

me @ msu

DEPARTMENT OF MECHANICAL ENGINEERING | FALL 2006 | COLLEGE OF ENGINEERING

Going with the Flow: Jaber's Research Promises Multidisciplinary Impact

How will a new aircraft design perform? Where and how will a river flow? How does fire spread? What will the weather be like tomorrow? Next week? Farhad Jaber, associate professor, thinks he can easily and reliably help to answer these questions and many more.

Working in his Computational Fluid Dynamics (CFD) Lab, Jaber is developing software that can predict how unstable—or turbulent—fluids will be under diverse circumstances and varying pressures. According to the researcher, 90 percent of fluids found in nature are turbulent, and the elements that behave like fluids include fire and the atmosphere. All of this means that CFD research has implications, not only for mechanical engineers, but for meteorologists, firefighters, even physicians.

"The applications for turbulent-flow prediction are pretty broad. Oceans are turbulent fluids and they determine the weather, so weather prediction and water-movement prediction are one and the same," says Jaber. "Even blood movement in the heart and lungs is turbulent. Predicting blood movement could benefit medicine greatly."

He even sees military applications for his work. According to Jaber, the U.S. Air Force is using turbulent flow prediction technology to develop next-

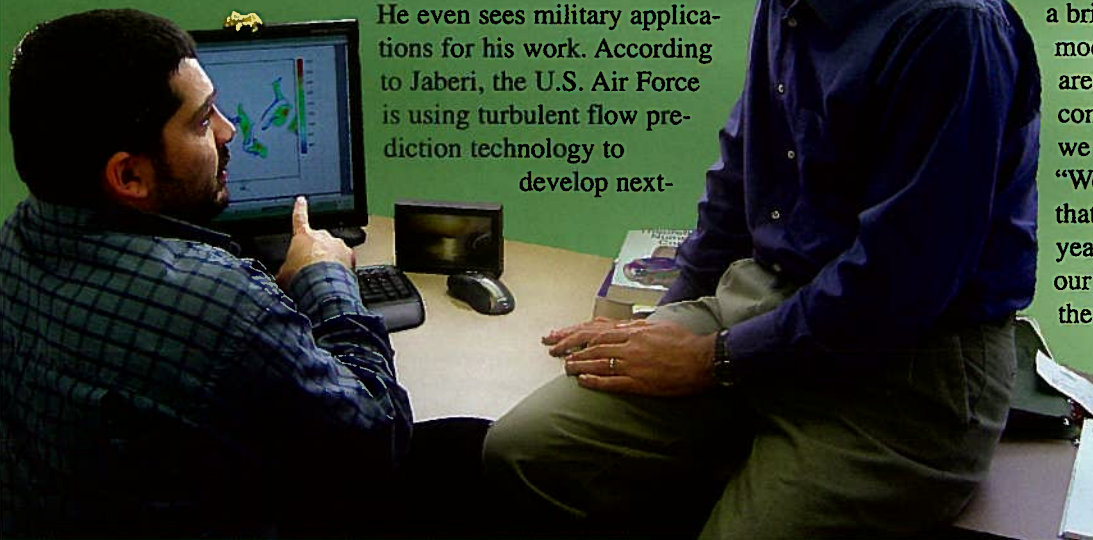
generation aircraft, and the Department of Homeland Security has also taken an interest in CFD research. "We have a tremendous advantage if we can predict how biological agents will move in water and air," he says. "In the case of a terrorist attack, we will know how to respond."

Jaber's research is focused specifically in the area of propulsion systems for use in gas turbine engines, chemical reactors, and aircraft. However, the broad applicability of the study has attracted research dollars from a range of agencies including the National Science Foundation and the Departments of Defense and Energy. The investigator credits the attractiveness of CFD research to the potential implications of new technology in the field.

"Improving software to model fluid flows means that—rather than building an entire aircraft and performing 100 experiments—we build and test the aircraft on the computer first," says Jaber. "Then we do only four or five actual experiments. This can save billions of dollars and countless hours of work."

