

# NEWS in Science and Technology



from the

## CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING

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The following is an Executive Summary of the Academy's quarterly Bulletin (Vol. 23,2) that includes topics and issues in science and technology deemed by the Academy to be both timely and relevant to Connecticut's interests. Each item is briefly summarized from press releases and reports of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. Hyperlinks are included to the original online source, where more detailed information is available.

NOTE: Online versions of this newsletter and the Bulletin are available on the Academy website at [www.ctcase.org](http://www.ctcase.org).

### FEATURE ARTICLE

#### ➤ Connecticut's ENGINEERS WITHOUT BORDERS:

*"Building a Better World, One Community at a Time"*

That is the motto of the Hartford Professionals' Chapter (HPC) of Engineers without Borders—a non-profit humanitarian organization that partners with developing communities around the world to improve their quality of life. Connecticut chapters of the US branch of Engineers without Borders (EWB-USA) include two professional (Hartford and New London County) and five student chapters (Central Connecticut State University, the University of Connecticut, the University of Hartford, Wesleyan and Yale).

#### How it works

Engineers without Borders projects are subject to a rigorous approval process by EWB-USA to ensure the following:

- That a project meets EWB-USA's mission and that it benefits the community, not the individual
- That a chapter works with the community to determine how a project will be maintained after the EWB team is gone and whether there is a need for education to that end
- That project design is reviewed for quality of work and appropriateness to the site

Fundraising is key and is left to a local chapter's own ingenuity. The only restriction from EWB-USA is that donations made for a specific project must be used for that project. The current norm is to garner funding on a project by project basis. Subhash Chandra, a member of the Hartford chapter and a Westinghouse Electric Corp. executive, cites the necessary support of foundations, private financiers and the corporate community so that projects can be replicable and sustainable.

#### What's Been Happening

**University of Hartford (U of H) & HPC in Abheypur, India:** In January 2008, the U of H student chapter built a solar-powered groundwater pump system at the girls' primary school. The HPC, in conjunction with the U of H chapter, continues the work there, returning this August to connect the solar-powered pump to the lower-caste community and to rehabilitate two of the non-working wells.

**Central Connecticut State University (CCSU) & Hartford's Upper Albany Area:** Partnering with HPC, CCSU EWB is working to bring a Closed Circuit Television security system to Hartford's Upper Albany neighborhood in conjunction with the Upper Albany Main Street Society for increased safety.

**Yale in Honduras and Cameroon:** Yale's EWB chapter completed its first international project in 2006 with the construction of a water collection system in El Rosario, Honduras. The group traveled to the

#### Two Yale Scientists Awarded Prestigious Connecticut Science Medals

The 2007 Connecticut Medal of Science was awarded to CASE member **Michael P. Snyder**, Lewis B. Cullman Professor of Molecular and Cellular Biology and professor of molecular biophysics and biochemistry at Yale University and director of the Yale Center for Genomics and Proteomics. Snyder's most influential research is in the area of genomics and proteomics. His laboratory was the first to initiate gene characterization on a large scale. This work spawned the functional genomics field in which a large number of genes and proteins are analyzed simultaneously, and became the foundation for what many now call "systems biology." More recently, Snyder's laboratory discovered a novel signaling pathway important for embryonic stem cell self-renewal. These efforts are considered important for ultimately using human embryonic stem cells for therapy.

The 2008 Connecticut Medal of Technology was awarded to CASE Member **Tso-Ping Ma**, the Raymond John Wean Professor of Electrical Engineering at Yale University. Ma also serves as chairman of the Department of Electrical Engineering, and a codirector of the Yale Center for Microelectronic Materials and Structures. He is also a professor of applied physics. Ma's research and teaching have focused on microelectronics, semiconductors, MOS interface physics, ionizing radiation and hot electron effects, advanced gate dielectrics, flash memory device physics, and ferroelectric thin films for memory applications. His work has had a major impact on the high-tech industry and he has served as the principal investigator of joint R & D projects with numerous companies worldwide, including: IBM, Intel, Motorola, Lucent Technology, GE, Hughes, Rockwell Semiconductors, Philips, Siemens, Hitachi, and Toshiba.

village of Kikoo, Cameroon in August 2007 to begin the first phase of construction for a gravity-fed water distribution system.

**University of Connecticut (UConn) in Nicaragua & Thailand:** UConn's chapter received EWB-USA approval for a road restoration project in Nicaragua. The group is also working through a non-governmental organization in Thailand on a project that includes work with natural pesticides, solar power, catfish fisheries and adobe house development.

