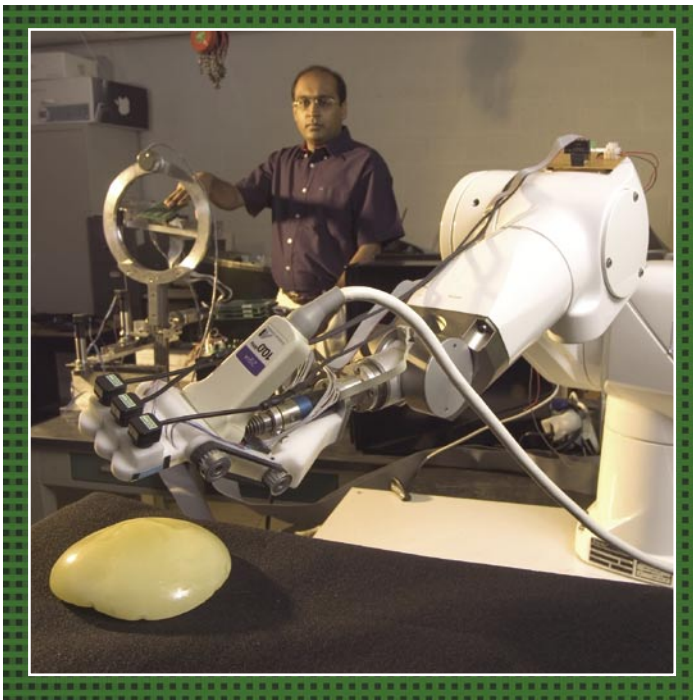


ME Alumni Newsletter

Department of Mechanical Engineering | www.egr.msu.edu/me

MICHIGAN STATE
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MSU Breast Exam Robot on BBC



Ranjan Mukherjee with the new breast exam robot
Photo by Kurt Stepnitz, MSU-University Relations

Women living in areas that lack easy access to health care can look forward to potentially life-saving breast exams because of robotic technology developed by Ranjan Mukherjee, associate professor of mechanical engineering. Physicians from MSU's Department of Surgery are developing a robotic device that can check for lumps and other abnormalities in a woman's breast and, at the same time, get an ultrasound image.

A physician or other health-care provider, located in a hospital or clinic, will slip his or her hand into a glove-like instrument. That will allow him or her to move the robotic arm that is with the patient in a remote location. *(Continued on page 7)*

New High Performance Computer

Mechanical Engineering Faculty Collaborate Outside the Department

The High Performance Computing Center (HPCC) at Michigan State University was established in 2005 to facilitate discovery by students, faculty, and staff through the use of high performance computing. HPCC began as a faculty-led initiative involving several faculty members from the Colleges of Engineering (Leo Kempel and Farhad Jaber) and Natural Science (Piotr Piecuch and SD Mahanti) interested in high performance computing simulations. *(Continued on page 7)*



**Tamara
Reid-Bush**

Biomechanics Research

Part of Tamara Reid-Bush's work involves "sitting down on the job" – she conducts research in the area of seating biomechanics. Reid-Bush assisted in the development and testing of Steelcase's Leap office chair which contains a feature called the "live back." The "live back" is named for its ability to move with and support occupants as they change postures. It is this movement, or postural change, that has been shown to play an important role in maintaining a healthy back.

More recently, Reid-Bush worked with Johnson Controls to develop an automotive seat with a "live back" component. Currently, occupants in automobiles are confined to a single posture. Some car seats may allow for small deviations in posture with the addition of a lumbar support. *(Continued on page 7)*



Eann Patterson

Chair's Message

I am delighted to be writing my first message in this newsletter. From my initial perspective ME@MSU is a sleeping giant. I mean this in the sense that the department is large. For instance we have more than a thousand students enrolled, we have a very talented faculty who are advancing knowledge on a number of fronts, and there are some world-class facilities. These facilities include the

new high performance computer; yet our department is relatively unknown. As you will read elsewhere in this newsletter, we are embarking on a period of expansion with plans at an advanced stage for a fabulous new research building, and a search is underway for four additional faculty with the probability of more to follow. Our research activity is growing and is beginning to make a major impact internationally. Some of this excellent work is featured here and more will appear on our new web site over the coming months.

Our graduates have always been in demand by blue-chip companies and smaller enterprises alike. We are engaged in a process of continuous improvement of the content and delivery of our programs to ensure that the popularity of our graduates is sustained. We are also collaborating nationally in an NSF award to develop a more accessible curriculum in mechanical engineering. The innovation in our curriculum has been recognized through an international award presented to Professor Jack Lloyd and Tim Hinds (see article below).