While he admits that current technology in the field is crude, Jaber says that he sees a bright future for CFD research. "Our models are not perfect, but this is an area that is growing very rapidly. As computer power and software mature, we develop more capability," he says. "We do things at the university level that will be advantageous 10 to 20 years down the road. My hope is that our models will be highly valuable to the next generation of engineers designing fluid flow systems."

Farhad Jaber, associate professor (right), works in the Computational Fluid Dynamics Lab with Murat Yaldizli, PhD student.



Chair's Message



Eann Patterson

Design has a high profile on campus these days, in part due to President Simon's "Boldness by Design" campaign for the university and in part due to the growing success of the Mechanical Engineering Design Day Program. The 2005-2006 academic year saw the introduction of the Edison Medals award for the best overall capstone design project in mechanical engineering (see page 6 for a list of design day winners). The judging is performed by a team of industrialists assisted by academics from the Colleges of Arts and Letters and Communication Arts and Sciences.

In late April, we were honored to welcome June Youatt, associate provost and dean for undergraduate studies, to Design Day to present the Edison medals. Next semester will see the introduction of cross-campus collaborations to capstone design, with students from different disciplines coming together to solve real-life problems for industry. We hope this will create a bigger impact for small businesses in the state, as well as broaden the student experience. Each semester we also have at least one humanitarian project for a local school or hospital. We intend to extend this to include one project focused on the needs of people in an under-developed country.

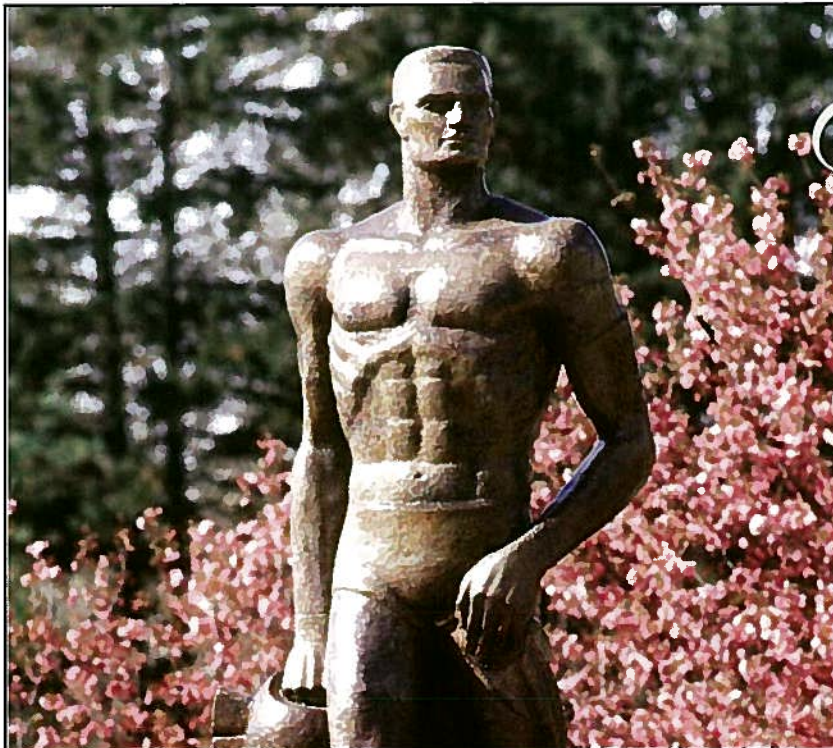
As we went to press, it was announced that we had won the Michigan/AFRL Collaborative Center in Aeronautical

Sciences (MACCAS) award. This center operates in collaboration with the Department of Aerospace Engineering at the University of Michigan and is funded by the U.S. Air Force. Congratulations to Mei Zhuang, associate professor, and her colleagues—including Farhad Jaber, associate professor (see cover story)—on this major success.

