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Making the Case for Space

It's been argued at water coolers and in the US Congress. Everyone from children to adults, technology experts to Presidents, has an opinion. Does the U.S. need a space program? The premise of this article is that a vibrant American space program is good for the country and that Connecticut has the technology infrastructure and expertise to lead the way to a strong future in space exploration.

First, a definition of the term "space program." While NASA's human spaceflight and exploration are the most visible aspects of the U.S. space program, there is significant space-related work being done for military and commercial applications as well. All of this work is supported by a combination of public and private funding. Many of these application areas have human and robotic components.

So, why continue to explore space? There are tangible and intangible reasons, but for most it's a combination of national pride and technology dominance.

"When I worked in industry, we'd contact vendors to buy a component for the space suit," said Tom Filburn, professor of mechanical engineering at the University of Hartford and director of the

NASA Connecticut Space Grant College Consortium. "We'd explain that there was not going to be a big market for the part we needed and they'd say that they didn't care. They just wanted to be able to claim that they made something for the space program. They weren't in it for the money, but it made the hair on the back of their neck stand up from the pride they felt in being involved in something so awe-inspiring."

Allen Flynt, general manager of the Space Systems group at United Technologies Aerospace Systems (UTAS), sees the tangible benefits such as technology development, but agrees that the intangible benefits such as the connection to the human spirit are equally important. "Humans have a desire to explore, compete and conquer new things," he said. "We want to do things that others can't. Great nations are often defined by their ability to explore. Financial considerations are obviously important, but if we try to make the case for space on a financial basis only, we don't stir the passion and emotion of people. I always believed that at the end of the day, there are tangible benefits that we can quantify in a financial sense, but it's much more difficult to measure the

(See *Space*, page 2)

Lutz Children's Museum in Manchester, CT, Introduces Kids to Science

The Lutz Children's Museum in Manchester, Connecticut, is where many young children go for their first experiences in science, art, and history. Programs include hands-on exhibits, live animals, classes, concerts, trips, a nature center, and school outreach.

Hazel Lutz was a local schoolteacher in the 1950s who collected artifacts in her classroom. She loaned the materials to other teachers to enhance their curriculum. Her commitment to teaching and learning is memorialized in the museum collection, and the institution named in her honor, which continues to grow.

(See *Lutz*, page 7)



The Lutz Children's Museum is home to the official State Groundhog of Connecticut. Shown above, "Connecticut Chuckles VIII," the latest in a long line of furry prognosticators, will be sworn in at the tender age of approximately 9 months on Groundhog Day, February 2, 2013. [Photo: Lutz Museum]

From the National Academies

The following is excerpted from press releases and other news reports from the National Academies (www.national-academies.org).

◆ Making Value: Manufacturing Transformation Should Favor US

Manufacturing is in a period of dramatic transformation throughout the world, and many of the changes taking place are ones that may favor American ingenuity, according to a new report from the National Academy of Engineering (NAE). Rapid advances in bio-manufacturing, robotics, smart sensors, cloud-based computing, and nanotechnology put a premium on continual innovation and highly skilled workers. In addition, smaller runs and custom-designed products favor agile, adaptable workplaces, business models, and employees, all of which have become specialties of American manufacturers.

The NAE hosted a workshop in June to discuss the new world of manufacturing and how to position the United States to thrive in it. The workshop focused on two primary goals: first, examining not just manufacturing but the broad array of activities that are inherently associated with manufacturing, including innovation and design; and second, focusing not just on making things but on making value, since value is the quality that will underlie high-paying jobs in America's future. The workshop findings are summarized *Making Value: Integrating Manufacturing, Design and Innovation to Thrive in the Changing Global Economy*.

http://www.nap.edu/catalog.php?record_id=13504

◆ Organizational Failures: Lessons from Fukushima

The principal causes of the Fukushima disaster were organizational culture and system complexity, according to an article in the National Academy of Engineering's "The Bridge" this fall. While most academics and practitioners in engineering focus their attention on the science and performance of physical structures and systems, delivering

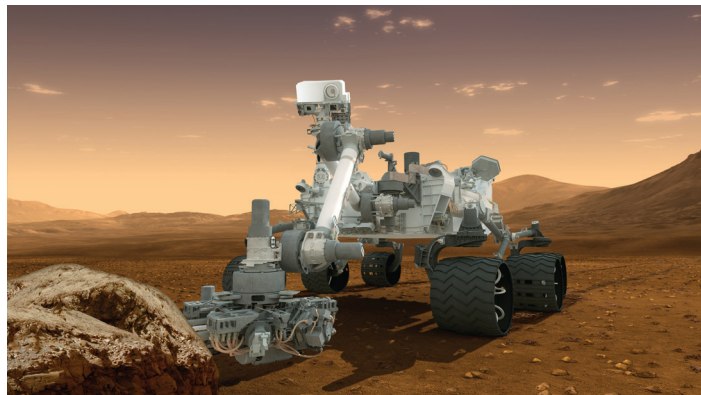
(See *NAS*, page 7)

impact the space program has had and continues to have on the spirit of our country."