Launching hundreds of graduates into successful careers is a major contribution to the economy at both state and national levels, but there are other ways in which we bring our expertise and leading edge knowledge to benefit society, such as through technology transfer. This is also being recognized (see page 1) and we are working hard to increase the impact and to give maximum value for money.

I have received a warm welcome from the MSU community and I am looking forward to working with everyone to wake up the sleeping giant!

\$10 million
budget for
energy and auto
research labs

John Lloyd and Tim Hinds receive the ASME Innovation Award for 2005



John Lloyd (center) and Tim Hinds (left) receive their award

John Lloyd, University Distinguished Professor of mechanical engineering, MSU; Timothy Hinds, academic specialist, mechanical engineering, MSU; Moon Jung Chung, professor, computer science and engineering, MSU; Kenneth David, associate professor, anthropology, MSU; and Douglas Timmer and Miguel Gonzalez, both in manufacturing at The University of Texas Pan American are immersed in an ongoing program known as INTEnD, International Networked Teams for Engineering Design, an engineering education program initially created in 1997 by educators at MSU and various international campuses. INTEnD is a multi-discipline, multi-college, multi-university, multi-country program that has as its focus engineering design and manufacturing. It has received more than \$1 million in support from the National Science Foundation and many companies since its inception.

In an international competition, the INTEnD team recently received one of four 2004 Curriculum Innovation Awards from the American Society of Mechanical Engineers in recognition of their successful program

As of December 2004, the INTEnD program has educated more than 160 MSU engineering students in the practice of

global engineering; more than 100 engineering students from around the world have participated on engineering design and manufacturing teams with the MSU students.

New Energy and Automotive Research Lab

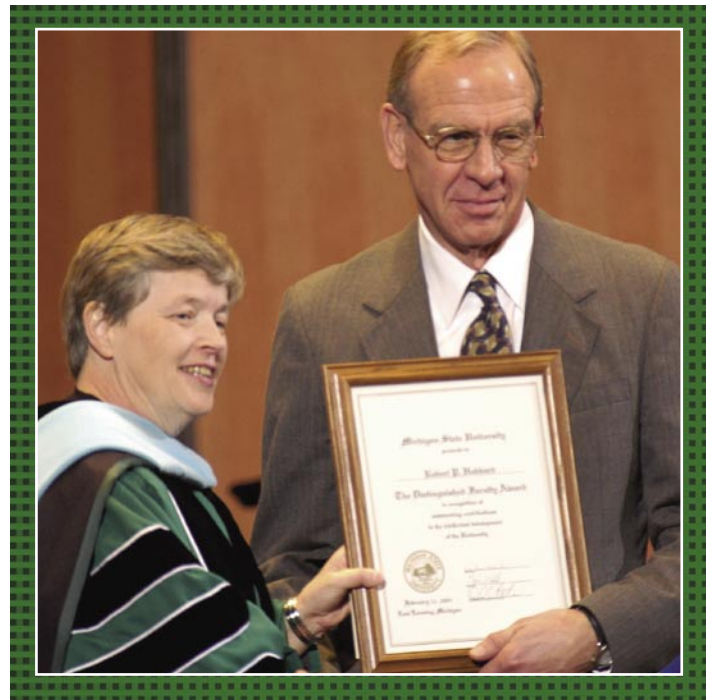


South perspective of proposed building addition

Spring and summer 2005 have been very busy times for the Department of Mechanical Engineering. Plans have been approved by the Board of Trustees to build the 29,000+ square foot mechanical engineering addition to the engineering research building. The building will house research labs, test cells, and offices for new faculty, providing increased capabilities for cutting-edge work. Funding has been provided by Ford, GM, alumni, and Michigan State University.

Robert Hubbard Receives Distinguished Faculty Award

Robert Hubbard was presented with a Distinguished Faculty Award at MSU in 2005. He received the award in recognition of a sustained record of scholarly excellence in research and creative activities, instruction, and outreach. Hubbard has received international acclaim for his bioengineering research on human spinal mechanics and for developing unique enabling



Robert Hubbard receiving his award from President Lou Anna K. Simon

technologies in human biomechanics, including office and automotive seating and a life-saving head and neck device for racecar drivers.