The department will grow by more than 10 percent this year, and we expect to start the new academic year with a faculty of more than forty—including new appointments in biomechanical engineering, combustion, and control. We will profile the new appointments in future issues of this newsletter. I anticipate a similar level of growth for next year, too. Our new \$10 million building, the Energy and Automotive Research Laboratories, will help us house this expansion. The facility is on schedule for completion in August 2006 and will open in spring 2007. See our Web site for a sequence of pictures showing progress.

In the last few months we have launched a new Web site and a research booklet with profiles of our faculty and their research interests. The booklet has a bright and vibrant look to it which reflects the future of the department. It can be downloaded from our Web site at www.egr.msu.edu/me/ or, if you would like a glossy hard copy, please call the department office at 517-353-9861.

Eann Patterson,
Professor and Chairperson
Department of Mechanical Engineering



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 - ✓ help shape the future of the college by participating as a donor in The Campaign for MSU, the largest capital campaign in MSU's 149-year history

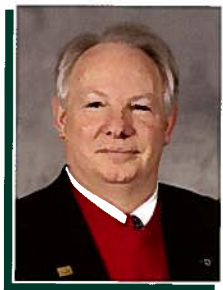
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Faculty and Staff @ ME

Gunn Receives Withrow Student Service Award



Craig Gunn

Craig Gunn, academic specialist, received the Withrow Student Service Award at the annual College of Engineering Awards Luncheon Thursday, March 30. Gunn has built a nationally-recognized technical communication program that effectively integrates communication skill-building throughout the mechanical engineering curriculum. He spends countless hours—practically living in his office—

working with hundreds of individual students and striving to provide the best possible support and assistance with their written and oral presentations. Students often praise Gunn's devotion to helping them succeed. "Every time, no matter how busy he was, he took the time to help me with my questions," says one student. "Craig was there for me, going through my theses line-by-line, even though they were more than 200 pages long," comments another student.

As a mentor, Gunn willingly provides a sympathetic listening ear. He goes above and beyond the call of duty, enthusiastically volunteering for the academic community in a wide range of activities. His willingness to serve extends to the faculty and staff of the college—whom he frequently provides with writing assistance—and into the community at large where he serves on multiple boards and committees. Gunn serves as the campus representative for the American Society for Engineering Education (ASEE). He was honored by the ASEE in June for having the highest percentage of faculty memberships in the north central section.

Naguib Receives Withrow Teaching Excellence Award

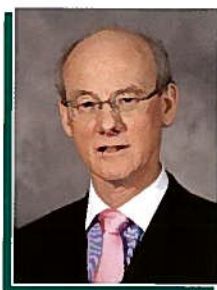


Ahmed Naguib

Ahmed Naguib, associate professor, received the Withrow Teaching Excellence Award at the College of Engineering Awards Luncheon Thursday, March 30. He has garnered the respect of his students for tackling difficult material with genuine concern for both the discipline and the learner. He is always available to answer questions, is friendly, and is focused on the needs of students in his courses. Long

after they leave his classroom, Naguib will remember students and stop to chat with them. Many alumni credit their positive perception of the mechanical engineering program at MSU to the beneficial experiences they have had in Naguib's classes. "He cares for the people he teaches," says one student. "He strives to make the information both interesting and understandable."

Thompson Receives Withrow Exceptional Service Award



Brian Thompson

Brian S. Thompson, professor and MSU Outreach and Engagement Senior Fellow, received the Withrow Exceptional Service Award at the annual College of Engineering Awards Luncheon Thursday, March 30. Thompson exemplifies selfless devotion to the public good. As a teacher, he strives to educate—as well as enhance the lives of—his students. He created and directs the 11-year-old Mechanical

Engineering Design Day Program which showcases the department's talent while stimulating the public's interest in engineering. This nationally-recognized program brings students together with manufacturers from across the country to collaborate on current industrial problems and opportunities. The Design Day showcase attracts a broad range of people including primary- and secondary-school students, business people, university VIPs, and CEOs of top companies. To date, students in the Design Day Program have completed over 500 projects.