Former NASA Administrator Michael D. Griffin spoke of "acceptable" and "real" reasons to support the exploration of space. As acceptable reasons, Griffin listed scientific discovery, economic benefit and national security. "These reasons have in common the fact that they can be discussed within the circles of public policy making," Griffin said. "They can be debated on their merits, on logical principles. They can be justified."

"Real reasons," he said, "are intuitive and compelling to all of us, but they're not immediately logical. They're exactly opposite of the 'acceptable reasons,' which are eminently logical, but neither intuitive nor emotionally compelling. The 'real reasons' we do things like exploring space involve competitiveness, curiosity and monument building [or leaving something for the next generation]."

Paul Hildebrandt, a filmmaker and self-admitted space junkie, has raised more than \$100,000 in private donations to support a docu-



An artist's rendition of NASA's Curiosity Rover on the Martian surface.
[Image courtesy of NASA]

mentary film he's making that explores the past achievements and future outlook for the U.S. space program. (www.fightforspace.com) He expects to release "Fight for Space" by the end of 2013. "I've always been intrigued by space exploration," Hildebrandt said, noting that he was an elementary school student during the early shuttle era. "I remember in 2004, when President Bush announced the Constellation Program," he said. "Then a couple of years later it was cancelled. That really hit me hard. I think what inspires us is when we send humans somewhere. It makes it personal."

Hildebrandt and his crew have interviewed scientists, engineers, politicians, teachers, students, astronomers and more, among them former NASA astronaut Leroy Chiao; astrophysicist and author Neil deGrasse Tyson; science educator, mechanical engineer, comedian, writer and television host Bill Nye; and aerospace engineer and author Robert Zubrin.

In an interview with National Public Radio earlier this year, deGrasse Tyson said America's space program is at a critical moment and it is time to invest heavily in space exploration and research. "Space exploration is a force of nature unto itself that no other force in society can rival," he said. "Not only does that get people interested in sciences and all the related fields, [but] it transforms the culture into one that values science and technology and that's the culture that innovates. And, in the 21st century innovations in science and technology are the foundations of tomorrow's economy."

Hildebrandt does not believe that efforts to engage commercial entities to facilitate space exploration will have the same impact that NASA has had. "Commercial companies are in business to make money," he said. "They can do a good job of taking over low-earth orbit projects where we've done all we can do in terms of exploration. It's cheaper to ferry supplies to the International Space Station via SpaceX's Dragon capsule, for example; however, I still think we need NASA to undertake the extremely expensive missions like exploration of Jupiter."

He cited technology transfer as another issue. "With NASA, technology spinoffs are shared as public property," he said. "When commercial companies are involved those technologies are owned by the company."

Mukwatsibwoha "Kwatsi" Alibaruho, director of the Enterprise Program Management Office for United Technologies Aerospace Systems, is a former NASA flight director who supported six Space Shuttle missions. "I don't think either NASA or industry does a stellar job of fostering interest in the space program," he said. "There is a lot of talent in both, but there are systemic problems. First, it is illegal for any federal agency (except the military) to engage in advertising or lobbying the public for its own good, which makes it difficult for NASA to hold onto an inspiring mission."

(See Space, page 8)

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IN BRIEF

Science and Engineering Notes from Around Connecticut



Biomedical Research

UCONN HOSTS GENOMICS CONFERENCE. Researchers from the **University of Connecticut's** (UConn) Storrs campus, the **University of Connecticut Health Center**, and **Jackson Laboratory** gathered September 6 at UConn's Student Center for a two-day conference that included talks on aging, cancer, personalized medicine, emerging human genomic technology, computational biology, and many other topics in genomics. In the past, Jackson Laboratory, based in Bar Harbor, Maine, focused on mouse genetics, but in collaboration with UConn, researchers at the new Jackson Laboratory for Genomic Medicine facility in Farmington plan to expand into whole-genome research and human health impacts.

UCONN'S LAURENCIN HONORED BY GENERAL ASSEMBLY. CASE member **Cato T. Laurencin** recently was recognized by the **Connecticut General Assembly** for his contributions and enduring leadership in bioscience innovations and research during his time as vice president for health affairs at the **University of Connecticut Health Center** and dean of the **University of Connecticut School of Medicine**. Cato is CEO of the **Connecticut Institute for Clinical and Translational Science**, director of the **Institute for Regenerative Engineering** and holds the Van Dusen Endowed Chair in Orthopedic Surgery at the UConn Health Center. Earlier in 2012, Laurencin's research on care for patients with tears of the anterior cruciate ligament was recognized in a special issue of *National Geographic* as being among the "100 scientific discoveries that changed the world."

STARTUP GRANTS FUND INTER-CAMPUS RESEARCH. Funding through the UConn Health Center/Storrs and Regional Campus Incentive Grants (UCIG) program, providing six teams of **UConn** researchers two-year start-up grants of \$100,000 to support interdisciplinary, inter-campus research proposals, was announced in September. The six teams, with at least one member on each team based at the Storrs and Farmington campuses, represent research disciplines ranging from cell biology and medicine to biomaterials, pharmaceutical sciences, chemistry, and pediatric dentistry.

