Nationally and Internationally Recognized Scholars

Codd wins second prestigious NSF award. Sarah Codd, assistant professor in mechanical and industrial engineering at Montana State University, has won a prestigious $400,000 CAREER Award from the National Science Foundation for her work in magnetic resonance microscopy, a technique that allows researchers to see the inner workings of devices as small as one-tenth of a millimeter in size. Codd's work assists research on fuel cells, medical catheters and the cleanup of contaminated soil and water. Codd will use the funds to advance her research, teaching and public education of how magnetic resonance microscopy can be used to help solve a variety of pressing engineering problems. In 2004 Codd received a $387,000 NSF Advance Fellowship. [http://www.montana.edu/cpa/news/nwview.php?article=4588]

ChBE student lands one of a dozen congressional internships. Katie Hoyt, senior in chemical and biological engineering, has been awarded a Morris Udall Native American congressional internship. Hoyt has been funded by an Idea Network of Biomedical Research Excellence (INBRE) undergraduate scholarship to work in the Center for Biofilm Engineering on research with Peter Suci, Sarah Codd and Phil Stewart. The Morris K. Udall Foundation funds 12 Native Americans or Alaska Natives each summer for a 10-week internship in Washington, D.C. The Foundation awarded the 2007 internships on the basis of merit to Native Americans and Alaska Natives. The internships are awarded to students or recent graduates based on their college status and demonstrated interest in fields related to tribal public policy. Follow this link to learn more about the internship program [http://www.udall.gov/udall.asp?Link=115].

Motivated ME students nab second in NASA competition. John Nelsen, a senior in mechanical engineering, and Isaiah Helm, a sophomore in ME, took second place in the Fundamental Aeronautics Program of NASA's Aeronautics Research Mission Directorate held in the summer of 2006. The pair tied for second place with two other teams: one comprised of three doctorate students and one senior undergraduate from the Georgia Institute of Technology in Atlanta and one of 10 undergraduates from the University of Virginia at Charlottesville. With just their initiative and a signature from Mike Edens, a supportive adjunct professor, Nelsen and Helm designed a “speed brake” system to reduce commercial aircraft noise. They won certificates, plaques and summer internships at NASA's Langley Research Center in Virginia. Due to previous obligations, both refused the internship. Nelsen graduated in December 2006. [http://www.montana.edu/cpa/news/nwview.php?article=4009]

Leading Research

CBE edges out Harvard in biofilm-related publications. According to the ISI Web of Science database, Montana State University published more biofilm-related papers in 2004 and 2005 than any other institutions. Harvard University ranked second in both years. As of December 2006, MSU had the second-most cited papers in 2004 and 2005. Researchers at the Institute of Genomic Research and at the University of California Berkeley wrote the most-cited papers published in 2005 and in 2004 respectively. Rankings may change slightly over time as the ISI database continues to collect more data. Follow link for details [http://www.erc.montana.edu/Res-Lib99-SW/newsarchives/HTML/2006/vol9_12Dec06.htm]

CBE to save lives lost to chronic wounds with $2.9 mil. from NIH. MSU's Center for Biofilm Engineering (CBE) has received a four-year grant for $2.9 million to find new ways to heal chronic wounds. Such wounds make diabetics 10 to 15 times more likely than non-diabetics to undergo foot or lower-leg amputations. A Finnish study found that 80% of diabetics who underwent such amputations died within five years. Grant partners are Dr. Randy Wolcott, Medical Director of the Southwest Regional Wound Care Center in Lubbock, Texas, and the dermatology division at the University of Washington's Department of Medicine. The CBE got involved in chronic wound research in 2004 after Wolcott asked CBE researchers to help him determine whether biofilms play a role in his patients' persistent wounds. Undergraduate research done by Ellen Swogger, ChBE '06, and Pat Secor, now an MSU doctoral candidate, provided the data used to win the grant. [http://www.montana.edu/cpa/news/nwview.php?article=3874]

Faculty strive to boost speed and reliability of fiber-optic networks. With the help of a National Science Foundation research grant, MSU professors Brendan Murney, computer science, and Richard Wolff, Gilhousen Telecommunications Chair in electrical and computer engineering, are trying to improve the performance, reliability and efficiency of fiber-optic networks. Their work could allow as much as a 10 percent increase in traffic on fiber-optic networks. Additionally, fiber-optic networks could become more robust from their research, being better able to support a large number of users making and ending calls without causing a system to slow down or crash. Graduate and undergraduate researchers will be involved in the project through interdisciplinary senior design courses and individual projects.