**HPC Work in New Orleans:** The HPC helped rebuild the Algiers Masonic Lodge in New Orleans and is currently at work on phase two of a rainwater catchment system at the Samuel J. Green Charter School.

People can get involved as volunteers, donors and corporate sponsors. Read the full story at [www.ctcase.org/bulletin/23\\_2/23\\_2.pdf](http://www.ctcase.org/bulletin/23_2/23_2.pdf) to learn more.

## NEWS FROM THE NATIONAL ACADEMIES

### ➤ Climate Change and the US Transportation Infrastructure

A new report from the National Research Council warns that while every mode of transportation in the nation will be affected as the climate changes, potentially the greatest impact will be flooding of roads, railways, transit systems, and airport runways in coastal areas because of rising sea levels and more intense storm surges. The report warns that impacts are certain to be widespread and costly and will require significant changes in the planning, design, construction, operation, and maintenance of transportation systems.

The report identified five climate changes of particular importance to US transportation: 1) increases in very hot days and heat waves; 2) increases in Arctic temperatures; 3) rising sea levels; 4) increases in intense precipitation events; and 5) increases in hurricane intensity. The report calls for the federal government to have a strong role in implementing many of its recommendations, but urges local governments and private infrastructure providers to begin to identify critical infrastructure that is particularly vulnerable to climate change.

[[http://books.nap.edu/catalog.php?record\\_id=12179](http://books.nap.edu/catalog.php?record_id=12179)]

### ➤ New Approach to Effective Health Care Urged

A new report from the Institute of Medicine urges establishment of a single entity with the authority and resources to help consumers sort through massive quantities of medical data and research, some of it contradictory, in order to identify reliable information about their healthcare options. This program would also be responsible for developing and promoting rigorous standards for clinical practice guidelines. The report proposes that the secretary of the US Department of Health and Human Services establish this program under the direction of Congress, which must see that the program is given the necessary authority, expertise, and funding. To help ensure objectivity and accountability, the report recommends that an independent, free-standing committee be created to advise the program and that an advisory board be established to provide broad oversight.

[[http://books.nap.edu/catalog.php?record\\_id=12038](http://books.nap.edu/catalog.php?record_id=12038)]

### ➤ Water Implications of Increased Biofuel Production

Last year, the Bush administration called for the production of more ethanol, raising the question of how this agricultural shift will impact water supplies and other resources. A National Research Council committee found that such a shift would likely lead to adverse effects on local water sources and water quality if new practices are not put into use

## CONNECTICUT SCIENCE CENTER UPDATE

Design of the Science Center's 200+ exhibits was completed in mid 2007. Fabricators are now at work constructing the various exhibit components. Multi-media firms are also busy creating the videos, exhibit touch screens, interactive games, and much more. Recently, film crews were developing a video for the Invention Dimension Gallery showcasing the work of Connecticut scientists.

Construction on the new Science Center building continues at a brisk pace. Details of the progress can be viewed in our latest WFSB Channel 3 project update available at [CTScienceCenter.org](http://CTScienceCenter.org).

The Science Center is now projected to open in late spring 2009.

promptly. Expanding corn and other biofuel crops into dry areas, could change current irrigation practices and greatly increase pressure on water resources. Water consumed during the ethanol production process could also diminish local water supplies. More crops also means increased use of fertilizers and pesticides, which would impact the water quality of groundwater, rivers, and coastal and offshore waters.

[[http://books.nap.edu/catalog.php?record\\_id=12039](http://books.nap.edu/catalog.php?record_id=12039)]

### ➤ Wake Turbulence A Challenge in Crowded Skies

The Next Generation Air Transportation System, or "NextGen," is an interagency federal effort to accommodate increasing demand for air travel, which is expected to double or even triple by 2025. One goal of NextGen is to take advantage of GPS to safely permit planes to fly more closely spaced. Unfortunately, GPS does not solve the problem of wake turbulence, the counter-rotating vortex of air that trails aircraft -- a danger for planes, especially smaller ones, flying too close behind. The FAA's current standards for how close planes can fly to each other are based on size. A National Research Council committee found that current requirements prevent taking full advantage of GPS and other technologies that would allow closer flying. While wake turbulence is not the only obstacle to increased air capacity, the committee concluded that a robust wake turbulence R&D effort is needed to maximize the air transportation system's efficiency.

[[http://books.nap.edu/catalog.php?record\\_id=12044](http://books.nap.edu/catalog.php?record_id=12044)]

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