As a scholar and citizen, Thompson relentlessly endeavors to improve the human condition. He serves his profession as a journal editor, a well-published scholar, and the author of several textbooks. Thompson played a key role in establishing the nationally-accredited Sparrow Regional Diabetes Center. He sits on the board and several committees of Physician's Health Plan of Mid-Michigan. He is a consultant to the Michigan Manufacturers Association and is deeply involved with For Inspiration and Recognition of Science and Technology (FIRST) National Robotics Competition for high school students. He also coached award-winning children's soccer teams for over a decade. As a teacher, scholar, and citizen, Thompson epitomizes the characteristics of selflessness, dedication, creative service, and civic-mindedness.

Satish Udpa Named College of Engineering Dean



Satish Udpa

As we went to press, Satish Udpa, acting dean of the College of the Engineering for the past year, was approved by the MSU Board of Trustees to permanently fill the dean position. Please visit the MSU University Relations Web site at <http://newsroom.msu.edu/site/indexer/2816/content.htm> for more information.

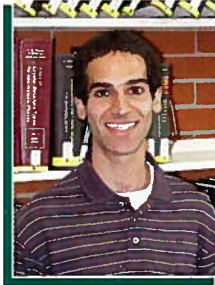
Students @ ME

Keech and Mahajerin Honored for Academic Achievement



Joseph Keech

Joseph Keech and Armon Mahajerin were two of the nineteen Michigan State University students who were honored for their academic achievements by the MSU Board of Trustees April 13. The May graduates both earned a perfect 4.0 grade point average. The



Armon Mahajerin

Board of Trustees Awards are granted at each commencement to students having the highest scholastic averages at the close of their last semester in attendance.

Obeirne Delivers Spring Commencement Address



Kevin J. Obeirne

Graduating senior Kevin J. Obeirne delivered the spring commencement address for the College of Engineering at the ceremony held May 7 at the Breslin Center. The Canton, Michigan, native discussed the importance of goals and the future of engineering. Following graduation, Obeirne went to work as a design engineer at the Toyota Technical Center in Ann Arbor, Michigan. He also married his high-school sweetheart, Pamela Hudson, last summer.

ME Team Wins ASME Design Competition

A team of mechanical engineering students beat out Carnegie Mellon University, the University of Cincinnati, and Michigan Technological University to win the design competition at the American Society of Mechanical Engineers (ASME) Midwest Student Leader Conference held April 7-9 in East Lansing, Michigan. Seniors Andy Hartsig, Aaron Huber, Jon Bendert, and David Gasparovich designed and built a device that can automatically—and in an accurate and repeatable fashion—cast a fishing lure using the “sip and puff” technology used by quadriplegics. The team earned the right to move on to the international competition at the ASME International Congress November 5-10 in Chicago. Hartsig, Huber, Bendert, and Gasparovich will face twelve other teams from around the world.

2006 Academic and Service Recognition Award Winners

Congratulations to the students from the department who were recognized for academic excellence and service to the community during the 2006 College of Engineering Student Awards Reception April 6 in the engineering auditorium. This year’s award recipients included:

Outstanding Graduate Student Award: Amirreza Zamiri

Service Award: Agatha Ygerne Bone

2005–2006 Ambassadors: Adam Joseph Alderman, Chad Phillip Glinsky, and Shannon Eileen Hunt

Undergraduate Academic Awards: Kayla Marie Batchelor, Adam Mark Brannan, Melissa Rae Carrier, Joel Timothy Cook, Amanda Christine Danielson, Brandon Geoffrey Gulker, Joseph Charles Keech, Lindsay Lynn Kredo, Armon Mahajerin, Andrew Keith Schafer, Paul Christian Strefling, Christopher Ryan Sweeney, Bryan Ellis Wagenknecht, and Mathew James Winkley



The 2006 SAE Formula Car Team during competition at Ford Proving Grounds in May.

