



Career Cornerstone News

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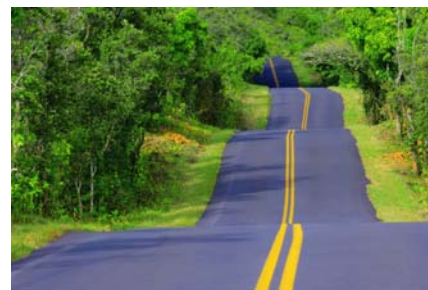
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Research Paves Way for Better Roads

The next generation of asphalt and concrete pavements used to build and rebuild roads, bridges, and other paved surfaces may well be based on a design guide produced by researchers from Arizona State University's Ira A. Fulton School of Engineering. Officials with the Transportation Research Board of the National Academy of Sciences and the American Association of State Highway and Transportation Officials (AASHTO), have approved new design guidelines for pavements developed by a team led by Matthew Witczak, a professor in the Department of Civil and Environmental Engineering.

AASHTO launched a study in 1999 into upgrading the methods by which asphalt and concrete pavements were designed. It included everything from pavements for roads and bridges to airfields, shipping ports, and rail lines. As a result, ASU studied new ways to design and construct asphalt and concrete pavements. The project became the largest transport study to be conducted in the United States, leading to an extensive update of the design guide. The new version provides different design and building guidelines for different locations based on varying



climate, soil and other environmental conditions. The team researched how soil changes due to climate conditions and its impact on pavement performance. This will help predict how well a road will be hold up in 10 or 15 years. The complexity of the design guide requires the final analysis to be done with the use of a computer program, which enables assessment of how much stress will make pavements crack.

Math, Science, & Technology Competition

Registration is now open for the 2008-09 Siemens Competition in Math, Science & Technology. The Siemens Competition attracts entries from high school science and math students nationwide. In the 2007-08 competition, 1,641 students registered to enter. The \$100,000 Grand Prize winners for 2007-08 represented the first young women to earn the top individual and team prizes. Isha Jain, a senior at Freedom High School in Bethlehem, PA, won top honors for her research on bone growth. The team of Janelle Schlossberger and Amanda Marinoff, seniors

at Plainview-Old Bethpage John F. Kennedy High School in Plainview, NY, were commended for their research on tuberculosis. Students may enter as individuals or as members of a team. The deadline for entries for the 2008-2009 competition is October 1, 2008. More details are at www.siemens-foundation.org.



that offer students an opportunity to network with other students, meet professionals in the field, and gain experience.

A state-by-state sample list is available online at www.careercornerstone.org.

There are many national and regional engineering, math, and science projects

Technical Disciplines Command Highest Salaries

New college graduates with degrees in the engineering and computer science fields boast the highest average starting salaries, according to a new report from the National Association of Colleges and Employers (NACE).

The NACE Salary Survey shows that chemical engineering graduates are currently pulling the highest average starting salary offer of \$63,616, followed by computer engineering graduates at \$59,962.

In fact, many disciplines have seen their starting salaries offers rise by 10 percent or more over the last year. For example, the average offer to computer science

graduates skyrocketed 14.7 percent from \$52,177 in Spring 2007 to \$59,873 currently. Also aerospace engineers saw an 11.3 percent increase from \$52,131 to \$57,999. And hefty increases aren't limited to the technical fields. The average offer to psychology graduates rose 10.7 percent from \$30,751 to \$34,054.

Conversely, many of the business disciplines seem to be feeling the effects of changes in the economy and have seen little movement in their average starting salary offers. For example, the current average salary offer to accounting majors -- \$47,429 -- is literally



just a few dollars higher than the average these grads posted in Spring 2007.

Keep up to date with all the salary trends for careers in science, technology, engineering, mathematics, computing, and healthcare online at www.careercornerstone.org.

Degree Profile: Respiratory Therapist

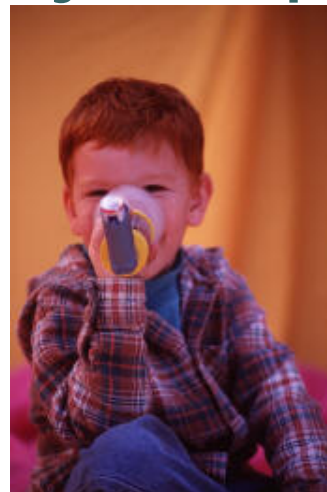
Respiratory therapists evaluate, treat, and care for patients with breathing or other cardiopulmonary disorders. Practicing under the direction of a physician, respiratory therapists assume primary responsibility for all respiratory care therapeutic treatments and diagnostic procedures, including the supervision of respiratory therapy technicians.

Respiratory therapists consult with physicians and other health care staff to help develop and modify patient care plans. They evaluate and



treat all types of patients, ranging from premature infants whose lungs are not fully developed to elderly people whose lungs are diseased. Respiratory therapists provide temporary relief to patients with chronic asthma or emphysema, and they give emergency care to patients who are victims of a heart attack, stroke, drowning, or shock.

To evaluate patients, respiratory therapists interview them, perform limited physical examinations, and conduct diagnostic tests. To treat patients, respiratory



therapists use oxygen or oxygen mixtures, chest physiotherapy, and aerosol medications -- liquid medications suspended in a gas that forms a mist which is inhaled.