911 responders ask researchers for lasting connections. The Department of Homeland Security has granted $300,000 to Richard Wolff, Gilhousen Telecommunications Chair in electrical and computer engineering, Doug Galarus, Western Transportation Institute, and Jian (Neil) Tang, computer science. The research team proposed the project after Wyoming’s Hot Springs County Sheriff’s Office sought help to build a reliable communications network.
A new study. The blocks are embedded with rebars or dowel bar and formulated to meet the Washington DOT's specifications and reflect what is typical for Washington's roads and bridges. Shi and Pan are exposing the blocks to four different highway de-icers, from straight salt to de-icers containing corrosion inhibitors. Their findings could lead to a national, standardized method for testing how chemicals seep into concrete and help the nation save billions of dollars in maintenance, repair and replacement of the nation's bridges and roads.

NASA taps ECE faculty to gather pieces of global climate change puzzle. MSU researchers have received $1.14 million from NASA to study aerosols and water vapor in the atmosphere. Electrical and Computer Engineering faculty members Kevin Repasky and Joseph Shaw are collaborating on the remote-sensing project with two Physics faculty members and two graduate students. The team will build a two-color light-detection and ranging system (LIDAR) to determine the concentration of aerosols and a device to measure water vapor. Water vapor is the chief greenhouse gas, but unlike carbon dioxide, its concentration varies widely over the globe from day to day. The team will also gather atmospheric data with two additional sensors that they will buy, install and maintain with funds from the NASA grant. The team's data will contribute to climate modeling. Understanding the complex interaction of aerosols, which might actually cause a cooling effect, and greenhouse gases that cause warming is important. At this stage, scientists need more data and better models to answer questions about whether reducing particulates from cars and smokestacks could accelerate global warming.

Acoustic research could help save soldiers from snipers. Rob Maher, Electrical and Computer Engineering, has gained considerable media attention because his research findings have the potential to save soldiers from snipers. Although Maher is unable with current technology to link a 911 recording of a gunshot to a specific weapon, he has determined the trajectory of a bullet on a shooting range. He used microphones and triangulation to locate the position of the firearm. Using this method in a city, where sound would bounce off buildings or be absorbed by trees, is far more difficult. Commercial systems to locate snipers are being used in Iraq, but because they are classified, it is unclear how they work precisely. According to Maher, the next step is to do more careful calibrations on all the parameters — the gunpowder, the local geometry, the acoustical characteristics of the vicinity — and work from there.

MTI battles corrosion to save nation's highways and billions of dollars. Xianming Shi and Tongyan Pan, researchers at the Western Transportation Institute at MSU, are experimenting with nine tons of concrete in the form of 150 custom-poured blocks to address highway corrosion. The Washington Department of Transportation is funding the study. The blocks are embedded with rebars or dowel bar and formulated to meet the Washington DOT's specifications and reflect what is typical for Washington's roads and bridges. Shi and Pan are exposing the blocks to four different highway de-icers, from straight salt to de-icers containing corrosion inhibitors. Their findings could lead to a national, standardized method for testing how chemicals seep into concrete and help the nation save billions of dollars in maintenance, repair and replacement of the nation's bridges and roads.

Montana State University is now in the top tier of research universities in the United States. A new classification system by the Carnegie Foundation for the Advancement of Teaching recognizes MSU as one of 94 research universities with "very high research activity." Other such institutions are Yale University, Harvard University, Johns Hopkins University, the University of Washington and Oregon State University. MSU's expenditures from sponsored research programs reached almost $100 million in Fiscal Year 2005 and are expected to keep going.