Formula SAE Team Takes Ninth at Competition

The 2006 Spartan SAE Formula Car team finished ninth overall from a field of 140 domestic and international teams at the annual competition held at Ford Proving Grounds in Romeo, Michigan, May 17-21. The group scored well in technical categories, placing ninth in design, tenth in autocross, twentieth in acceleration, and thirtieth in skid pad. They turned in their best performance in endurance, placing seventh in the race that fewer than 40 percent of the teams were able to complete. RMIT University, Penn State University, and University of Michigan—Ann Arbor took the top three spots overall. Gary Cloud, professor, served as the faculty adviser for the 2006 team.

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Surinder Kapur (left) accepts the Joon S. Moon Distinguished International Alumni Award from Keith Williams, director of the MSU Alumni Association.

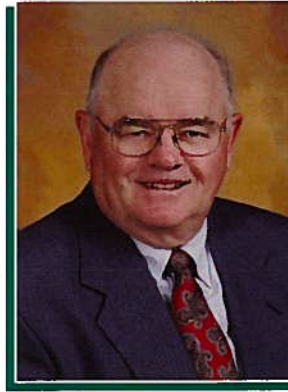
Surinder Kapur (BS '64, MS '65, PhD '72) received the Joon S. Moon Distinguished International Alumni Award Wednesday, March 29, 2006, at the MSU International Awards Ceremony in the Delia Koo International Academic Center. Kapur spearheaded efforts to promote India as an exporter of quality automotive engineering goods. He was among the few Indian industry leaders who gave particular attention to technology and quality components in the automotive sector in the late 1980s. He

understood early that the real test of quality is the ability to export and to compete with imports.

Kapur chairs the National Committee on Quality and the Total Productive Maintenance Club of India, and has made quality a way of life in all his activities. In recognition of his various achievements as an industrial entrepreneur, an innovative manager, a technical pathfinder, and an industrial leader, the government of India appointed him a member of the National Manufacturing Competitiveness Council. According to the chair of this council, Kapur's "incredible creative energies and refreshing idealism are already improving the competitiveness of Indian industry."

Kapur has also chaired the Confederation of Indian Industry National Committees on Quality, Training Services, and Education. The World Economic Forum recognized his company, Sona Koyo Steering Systems Ltd., as the Global Growth Company in 1997; he was presented the Award for Visionary Execution by Oracle in 2003; Sona was named India's Fastest Growing Company by *Business Today* in 2004; and Kapur received the Amity Leadership Award for Quality Excellence in 2005.

Social welfare is an integral part of Sona's business philosophy. Social initiatives under Kapur's leadership are targeted at preserving the environment and contributing to the welfare of the community where the company operates. For example, in one village the company has repaired roads and the local temple, developed a home for the elderly, organized periodic health related checkups, and provided vocational training for members of the community.



Patrick M. Miller

Patrick M. Miller (BS '57 Mathematics; MS '60, PhD '66 Applied Mechanics) received the Mechanical Engineering Distinguished Alumni Award at the College of Engineering Alumni Awards Banquet May 6 at the Kellogg Hotel and Conference Center. The award is given to outstanding ME alumni who have made exceptional contributions to the field and to society. Miller founded MGA

Research Corporation 29 years ago with two other engineers. The company provides testing services and test equipment to over 400 industrial customers, primarily in the automotive industry. As president, Miller is responsible for long-term company planning and growth. Through his technical leadership, MGA has developed novel methods for both repairing and evaluating the performance of collision-damaged automobiles. He is internationally recognized for his work in automobile crashworthiness and automobile collision damage repair.

Earlier in his career, at Calspan Corporation, Miller was the project engineer for the complete spectrum of production automobile structural research. He was involved in the development and testing of configurations that resulted in improved automobile crashworthiness. Many of those concepts are now used in modern automobiles.