YALE TEAM STUDIES KETAMINE USE IN DEPRESSION. In the October 5 issue of *Science*, researchers from the **Yale School of Medicine** published research on the use of ketamine as a treatment for depression. Ketamine triggers the release of neurotransmitter glutamate, which in turn stimulates growth of synapses, leading to improved symptoms hours after administration. Researchers believe ketamine could lead to the development of an entirely new class of antidepressants. The original link between ketamine and depression was made at the **Connecticut Mental Health Center** in New Haven by CASE member **John Krystal**, chair of the department of psychiatry at Yale, and **Dennis Charney**, now dean of Mt. Sinai School of Medicine in New York City.



Business & Industry

P&W GETS NOD FOR USAF ENGINE DEVELOPMENT FUNDING. **Pratt & Whitney**, a unit of Hartford-based **United Technologies Corp.**, has been selected over competitor Rolls-

Royce for funding by the US Air Force Research Laboratory for the Adaptive Engine Technology Development (AETD) program, an initiative to bring fuel-efficient, high-thrust technologies and engine design features that could transition into legacy and next generation military fighter aircraft, to maturity. The AETD program will lead to demonstration testing of an advanced high operating pressure ratio (OPR) core in late 2015, to be followed in 2016 by full engine testing of a three-stream adaptive fan and three-stream compatible augmentor and exhaust system.

CI INVESTS \$1.5 MILLION IN EMME. **Connecticut Innovations** has invested \$1.5 million in **Emme**, an energy management company that recently relocated from Beaverton, Oregon, to Bristol. The investment matches \$1.5 million the company raised from a combination of private investors and the state **Department of Economic and Community Development**. Emme has developed a proprietary energy management system that provides flexible climate control options for buildings using Internet connectivity, saving as much as 40% on energy bills.

OPERATION FUEL AIDS SMALL BUSINESSES. Bloomfield-based **Operation Fuel Inc.** is helping small businesses struggling to access energy assistance programs due to financial and time constraints. Project BEST (Business Energy Sustainability Team), funded with a \$1 million grant from Virginia-based **Dominion Resources Inc.** and \$150,000 from New Jersey energy company **PSEG**, assists small businesses in five of Connecticut's largest cities, providing \$1,000 grants for each business accepted into the program. The program accepted nearly 800 businesses. Dominion Resources owns Waterford's **Millstone Power Station** and a subsidiary of PSEG owns generating stations at harbors in Bridgeport and New Haven.

GO GREEN APPROVED FOR ANGEL INVESTOR CREDIT. **Go Green Global Technologies Corp** announced in September that its application to be a "Qualified Connecticut Business" for purposes of the Connecticut Angel Investor Tax Credit program has been approved. The company will be certified until September 20, 2013. Go Green focuses on developing and marketing innovative technologies leading to a cleaner planet. The Angel Investor Tax Credit, started in 2010 and administered by **Connecticut Innovations**, allows accredited investors to receive a Connecticut state income tax credit for investments made in qualifying businesses.

GE DONATES \$7.5 MILLION TO UCONN. This October, **General Electric Co.** announced it will donate \$7.5 million to the **University of Connecticut** for scholarships, an endowed professorship and research and development that can be developed into global products. Over the next five years the investment includes a \$1.5 million endowment for a GE professorship in the **School of Engineering**, a \$2.7 million grant for graduate and undergraduate fellowships and sponsorships, and up to \$3.3 million for GE-directed research in materials, manufacturing and circuit breaker technologies.

QUERALT GETS 2ND ROUND FUNDING. **Queralt Inc.**, a New Haven-based technology company producing cloud computing applications used to track personnel and equipment, received \$200,000 in October from **Connecticut Innovations** in the second round of its \$500,000 funding. The investment has helped expand Queralt's research and development efforts. The company's software platform gathers and processes data from multiple sensors, radio-frequency identification tags and GPS and mobile devices.

Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases.

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IN BRIEF

Science and Engineering Notes from Around Connecticut

The firm's software is currently in use at **Seabury**, an assisted living facility in Bloomfield, where it interacts with residents' pendant tag alerts, door and temperature sensors, and employee access tags.



Communication

CI INCREASES MYCARE INVESTMENT. In October, **Connecticut Innovations** announced that it had contributed an additional \$375,000 to Westport's **MyCare, Inc.**, in addition to \$500,000 invested earlier this year. MyCare is continuing to develop a data portal that gives doctors and care providers real-time access to patient medical information. In mid-September, the 383-bed **Bridgeport Hospital** announced it would be the first hospital to use MyCare's Smart Access to Medical Information (SAMI) portal, developed by Westport-based **Intersection Health Partners LLC**. SAMI is accessible via desk-top computers and wireless devices such as iPads or iPhones. **Yale-New Haven** and **Greenwich Hospitals** are in the process of implementing the portal.