An associate degree is the minimum educational requirement, but a

bachelor's or master's degree may be important for advancement. All States, except Alaska and Hawaii, require respiratory therapists to be licensed.

Find out more about careers in respiratory therapy at www.careercornerstone.org/respthr/restherprep.htm.

First Steps Toward Autonomous Robot Surgeries

The day may be getting a little closer when robots will perform surgery on patients in dangerous situations or in remote locations, such as on the battlefield or in space, with minimal human guidance. Engineers at Duke University believe that the results of feasibility studies conducted in their laboratory represent the first concrete steps toward achieving this space age vision of the future. Also, on a more immediate level, the technology developed by the engineers could make certain contemporary medical procedures safer for patients, they said.

For their experiments, the engineers started with a rudimentary tabletop robot whose “eyes” used a novel 3-D ultrasound technology developed in the Duke laboratories. An artificial intelligence program served as the robot’s “brain” by taking real-time 3-D information, processing it, and giving the robot specific commands to perform. The results of a series of experiments on the robot system directing catheters inside synthetic blood vessels demonstrated that

the autonomous robot system could successfully perform a simulated needle biopsy. Advances in ultrasound technology have made these latest experiments possible, the researchers said, by generating detailed, 3-D moving images in real-time.

The Duke laboratory has a long track record of modifying traditional 2-D ultrasound – like that used to image babies in utero – into the more advanced 3-D scans. After inventing the technique in 1991, the team also has shown its utility in developing specialized catheters and endoscopes for real-time imaging of blood vessels in the heart and brain.

In the latest experiment, the robot successfully performed its main task: directing a needle on the end of the robotic arm to touch the tip of another needle within a blood

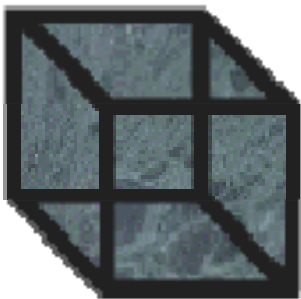


vessel graft. The robot’s needle was guided by a tiny 3-D ultrasound transducer, the “wand” that collects the 3-D images, attached to a catheter commonly used in angioplasty procedures.

While the research will continue to refine the ability of robots to perform independent procedures, the new technology could also have more direct and immediate applications.

Find out more about careers in engineering and healthcare at www.careercornerstone.org.

Link to the Sloan Career Cornerstone Center



Why not link to the Sloan Career Cornerstone Center from your website? Link to individual pages such as precollege resources, to degree profiles, or to our podcasts or newsletter. We’re happy to provide you with a custom graphic or any materials you need!

Find out more at www.careercornerstone.org

Experiment Sheds Light on Ketchup Phenomenon

Using data recovered from a damaged computer hard-drive that was aboard the ill-fated Space Shuttle Columbia in 2003, scientists have recently learned more about why the act of shaking a material can quickly transform it into something completely different. One of the best examples of this phenomenon is ordinary ketchup. Shake the bottle and the semi-solid paste becomes a runny liquid. Food scientists do the shaking in a controlled way by putting ketchup (and other processed foods) into a rheometer (rheo, meaning "flow") to see how its viscosity -- the scientific word for stickiness -- decreases when shaken. Robert Berg and his colleagues at the National Institute of Standards and Technology wanted to do more than measure viscosity. They wanted to know why the changes happen through

"shear thinning," a phenomenon in which agitation enhances a force that cuts across weak attachments among atoms or molecules. Understanding shear thinning is a big deal in the industrial world of processed foods, polymers, and paints. For instance, motor oil's viscosity can be degraded by the movement of engine parts, and the application of paint to a surface can be easy or hard depending on the manner of the brushstroke. To better understand the microscopic relation between viscosity and shear thinning, the NIST scientists looked at how the



thinning works in an unusual fluid -- the gas xenon. The trick is, xenon's own weight—as light as it is—still can compress the sample of the gas enough to throw off the delicate measurements that were needed. To do a proper study, the experiment needed a zero-gravity environment. And so up it went in Columbia. Fortunately, NASA found the hard drive and the packaged experiment among Columbia's debris. While in orbit aboard Columbia, the xenon was gently stirred by a fine mesh, a sort of tiny tennis racket. Stirring harder decreased the viscosity, confirming a decades-long theory about the relation between shear thinning and stirring.

Research on Underrepresented Minorities in STEM

The National Action Council for Minorities in Engineering has released new research that quantifies a growing "opportunity gap" in the number of minority students pursuing degrees and careers in science and technology. In what NACME characterizes as "the 'New' American Dilemma," the report shows that rates of participation by African Americans, American Indians, and Latinos in science, technology, engineering, and mathematics (STEM) fields have flatlined, and in some cases have actually declined. At a time when the pursuit of careers in science and technology is a major indicator of the nation's ability to be competitive and economically strong, the report finds a vast pool of minority students who aren't prepared for STEM fields and who thus can't contribute to the solution. Among other statistics, the report reveals that the proportion of bachelor's degrees in engineering awarded to African Americans between 1995 and 2005 has declined. In addition, though Latinos are expected to account for 25% of the U.S. population by the mid-21st century, the gap in educational attainment for Latinos relative to non-Hispanic whites has widened. Find out more about careers in STEM and diversity support at www.careercornerstone.org.