Advanced Manufacturing Research

Al Loos, Patrick Kwon, Farhang Pourboghraat, and David Ki form the nucleus of the Advanced Manufacturing Research Laboratory, A100 RCE. The primary mission of the research laboratory is to support the basic and applied manufacturing research activities in the Department of Mechanical Engineering. The major equipment items housed in the laboratory include a Lambda Physics Compex 301 Excimer Laser, a Trumpf TLF 2500 CO₂ Laser, Sharnoa SVC 36 CNC Milling Machine, a double-action stamping press (Interlaken ServoPress 75), a tube hydroforming simulation system, and a complete machine. A high pressure gas gun is currently under construction and equipment for the manufacture of polymeric composite materials will be added in the future. The laboratory is used by faculty and students to support their research activities in laser manufacturing and micromachining, manufacturing processes, composites manufacturing, forming processes, environmentally benign manufacturing, coating technology, and impact response of material.

Student Issues and News

Freshmen course sequence 101/102

The Department of Mechanical Engineering believes that the sooner problem solving can be introduced to students, the stronger their educational experience and problem solving abilities will be. Two new courses are being developed at the freshman level to facilitate this education. This year ROSES (Residential Option for Science and Engineering Students) students have the unique opportunity to take these two new courses:

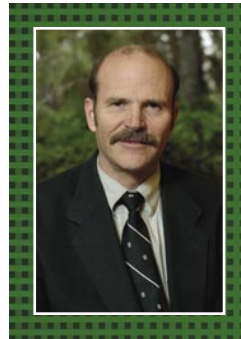
ME 101 Creative Engineering Solutions I

ME 102 Creative Engineering Solutions II

In both of these courses students will learn about the practices and disciplines of mechanical engineering. Problem solving techniques will be introduced that will use hands-on experiences, calculation experiences, and computer experiences to solve many real-world, mechanical engineering problems. The courses will also include extensive computer experiences, as students learn programs that allow them to draw on the computer and carry out analysis on the computer. These two courses will be used in the student's curriculum to replace ME 180: Engineering Graphic Communications and CSE 131 Technical Computing and Problem Solving. Curriculum developments for sophomore, junior, and senior years will follow these changes to the freshman experience.

New Graduate Coordinator

Fall 2005 has seen a number of changes in the Department of Mechanical Engineering. One of these involves Clark Radcliffe taking over the duties of graduate coordinator from Indrek Wichman. Wichman served in the position for two years and speaks of his time as "a wonderful experience that allowed him to really get to know the graduate students." It is also important to note that Professor Wichman's research in combustion has given him insights into directing graduate students in their paths of study. As new incoming graduate coordinator, Clark Radcliffe reflects that his 25 years in the department have given him a good perspective on graduate issues. He has also been instrumental in conducting research in controls, especially in mechatronics. This change in graduate coordinators has also brought about a move of the graduate secretary to the 2400 wing of the Engineering Building. Aida Montavaldo now resides only doors from Professor Radcliffe in a new office created exclusively for the program to better serve the graduate population. This is part of an overall plan to raise the impact and status of the graduate program.



Clark Radcliffe

Clark Radcliffe, professor of mechanical engineering, was awarded the 2005 Withrow Teaching Excellence Award. Professor Radcliffe has a particular quality that is both respected and admired by his students, the quality of being available for counsel and friendship. Education for Radcliffe does not end as he walks out of the classroom door. Education is an integral part of the way he draws students into the excitement of mechanical engineering. As voiced by one of his students, "He cares about our lives as well as our studies." Education is everything with Clark Radcliffe, and "He has made an enormous impact on the lives of many of the students with whom he deals." He is seen by his students as a mentor who is always "ready to share his experiences, advice, and things to look out for in the real world." Clark Radcliffe is a professor who "really cares!"

2005 Withrow Teaching Excellence Award Recipient

Clark Radcliffe, professor of mechanical engineering, was awarded the 2005 Withrow Teaching Excellence Award. Professor Radcliffe has a particular quality that is both respected and admired by his students, the quality of being



Joseph Klewicki

Distinguished Alumnus Award

Joseph Klewicki (BS'83 PhD'89) was awarded the Department of Mechanical Engineering Distinguished Alumnus Award for 2005. He studied under John Foss in the area of fluid mechanics. Klewicki is currently the dean of engineering at the University of New Hampshire, a position he took in August 2005.

His previous position was with the University of Utah where he served as chair for the Mechanical Engineering Department.

Four Faculty Searches in Process

The Department of Mechanical Engineering is beginning an exciting fall, which hopefully will culminate in the hiring of four new faculty members, bringing the number of faculty in the department to 40, improving the standing of the department in the Big Ten ranking in terms of number of faculty. The areas to be focused on for these new faculty positions include combustion, controls, biomechanical, and multi-scale modeling and computational physics.