Education & Cognition

UCONN HEALTH CENTER AWARDED \$1.2 MILLION FOR EARLY CHILDHOOD PERSONNEL CENTER. In September the US Department of Education announced it will award a \$1.2 million grant to the **University of Connecticut Health Center** to establish an **Early Childhood Personnel Center** to strengthen the skills of the early childhood workforce, thus improving developmental and learning outcomes for preschoolers with disabilities. The center will receive \$6 million over five years, and will work with five universities and 12 national organizations to assist professionals serving infants, toddlers, and preschoolers with disabilities. The goal is to develop qualified college faculty and future supervisors of personnel providing direct services to infants and children with disabilities.

GROUND BREAKING FOR NEW MAGNET HIGH SCHOOL. Ground was broken this September for the new location of the **Pathways to Technology Magnet High School**, which will become the **Pathways Academy for Advanced Design and Technology**—a \$40 million, high-tech, regional magnet high school in East Hartford that was previously housed in Windsor. The school is part of the Hartford school system, but will be partnered with **Goodwin College**, which already operates an environmental-studies magnet school on its East Hartford campus.

SCSU EXPANDS NANOSCIENCE EDUCATION. In September, **Southern Connecticut State University** announced it would expand its leadership in nanotechnology education by implementing the **NanoProfessor® Nanoscience Education Program**, which complements the university's existing curriculum by engaging students with hands-on, nano-focused experiments designed to teach scientific concepts related to nanoscale. Implementation of the program was made possible by a grant from the National Science Foundation (NSF) funding the **Center for Research on Interface Structures and Phenomena (CRISP)**, a Materials Research Science and Engineering Center (MRSEC) at **Yale University** and SCSU.

NEW LOCATION FOR CT CHILDREN'S MEDICAL CENTER'S SCHOOL. The **Connecticut Children's Medical Center** has a new, expanded location for its school. The school is now located in a 48,000-square-foot building in New Britain, providing space for the 125 students it serves with additional space to accommodate up to 175 children. The school, originally created to serve children

with long-term illnesses, currently focuses on children with developmental disabilities who have behavioral problems that interfere with education in the public schools. Most students come from central Connecticut and the Hartford region and stay between three and four years before transitioning to their local school.

MALLOY, UTC, HONORED FOR SCIENCE LEADERSHIP.

Governor Dannel Malloy and **United Technologies Corp.** were honored by the **Connecticut Science Center** for leadership in science education at the Science Center's October 20 Green Gala. The governor was recognized for his efforts to reform the state's public education system, particularly in the core disciplines of science, technology, engineering and math.



Energy

DEEP PRESENTS DRAFT ENERGY STRATEGY. On October 5, the **Connecticut Department of Energy and Environmental Protection (DEEP)** issued a draft *Comprehensive Energy Strategy for the State of Connecticut*. The plan is being developed in response to legislation passed in June 2011 that requires DEEP, in consultation with the **Connecticut Energy Advisory Board (CEAB)**, to prepare a Comprehensive Energy Strategy for Connecticut every three years. The draft plan—an assessment and strategy for all residential, commercial, and industrial energy issues—includes recommendations for increasing access to natural gas as an oil alternative by ensuring homes and businesses can connect to already installed gas lines and creating lines where currently none exist. The draft is available on the DEEP website at <http://www.ct.gov/deep/cwp/view.asp?a=4120&q=500752>.

COLLEGES SHARE ENERGY EFFICIENCY LOAN. Five Connecticut colleges will share a \$1 million loan from **Connecticut's Clean Energy Finance and Investment Authority** to improve energy efficiency as part of the "Campus Efficiency Now" program. The **University of Hartford**, **Mitchell College**, **Connecticut College**, the **University of Saint Joseph** and the **University of New Haven** will have five years to repay the loan from savings accrued by reducing energy costs. **Judith Greiman**, president of the **Connecticut Conference of Independent Colleges**, says the program, "should serve as a national model for reducing energy consumption and cost on college campuses which tend to have large energy-using footprints and older buildings and systems."

NUCLEAR WASTE ENVIRONMENTAL IMPACT STATEMENTS

ORDERED. In a nationwide study of storage for spent uranium, the US Nuclear Regulatory Commission (NRC) will investigate the environmental impact of nuclear waste stored at Connecticut's **Haddam** and **Waterford** sites. Starting in 1998, the US Department of Energy planned to transfer nuclear waste to a permanent storage facility that was never constructed, resulting in the need for **Millstone Power Station** in Waterford and **Connecticut Yankee** in Haddam to temporarily store spent uranium fuel onsite in cooling pools and dry casks. The NRC has directed its staff to develop environmental impact statements on the temporary storage sites in Connecticut, where more than 1,800 metric tons of nuclear waste is stored.

FUEL CELL TAX INCENTIVE PROGRAM LAUNCHED. In September, **US Rep. John Larson** and **US Senator Richard Blumenthal** pushed for new tax incentives boosting fuel cell development under the Fuel Cell and Hydrogen Infrastructure for America Act of 2012, providing a tiered incentive system with the most efficient fuel cells receiving the largest tax credits.