Alumni Contributions

Joel T. Long and the estate of Lysle A. Wood each donate $1 million to the College of Engineering. Thanks to the generosity of two MSU alumni, the College of Engineering has recently established two professorships. A $1 million gift from Joel T. Long, '65 B.S. Phys., '67 M.S. CE, and '05 Hon. Doc. Eng., allowed the COE to establish the Joel T. Long Professorship of Civil Engineering, which is currently occupied by Brett Gunnink, Civil Engineering Department Head. Remaining funds will be used for scholarships and to strengthen civil engineering programs, particularly in Construction Engineering Technology. With half of a nearly $1 million gift from the estate of Lysle A. Wood, ME '25, the COE has established a Mechanical Engineering professorship in his name. Wood, who died in 1991 at age 87, was a prolific aerospace pioneer who spent 44 years with Boeing. The Wood professorship is not yet filled.

More than 100 companies recruit COE grads in annual Career Fair. More than 100 companies and organizations recruited from MSU's COE at the Career Fair held in fall 2006. Upon graduating, our graduates are ready to hit the ground running. They are known to be hardworking, ethical, and knowledgeable. Upper classmen and those who have recently graduated can begin shaping their careers by seeking guidance from MSU's Career Services.
**Student Centered Campus**

**COE supporters donate more than 60% of college-based funds to MSU Scholarship Campaign.** Donors supporting the College of Engineering provided more than 60% of the college-restricted funds and nearly 28% of the total amount raised in the MSU Foundation’s recent scholarship campaign. The campaign raised $21,354,755, with $5,941,849 designated for the COE. Total gifts to the campaign substantially exceeded the Foundation’s $18 million goal. [http://www.montana.edu/wwwulf/camp_update_final.htm](http://www.montana.edu/wwwulf/camp_update_final.htm)

**Opportunities for Hands-On, Active Learning**

**Small spaces packed with performance: Rare electronics lab and student-designed CMOS chips.** Jim Becker, assistant professor in electrical and computer engineering, combined his 2004 NSF CAREER Award with two other grants to create MSU’s first high-frequency circuit lab, the Microwave and Millimeter Wave Electronics Lab. The garden-shed-sized lab is one of only three west of the Mississippi with equipment that lets researchers test circuits and devices in the one to 300 gigahertz range made from silicon CMOS (complementary metal oxide semiconductors). CMOS chips are especially small circuits and devices such as those in ipods, DVD players and global positioning devices. By creating chips operating at higher frequencies, Becker and his students hope to find an inexpensive way to manufacture chips that handle orders of magnitude more data. Such research could dramatically change wireless communication, radar and even create new ways to detect harmful chemical and biological agents. [http://www.montana.edu/cpa/news/nwview.php?article=3801](http://www.montana.edu/cpa/news/nwview.php?article=3801)

**Wireless expert gets NSF support to guide undergrad research.** Richard Wolff, Gilhousen Telecommunications Chair, Electrical and Computer Engineering, has received a National Science Foundation grant to support a Research Experience for Undergraduates program. The REU program will engage eight undergraduate students each year for three years in a 10-week research experience at MSU. Participants will work on real-world, innovative and interdisciplinary research focused on wireless communications for rural and remote areas; be encouraged to seek graduate degrees in engineering, computer and information science; develop research skills and improve communication and collaborative skills. The students will gain financially as well. The grant allows each student a $4,000 stipend, travel expense up to $500, MSU housing, and a meal allowance. All objectives will be met in state-of-art wireless research facilities and will be interwoven with faculty-student mentoring, weekend outings and social activities.

**Undergraduates in the College of Engineering test their abilities to design and build.** Twice each year during a Design Showcase open to the public, students display senior design projects, ranging from wireless robots and satellite sensors to a fishing line swivel or high-performance bowsight. After devoting time in and out of class, several teams headed to regional engineering competitions with creations that they designed and built, including a formula car, a recumbent bicycle, two radio-controlled micro-Baha cars, and a concrete canoe.