Brian Thompson

Brian Thompson Awarded High Honor

Professor Brian Thompson has been named a University Outreach & Engagement Senior Fellow. Michigan State University has established an advisory/consultant panel of distinguished investigators to meet with visiting scholars, advise the assistant provost, and serve as a visible sign of MSU's focus

on engaged scholarship. Although the designation is for life, Fellows agree to a three-year term. The 24 current Fellows have appointments in Sociology, Education, Psychology, Journalism, Nursing, Business, Medicine, Agriculture, Law, Engineering, Food Safety and Toxicology, Family and Child Ecology, Geography, the Museum, and Extension. Thompson has been a professor in the Department of Mechanical Engineering since 1982. His principal focus in engineering is in the area of design. He coordinates the design program in mechanical engineering, which culminates in the nationally recognized Design Day, held each semester at the MSU Union.



Nikolai Priezjev

New Faculty

Nikolai V. Priezjev, assistant professor of mechanical engineering, effective August 16, 2005, earned his PhD (2002) in physics from Brown University in Providence, Rhode Island. He received his BS (1997) in physics and applied mathematics from Moscow Institute of Physics and Technology and his MS (1999) in physics from Brown University. Before coming to MSU he held a

postdoctoral research position in the Department of Chemical Engineering at Princeton University. His research interests include molecular simulations of complex fluids, interfacial phenomena, transport phenomena in micro and nanofluidic systems, fluid flows at the solid boundary and thermocapillary fluid motion, hybrid multiscale methods, liquid crystals, and statistical mechanics.

817 **undergrads enrolled in mechanical engineering**

Brian Olsen ME Graduate Student Receives Honor



Brian Olsen receiving his award from President Lou Anna K. Simon

Brian Olsen, doctoral student in mechanical engineering under the tutelage of Steve Shaw, received an Excellence-in-Teaching Citation during the February 11, 2005 MSU Annual Awards Convocation for demonstrating exceptional care and skill in meeting classroom responsibilities.

Mini-Baja: MSU Spartan Offroad Racing

For the first time ever, MSU fielded two vehicles in the mini baja competition, and the two vehicles were backed by the largest team ever in the history of the MSU mini baja program, according to Pete Schupska, mini baja chief engineer. Twenty students were involved; the team's faculty adviser is André Bénéard, associate professor of mechanical engineering.

The 2005 team competed in the Mini Baja 100 in Arizona and the Mini Baja Midwest in Ohio. They placed 18th and 29th out of 131 teams in Arizona, and 16th and 47th out of 141 teams in Ohio. Highlights include a 3rd place in maneuverability, 10th place in rock crawl, 13th place in hill climb, 14th place in



The MSU team poses beside a Caterpillar 797 off-highway dump truck typically used in open mining. Back row, left to right: Tim Locker, Ben Usher, Pete Schupska, Neal Koenig. Front row: Andy Gillett, John Benghauser, Erin Johnson, Emily Duszynski, Brian Kunkel.

acceleration, and 18th place in endurance. The team presented a strong design with a 5th place sales presentation, 7th place powertrain design, 10th place suspension design, and 15th place chassis design.

“Mini baja gives students the opportunity to meet a design challenge and apply the engineering fundamentals learned in the classroom. The challenge is to design, construct, test, and race a small, off-road vehicle while at the same time raising funds and maintaining a university schedule,” says Schupska. “This challenge forces students to utilize classroom knowledge while working in a team environment and balancing many responsibilities. These skills are invaluable and are the focus and intent of collegiate design competitions.

“2006 brings a promising season with new challenges,” he says. “We plan to enter two vehicles again, and also to return to the amphibious competition--Mini Baja East--for the first time since 1998. This will be another exciting year for everyone involved.”

For more about the team, visit www.egr.msu.edu/baja.

Alumni News

- Erik Skirmants was named President of Sports Car Club of America Enterprises.
- Kristin Zimmerman, PhD, was a mini plenary speaker for the annual conference for the American Society for Engineering Education
- Joe Colucci has been honored by the Brooklyn Technical High School as a 2005 Hall of Fame inductee. Tech is one of the best and largest science and engineering high schools in America with about 80,000 graduates. Its Alumni Hall of Fame has 30 members.
- Frank T. Paganini, (BS’57 MS’58) of Grand Rapids, passed away September 6, 2004. He was admitted to MSU on a varsity swimming scholarship (backstroke) during his undergraduate years and was captain of the 1956 squad his senior year.

Faculty News

- John Foss will be spending fall semester on sabbatical.
- André Bénard and Charles Petty have instituted an NSF funded Industry/University Cooperative Research Center on Multiphase Transport Phenomena (NSF I/UCRC -MTP) The center’s objective is to further development, evaluation, and deployment of next generation multiphase models for turbulent and non-turbulent flows as well as computational methods for rapid design and analysis of processes and equipment for a wide range of applications encountered in, but not limited to, the automotive, chemical, and petrochemical industries.
- Farhang Pourboghraat has returned to the classroom from his 2004-2005 school-year sabbatical
- Eann Patterson received the Zandmann Award from the Society for Experimental Mechanics for his contributions to research in reflection photoelasticity.