IN BRIEF

Science and Engineering Notes from Around Connecticut

Connecticut, home to **Fuel Cell Energy Inc.** of Danbury and **UTC Power** in South Windsor, is a global fuel cell technology leader. The technology is used for buses and government buildings; during last year's storm-related outages, fuel cells kept the power on in those schools that had them.



Environment

ENVIRONMENTAL PARTNERSHIP TO AID LONG ISLAND SOUND. In September, the Long Island Sound Futures Fund, a public-private partnership of the US Environmental Protection Agency, National Fish and Wildlife Foundation, US Fish and Wildlife Service, US Department of Agriculture's Natural Resources Conservation Service and Wells Fargo, granted \$757,922 to various Connecticut groups dedicated to improving the condition of the **Long Island Sound**. Connecticut projects receiving funds include: the Audubon's "Urban Schoolyard Habitat" partnership, a Long Island Sound inner city curricula outreach project by the **Sea Research Foundation**, and the **Environment Pond Lily** dam removal project, which will allow fish to travel upriver to spawn.

NU ANNOUNCES OPEN SPACE LAND TRUST. **Northeast Utilities** is preserving 981 acres in a land trust for open space in Connecticut. The trust includes 723 acres in **Sharon**, 188 acres on the Connecticut River in **Enfield**, 57 acres in **Newtown** and 13 acres in **Waterford**. The land will be permanently protected and accessible to Connecticut residents with the help of an interactive website including maps, pictures and videos of the property to help identify hiking trails and other recreational facilities. The grant is part of an agreement made last April between Northeast Utilities and Boston's NStar Utilities.

MARSHLAND STUDY SHOWS IMPACT OF EXCESS NUTRIENTS. An article published October 17 in *Nature* details research conducted by **Connecticut College** emeritus professor **R. Scott Warren**, lead author Linda Deegan of the Marine Biological Laboratory Ecosystem Center at Woods Hole, and a large team including faculty from research universities, graduate students and Connecticut College undergraduates. The researchers studied the impact of excess nutrients on a salt marsh within the Plum Island Estuary of Massachusetts by pumping nitrogen and phosphorus at levels typical of densely developed areas such as Cape Cod into a 25-acre swath of the marsh on every incoming tide during spring and summer for nine years and monitoring the marsh. They observed that marsh grasses below high tide levels grew fewer roots, and decomposition of the marsh peat accelerated, resulting in collapse of the tidal creek banks, which in turn caused the low marsh to turn into mudflats and diminished the environmental benefits resulting from grass-covered marshland.

NO ENVIRONMENTAL IMPACT FROM SANDY-RELATED SEWAGE DISCHARGE. Although Hurricane Sandy was responsible for untreated or partially treated sewage pouring into **Long Island Sound** and other Connecticut waterways during flooding and power outages, the sewage did not create an environmental problem, according to the **Department of Energy and Environmental Protection**. Areas affected include **Branford**, **Bridgeport**, **East Lyme**, **Fairfield**, **Greenwich**, **Ledyard**, **New Hartford** and **New Haven**. In Bridgeport, 15 million to 20 million gallons of partially treated sewage went into Long Island Sound when the city's two treatment plants were impacted by tidal surges.



Food & Agriculture

AG ENROLLMENT UP AT UCONN. Enrollment at the **University of Connecticut's College of Agriculture and Natural Resources** has increased from 808 students in 1997 to 1,484 in 2007 and 1,960 last year according to data published August 26. Increased interest in Connecticut farming is driven by consumers seeking locally produced vegetables, fruits, meats and poultry. Farmers are capitalizing on the opportunity and experimenting with new crops and technologies including adding products such as pickles, sauces or cheeses to increase profitability.

FARM BILL FAILURE COULD IMPACT DAIRY FARMERS. Congress failed to reauthorize the five-year farm bill that expired September 30 and the Senate did not approve a new bill. Connecticut's \$1 billion a year dairy industry supported the bill, which would provide farmers with subsidies when prices are low and cost of production is high. "Without government help, the price of milk explodes," said **US Rep. Joe Courtney**, a member of the US House Agriculture Committee. Without a new bill, the cost of milk at the supermarket could rise to \$8 a gallon. US House Speaker John Boehner indicated there may be a vote on a farm bill during the lame duck session, but it was not clear if it will be for a one-year extension or a new, multi-year authorization for a new dairy program.

HEALTHIER WIC REQUIREMENTS HAVE POSITIVE IMPACT. A study published in October by **Erin Havens** and colleagues at the **University of Connecticut's Center for Public Health and Health Policy** finds that after federal policy changes, WIC-certified stores in **Hartford** carried healthier foods than stores without WIC certification. The Special Supplemental Nutrition Program for Women, Infants, and Children (better known as WIC) provides checks for nutritious foods that can be redeemed in grocery stores. The purpose of the program is to improve the nutritional status of low-income mothers, infants, and children up to age five. In 2009, the WIC food package was updated, requiring that WIC-certified stores offer fresh fruits and vegetables, whole wheat bread, and lower-fat milk. These changes make healthier foods more accessible in low-income neighborhoods with limited access to larger supermarkets.