**Service and Outreach**

**MMEC receives Montana’s first WIRED grant.** The Montana Manufacturing Extension Center received the first grant from the State of Montana’s New Homestead Act, funded by the U.S. Department of Labor’s Workforce Innovation in Regional Economic Development Program. The program is designed to capitalize on markets for bioproducts and renewable energy. Most of northeastern Montana, comprised of 32 counties and six Indian reservations, has been designated a WIRED region. MMEC will provide customized worker training and help new and existing bioproduct companies improve efficiencies. The long-term goal is to develop bio-products and agro-energy industries to help the region overcome the ravaging effects of drought, out-migration and economic stagnation.

**Middle-school students glimpse the biofilms world at the CBE.** In February the Center for Biofilm’s Promoting Enrichment Activities for Kids (PEAK) program gave Helena middle-school students a firsthand look at biofilms. They investigated yeast metabolism, used a stereoscope to see goo that kitchen sponges trap and grow, toured some of the CBE labs to learn about the equipment and experiments, and used a scientific method to identify “glowing goo”, an unknown luminescent material. See photos at this link [http://www.erc.montana.edu/Res-Lib99-SW/newsarchives/HTML/2007/PeakTour07.htm](http://www.erc.montana.edu/Res-Lib99-SW/newsarchives/HTML/2007/PeakTour07.htm)

**MMEC helps Montana businesses deliver $88 million economic impact.** From July 2005 through June 2006, Montana Manufacturing Center (MMEC) clients reported nearly $88 million of positive economic impact. The companies were surveyed by an independent survey house that collects data quarterly to assess the effectiveness of MMEC services in delivering measurable returns to clients and investors. Clients also reported that direct services resulted in an increase of 169 jobs and retention of 150 positions. Respondents indicated that they were highly satisfied with MMEC services, giving the center a rating of 4.73 out of a possible 5. That high rating is not surprising given that survey results also indicate that MMEC clients are modernizing, investing in their people, increasing sales, saving money and becoming more productive and competitive.
WTI hosts high school students for Summer Transportation Institute. The Western Transportation Institute hosted high school students for the 2006 Summer Transportation Institute (STI). Students in grades 10 to 12 came to the MSU campus for a four-week transportation program. They participated in a number of hands-on activities, demonstrations, and field trips. Guest speakers described a wide range of career opportunities, including traffic engineering, road ecology, safety, infrastructure design, aviation, and automotive design. The STI is a national program funded by the Federal Highway Administration. Students who attended the STI at MSU got additional benefits. Thanks to contributions from WTI and a generous sponsorship from Morrison-Maierle, Inc., participants got a stipend to offset lost income from summer jobs. Summit Aviation contributed free “discovery flights” on its Cessna training plane and the Montana Department of Transportation hosted a lunch and facilities tour in Helena.

MSU’s College of Engineering packed its National Engineers Week agenda with ways for students in middle school through college to learn about engineering careers and concepts. More than 300 middle school students participated in an Engineerathon or Girl Scout Badge Day at MSU and high school students spent a day with an engineering student during Shadow an Engineer. Rebecca Ortiz, the keynote speaker at the Women in Engineering Dinner, described her career and life choices. She began her career as an active-duty member of the U.S. Air Force. Ortiz is currently an associate for Booz Allen Hamilton, a global strategy and technology consulting firm. More than 100 people, including female high school students and their parents, attended the dinner.

Robots draw young Native Americans to engineering during summer camp. Designing Our Community, a program to attract Native American students to engineering and computer science programs at MSU, hosted middle school students for a one-week summer engineering camp in 2006. The camp focused on engineering skills such as applying math and science to real-world problems. Hands-on activities occupied most of the schedule and covered all of the COE’s disciplines. Most students said that building and competing with LEGO® robots was their favorite activity. The camp is intended to increase the number of low-income students who are prepared to enter and succeed in post-secondary education. It was funded by the COE’s EMPower (Engineering Minority Program) and Montana’s Gaining Early Awareness and Readiness for Undergraduate Program, or GEAR-UP.