phantom camera for a new 10-part video series that explores the science behind NFL football. Credit: NBC Universal

NBC News' educational arm, NBC Learn, to develop a series of videos explaining science in relation to football. Launched during the back-to-school season and at the start of the NFL season, "The Science of NFL Football" is made especially for students and teachers as they head back to the classroom, and the videos are aligned to lesson plans and national state education standards. The 10-part video series, narrated by NBC News' Lester Holt, covers a wide variety of math and science topics and includes participation by NSF-supported scientists as well as current and retired NFL football players. For example, former NFL Saints running back and two-time Pro Bowl selection Deuce McAllister participated in the "Kinematics" **video**, in which NSF-funded scientists Tony Schmitz from the University of Florida and John Ziegert of Clemson University explain how the kinematic concepts of position, velocity and acceleration can be used to define how a running back moves. The Science of NFL Football series received mentions on "The Today Show" and during NFL programming. More videos will continue to be added weekly through October. These videos are available to the public cost-free on **NBC Learn** and **Science360**.

Innovation Contest Winners Announced

The U.S. Department of Commerce has announced the winners of the i6 Challenge, a \$12 million innovation contest led by the Department of Commerce's Economic Development Administration (EDA) in partnership with the National Institutes of Health and the National Science Foundation.



The i6 Challenge was created to identify and support the nation's best ideas for technology commercialization and entrepreneurship. Winning teams were identified in six different regions across the country.

The winning teams from each region are: the Global Center for Medical Innovation (Atlanta region); New Mexico Technology Ventures Corporation (Austin region); the University of Akron Research Foundation and Austen BioInnovation Institute in Akron (Chicago region); BioGenerator, Washington University in St. Louis, Saint Louis University, the University of Missouri at St. Louis, Donald Danforth Plant Science Center, St. Louis County Economic Council and the St. Louis Development Corporation (Denver region); Innovation Works, Inc., and Carnegie Mellon University (Philadelphia region); and the Oregon Translational Research & Drug Development Institute, the Oregon Nanoscience & Microtechnologies Institute, and the Oregon Built Environment & Sustainable Technologies Center (Seattle region). For more information, visit the i6 Challenge **website**.



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