CT SCHOOL FITNESS PROJECT LAUNCHED. On October 26, **US Senator Richard Blumenthal** and representatives from the **University of Connecticut** launched the **Connecticut Fitness and Nutrition Clubs In Motion** or "CT Moves IM"—a National Institute of Food and Agriculture project focused on lowering childhood obesity in children ages 9 to 14. The project received a five-year, \$2.5 million Agriculture and Food Research Initiative Competitive Grant from the US Department of Agriculture. The project will begin at the **Roger Sherman Elementary School** in Meriden and over a five-year period will be brought to schools in **Danbury**, **Windham/Willimantic**, **Waterbury**, and **New Haven**. The project results from a partnership with the **College of Agriculture and Natural Resources** and the **Neag School of Education** at the **University of Connecticut**.

CT HORSES TEST POSITIVE FOR WEST NILE. Two Connecticut horses tested positive in September for West Nile Virus (WNV). According to the **Connecticut Department of Agriculture**, these are the first cases of domesticated animals contracting West Nile Virus infection in 2012. One horse, a 31-year old from South Windsor, had to be euthanized, while a four-year old from Southbury recovered after treatment. Horses are the domesticated animal most vulnerable to WNV.

IN BRIEF

Science and Engineering Notes from Around Connecticut



Health

YALE, HOSPITAL OF SAINT RAPHAEL MERGE. On September 12, Yale acquired the **Hospital of Saint Raphael**, making **Yale-New Haven Hospital** one of the largest hospitals in the nation. The merger will add an additional 511 new beds for a total of 1,519 beds and more than 12,000 employees. Although efforts were made to minimize job losses by keeping vacant positions open, about 200 positions will be eliminated.

HADDAM, WATERFORD TO PARTICIPATE IN NRC CANCER RISK STUDY. Haddam, where now-decommissioned **Connecticut Yankee** nuclear plant is located and Waterford, home to **Dominion Energy's Millstone** nuclear plant, will participate in a \$2 million pilot study of cancer risk in communities around six US nuclear power plant sites and nuclear fuel facilities. The study, conducted by the US Nuclear Regulatory Commission (NRC), will begin in the next three months and continue through 2014, with results expected to help the NRC decide whether to extend reviewing cancer risks in communities surrounding remaining nationwide nuclear facilities. The sites were recommended by the National Academy of Sciences because they provide a sampling of facilities with different operating histories, population sizes and levels of complexity in data retrieval from the relevant state cancer registries.

HOUSING, TRANSPORTATION KEY ISSUES FOR CT SENIORS. According to the state **Commission on Aging**, Connecticut has the nation's seventh oldest population, and ranks 10th in the number of residents over age 85. Connecticut's older population will grow by about 64% between now and 2030, while the percentage of younger residents declines. The two biggest issues facing the state in terms of its aging population are housing and transportation. Connecticut spends \$2 billion per year on long-term care services through Medicaid, and is trying to curtail the growth by improving support systems that help people remain at home rather than move into nursing homes. Developing transportation networks and building sidewalks are two other ideas currently under consideration.



High Technology

CT GRANT TO FUND PRODUCT LINE EXPANSION. **Andrews Consulting Group**, a 38-year-old IT services firm, was awarded \$1 million from **Connecticut Innovations** on August 9. The funds will be used to expand Andrews' product line, including software that organizes data to facilitate analysis by all of the major data analysis tools.

CLOUD TECHNOLOGY KEEPS STAMFORD FIRM ON TOP. For the 6th consecutive year, Stamford's **Amnet Technology Solutions** made the Inc. 5000 list of the fastest growing US private companies. Amnet's latest cloud delivery technology has contributed to its success, resulting in a steady increase in its workforce. The median growth rate of 2012 Inc. 5000 companies is 97% with companies on this year's list creating over 400,000 jobs in the last three years.

TWO STAMFORD FIRMS AMONG CTC'S TECH TOP 40. **Connecticut Technology Council (CTC)** recently announced the 2012 Marcum Tech Top 40 list, honoring the 40 fastest-growing tech companies in Connecticut. Two Stamford companies were recognized: **M2 Media Group** and **PASSUR Aerospace**, based on revenue growth over the last four years.

CT INVESTS IN NEW HAVEN PHARMACEUTICAL STARTUP. On October 29, **Connecticut Innovations** announced its \$1.5 million investment in **New Haven Pharmaceuticals Inc.**, which received a total funding of \$6.6 million from investors including **Yale University, EJ Funds, Kuzari Group** and **Advantage Capital Partners**. Using technology licensed from Yale, the startup is working on a line of drugs including a treatment for heart disease and acid reflux.



Transportation

MALLOY TO HEAD TRANSPORTATION INITIATIVES. **Governor Dannel Malloy** was named Lead Governor for Transportation by the **Coalition of Northeastern Governors (CONEG)**, a non-partisan association of governors from seven northeastern states, in August. Malloy will serve as chief coordinator for advocacy and policy advancement of transportation initiatives for CONEG.

TROLLEY MUSEUM GETS STATE GRANT. In August, the State Bond Commission announced that the **Shore Line Trolley Museum** in East Haven will receive a \$1 million state grant to construct new trolley storage buildings above the flood plain to protect the museum's valuable collection of 100-year-old trolleys as well as thousands of photographs, artifacts and books.