Joachim Lay

Joachim E. Lay Passes Away

Joachim E. Lay, professor emeritus, serving Michigan State University from 1957-1990, passed away at 85 on June 9, 2005. He was educated in France, Switzerland, Belgium, and the United States, receiving the

Candidat Ingenieur degree from the University of Liege and a Ph.D. from the University of Michigan. He was a weight and stress engineer on the B-24 bomber at the Ford Motor Company (Willow Run), research engineer at Ford (Dearborn), assistant professor at the University of Detroit, professor emeritus at Michigan State University, research associate at M.I.T., and consultant to the U.S. Office of Ordnance Research. He was the author of *Thermodynamics: A Macroscopic-Microscopic Treatment*, and co-editor of *Development in Mechanics*. He is the inventor of various flying devices, held several patents on engines; and is listed in *Time* magazine's special bicentennial issue under "American Ingenuity: Still Going Strong."

Breast Exam Robot on BBC

(Continued from page 1)

As the hand touches the patient, the sensation from this touch comes back into the hand. When the robotic fingers feel a lump or some other abnormality, the physician can also feel it

The robotic hand will also be equipped with an ultrasound transducer that will collect and transmit back to the health-care provider an image of what he or she is feeling. The system also will have video and audio capabilities, so patient and physician can directly communicate.

It can provide health care for people in remote locations by putting an experienced provider at the other end. Mukherjee has also been working on a spherical robot that will be a unique platform for mobile machines. A sphere has many advantages over a wheel.

It is more stable, it is capable of rapid maneuvers and movement, and it can roll in any direction. As a consequence, it has less trouble traversing rough terrain. The robot moves by shifting internal weights. These weights are pushed up and down by motors on three inner spokes. The movements of the weights create the internal imbalances that make the sphere roll. When a weight is pushed out on a spoke, the sphere moves in that direction. Once the weight is at the bottom, it can be retracted without causing further movement.

Ranjan Mukherjee's new remote breast exam robot has been mentioned repeatedly in the media.

MSU Today - June 10, 2005

The Great Lakes IT Report (the leading daily technology e-newsletter in the Midwest published by WWJ Newsradio 950) - June 17, 2005

The State News - June 21, 2005

WILX TV (Channel 10) news - June 2005

WLNS TV (Channel 6) news - June 30, 2005

MedGadget (internet journal of emerging medical technologies) - June 30, 2005

NewScientist.com news service - July 5, 2005

Jay Leno monologue - The Tonight Show - July 6, 2005

Jay Leno monologue - The Tonight Show - July 13, 2005

New High Performance Computer

(Continued from page 1)

The center activities are jointly funded by the Vice President for Research and Graduate Studies (VPRGS), the Vice Provost for Libraries, Computing and Technology (VPLCT), the College of Engineering, the College of Natural Science, and the National Superconducting Cyclotron Laboratory (NSCL). Computation has emerged as the third leg of scientific discovery. During Fall 2004 and Spring 2005, the HPCC center staff and faculty advisory board conducted source selection and site planning. The HPCC occupies 2,100 square feet on the third floor of the Engineering Building with two primary computational assets:

1. SGI Altix 3700 Bx2 with 64 processors, 256 GB RAM, and 6.4 TB fiber-channel attached storage. This system provides approximately 333 GFlops of tightly coupled computer power.
2. Western Scientific AMD Cluster with 512 cores, 1 TB aggregate RAM, with an Infiniband connective fabric, and 8 TB fast storage. This system is estimated to provide 2.4 TFlops of distributed computer power. In addition, the HPCC installed an SGI Altix 350 as a "sandbox" for developmental activities associated with the Altix 3700.

Biomechanics Research

(Continued from page 1)

However, with the live back, Reid-Bush's testing has shown that the seat back flexes with the occupant, allowing spinal movement and providing continuous support, reducing the need to stuff a small pillow behind your back for support.

Testing of both the Steelcase and JCI seats was performed in MSU's Biomechanical Design Research Laboratory. This testing included measures of motion and pressure distribution. Recently, PBS's *DragonFly* television came to MSU to videotape Reid-Bush and some of her seating research. The show, which is designed to get young students excited about science, links biomechanics research performed by a "real-scientist," to a trebuchet contest held at Mason Middle School.

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Graduation year and degree: _____

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