FOURTH BUSINESS ONBOARD FOR BRADLEY DEVELOPMENT ZONE. In September, the **Connecticut Airport Authority** approved the preliminary application of **Merchandising Partners**, the fourth business to join the Bradley Airport Development Zone. The company, a designer of consumer packaging and maker of point-of-purchase displays, will qualify for the zone's tax incentives—including a 10-year corporate business tax credit—because it is growing its operation in one of the zone's four towns: **East Granby, Suffield, Windsor, and Windsor Locks**. The zone provides the incentives to airport-related business firms utilizing the airport for distribution, manufacturing, and other specified businesses that develop or acquire property in the zone and foster job growth. A business qualifies if it acquires an idle facility or constructs, substantially renovates, or expands one and uses the facility for specified uses. The communities can apply to the state for a 50% reimbursement of property taxes during the abatement period, said Karen Jarmoc, chairwoman of the Airport Authority's outreach committee.

GRANT TO FUND ANTI-TEXTING PROGRAMS. The US Department of Transportation's National Highway Traffic Safety Administration announced in October that Connecticut will receive \$275,000 to conduct high-visibility anti-texting enforcement programs. The funds will be used to train police officers, develop improved methods for identifying texting drivers including enforcement protocols and techniques such as using stationary patrols, spotters on overpasses and roving patrols, and develop media strategies that alert the public to the dangers of texting while driving, of place.

CONSERVATION GROUP RELEASES ROAD MAP FOR FUTURE. The **Connecticut League of Conservation Voters Education Fund** released a comprehensive transportation guide in September promoting a 21st Century transportation system that would help Connecticut's economy while respecting natural resources and sense of place. The guide outlines benefits and options for improving transportation in terms of the environment, economy and public health.

—Compiled and edited by Wendy Millstein Swift

and operating engineered systems in an effective and safe manner has always depended on society and human beings, according to the article's author. People, organizations, and ultimately their cultures are all involved in decisions about the design, building, and management of complex engineered systems.

In addition to the human element, failures of complex engineered systems are rarely due to a single technical or environmental cause, the author says. Fukushima and other relatively recent examples of major system failure (e.g., the Deepwater Horizon oil spill in the Gulf of Mexico) are particularly disturbing because the underlying pathology of such situations has been well understood for more than 30 years, according to the author of the article.

<http://www.nae.edu/Publications/Bridge/62556/62560.aspx>

◆ US Electric Power Grid 'Inherently Vulnerable'

The US electric power delivery system is vulnerable to terrorist attacks that could cause much more damage to the system than natural disasters such as Hurricane Sandy, blacking out large regions of the country for weeks or months and costing billions of dollars, says a newly released report by the National Research Council. The report concludes that the security of the nation's electric power system is in urgent need of attention. The power grid is inherently vulnerable physically because it is spread across hundreds of miles, and many key facilities are unguarded. This vulnerability is exacerbated by a reorganizational shift in the mid-1990s, prompted by federal legislation to introduce competition in bulk power across the country, resulting in the transmission network being used in ways for which it was not designed. As a result, many parts of the bulk high-voltage system are heavily stressed, leaving it especially at risk to multiple failures following an attack. Important pieces of equipment are decades old and lack improved technology for sensing and control that could help limit outages and their consequences.

The report recommends ways to make the power delivery system less vulnerable to attacks, restore power faster after an attack or failure, and make critical social services less susceptible even if the delivery of conventional power is disrupted. The report urges investment in power system research, noting that the current level of actual investment in this research is much lower than it should be.

http://www.nap.edu/catalog.php?record_id=12050

◆ Aging US Population Will Require Policy Changes

The aging of the US population will have broad economic consequences for the country, particularly for federal programs that support the elderly, and its long-term effects on all generations will be mediated by how the nation responds, says a new congressionally mandated report from the National Research Council. The unprecedented demographic shift in which people over age 65 make up an increasingly large percentage of the population is not a temporary phenomenon associated with the aging of the baby boom generation, but a pervasive trend that is here to stay, the study finds.

Social Security, Medicare, and Medicaid are on unsustainable paths, and the failure to remedy the situation raises a number of economic risks, the report warns. Because of overall longer life expectancy and lower birth rates, these programs will have more beneficiaries with relatively fewer workers contributing to support them in the coming decades. Combined with soaring health care costs, population aging will drive up public health care expenditures. The ultimate national response will likely be some combination of major structural changes to public support programs, more savings during people's working years, and longer working lives. The report emphasizes the need to act now in order to craft a balanced response.

http://www.nap.edu/catalog.php?record_id=13465

The following Connecticut scientists were elected to the National Academies in 2012:

NATIONAL ACADEMY OF SCIENCES

John Carlson, PhD

Higgins Professor of Molecular, Cellular, and Developmental Biology
Yale University

Jorge E. Galán, PhD, DVM

Lucille P. Markey Professor of Microbial Pathogenesis and Chair, Department of Microbial Pathogenesis, and Professor of Cell Biology
Yale School of Medicine

NATIONAL ACADEMY OF ENGINEERING

Richard Wilker Korsmeyer, PhD

Senior Research Fellow and head of business development and licensing for pharmaceutical sciences
Pfizer Inc.

INSTITUTE OF MEDICINE

Marina Picciotto, PhD

Charles B.G. Murphy Professor of Psychiatry and Professor of Neurobiology and Pharmacology
Yale School of Medicine

◆ Engineering Education: Real World Experiences

A new report from the National Academy of Engineering showcases 29 engineering programs at colleges and universities across the United States that effectively incorporate real world experiences into their curriculum and highlights best practices for schools seeking to create new programs. The best practices outlined in the report, entitled *Infusing Real World Experiences into Engineering Education*, include incorporating multidisciplinary team-based projects into curricula to help students develop skills in decision-making, leadership, written and oral communication, organization/time management, cultural awareness, and problem-solving. The report identifies frequent impediments to incorporating real-world experiences into engineering programs and suggests ideas for overcoming these barriers to program implementation. The most frequent obstacles cited include lack of funding and financial support, faculty workload concerns, and challenges encountered with partners.

<http://www.nae.edu/Publications/65099.aspx>

Lutz (from page 1)

Today families come from across Connecticut to visit the museum and a dedicated team of museum curators travels to schools and libraries to deliver interactive programs. The museum gets a lot of exposure every year on February 2 as the museum's most famous resident, the official Connecticut State Groundhog, makes her weather prediction. She is one of about fifty wild and domestic animals that call the museum home.

Try to plan your visit around a regularly scheduled museum class. Topics range from puppets to the human heart. You might meet a chinchilla, paint like Picasso, or dissect a worm but children are guaranteed to learn something (and have fun too). The museum is located at 247 South Main Street in Manchester, just off I-384. More information is available at www.lutzmuseum.org or by calling 860-643-0949.

Visit our web site at www.ctcase.org

Space *(from page 2)*

“Second, NASA has to apply for funding every year and the bureaucratic process makes it difficult to be nimble,” he said. “The bureaucracy has grown to a point where there are so many wickets to go through that even if you have a grand vision, it will take years to act on it. Consider this: Between the end of the Apollo program in 1970 and 2012, our nation started several human space programs and executed only two—the International Space Station and the shuttle program. And, we were a handful of Congressional votes away from not funding the International Space Station.”

Noting that each new administration has a “new” plan for NASA, he said, “changing political tides put tremendous pressures on the mission and budget of NASA.”

Alibaruho went on to define space exploration as a “critical engine” that drives interest and education in science and engineering. “China is graduating two orders of magnitude more engineers every year than we are,” he said. “That’s one of the biggest implications of the lack of interest in our space program. Space is not the only driver of technology development, but we need everything we can get.”

Hildebrandt agreed. “Students from other countries (like Germany, Japan and China) come to the United States to get the best possible technical education and then return

“Space exploration is a force of nature unto itself that no other force in society can rival. Not only does that get people interested in sciences and all the related fields, [but] it transforms the culture into one that values science and technology and that’s the culture that innovates.”

— Neil deGrasse Tyson

to their home countries to be part of their active space programs in societies that value technical professionals.”

So, if space is critical, how does Connecticut capitalize on it?

“We have a strong history in this region that will help facilitate future space exploration,” said Elliot Ginsberg, president and CEO of the Connecticut Center for Advanced Technology, Inc. “We have an experienced workforce that understands what space travel requires and we have the infrastructure in place to transfer that knowledge base to the next generation so that we can build on the foundation that has been established.”

State Representative Pam Sawyer (R-55), House Minority Deputy-Leader-at-Large and a member of the General Assembly’s Higher Education and Employment Advancement Committee, who represents Andover, Bolton, Hebron and Marlborough, agrees. “Our state’s legacy in the US Space Program ranges from large to small companies,” she said.

“I visited Carlyle Johnson Manufacturing in Bolton recently. This company has on the

order of 40 employees who have an average of 19 years of experience. One of the company’s products is used to help move machinery on the International Space Station.

Sawyer explained that the Higher Education Committee worked with three of the state’s community colleges to develop a new high-tech manufacturing skills program. “We want to ensure that manufacturing for space and other applications isn’t a dying breed in our state,” she said. “We will have the skilled workforce ready to update the technologies in space and other industries that will move us forward. Space is not going away because it is an important frontier.”

Hildebrandt agrees. “We are drawn to space because of the unknown,” Hildebrandt said. “We don’t know what’s out there and that’s exciting. Are we the only intelligent beings in the universe? Is there life under the surface of Europa? The space program is about advancing technology, but it’s also about advancing the people, advancing the culture and pushing ourselves further. We better the nation and the world through the exploration of space because it IS the final frontier and the ultimate goal in exploration because it is almost infinite and we will never explore all of it.” — **Karen Cohen is a writer and owner of The Write Stuff, LLC.**

[An expanded version of this article is available at www.ctcase.org/bulletin/24_2/space.pdf]