He is a member of the Society of Automotive Engineers (SAE), the American Society of Mechanical Engineers, Sigma Xi, and Phi Kappa Phi. He was listed in *American Men and Women of Science*, 12th Edition, and *Who's Who in the East*, 16th Edition. He is a former member of the SAE Highway Vehicle Maintenance Division and of the Transportation Advisory Committee of the Federal Energy Administration.

William C. Oakes (BS '85, MS '87), an associate professor of engineering education at Purdue University, was one of three Purdue faculty members awarded the National Academy of Engineering Bernard M. Gordon Prize for educational innovation. The \$500,000 award was split between the three recipients and the university to fund the 2005 Engineering Projects in Community Service (EPICS) program at Purdue. The Gordon prize is intended to recognize new modalities and experiments in education that develop effective engineering leaders. The award is given to educators who promote curricular design innovations, new teaching methods, and technology-enabled learning experiences that help students grow into leadership roles.

Mechanical Engineering Spring Design Day Winners



Andrea Davis (left) and Molly Gomoll (right) of Sparrow Health Systems help Danny Francis (seated) demonstrate the Upper and Lower Extremity Cycle built for the pediatric rehabilitation facility as part of an ME 481 Shell Humanitarian Engineering Project.

ME 371 Mechanical Design I, Prototypes of Diverse Machines and Mechanisms (Section 1):

First Place: Michael Balck, Alexis Bauer, David Biegas, Adam Brannan.

Second Place: Blake Gower, Seung Han, Matthew Hays, Michael Hundt.

Third Place: Matthew Rokosz, Sean Steffer, Ryan Taelman, Bradley Wackerle.

ME 371 Mechanical Design I, Prototypes of Diverse Machines and Mechanisms (Section 2):

First Place: John Benghauser, Ben Dreher, Brandon Goad, Brian Powell, Scott Stieber.

Second Place: Bethany Danielski, Lindsay Kredo, Justin McIver, Jessica Theis, Beth Volz.

Third Place: Ratikant Behera, Bryan Cooper, Shantanu Joshi, Nicholas Nwabueze, Basak Oguz.

Kids' Choice Award – Best ME 371 Project as Selected by Secondary-School Participants:

First Place: Matt Bauer, Aaron Cole, Richard Henderson, Matt Holley, Ryan Slobodian.

Second Place: Matthew Rokosz, Sean Steffer, Ryan Taelman, Bradley Wackerle.

Third Place: Michael Balck, Alexis Bauer, David Biegas, Adam Brannan.

ME 412 Heat Transfer Laboratory, “Gas to Liquid Heat Exchanger”:

First Place: Mohamed Aseel, Jason Harrison, Andrew Messieha, Steven Song.

Second Place: Shawn Klann, Pranav Mokashi, Eric Truskoski, Marco Vagani.

Third Place: Eric Gorman, Dmitriy Kats, Nicole Pawelec, Kalvis Terauds.

ME 471 Mechanical Design II, “Autonomous Walking Machine”:

First Place (Tie): Jimmy Chen, Nicholas Harrington, Michael Nicley.

First Place (Tie): Scott Miller, Jared Scott.

Third Place: Matthew Atanasoff, Kevin Sherman, Ryan Spiekermann.

ME 481 Mechanical Engineering Capstone Design, Poster Session:

First Place: “Sensory Stimulation Table.” Sponsors: Shell Oil and the Heartwood School of Ingham County, Michigan. Industrial advisers: Jennie Hall and Becky Love. Academic adviser: Alan Haddow, associate professor. Team members: Ben Banworth, Sarah Overman, Nathan Remsberg.

Second Place: “Railcar Speed-Restricting Capsule Analysis Device.” Sponsor: Union Pacific Railroad. Industrial adviser: John Manutes. Academic adviser: Brian Feeny, associate professor. Team members: Daniel Bak, Teresa Franklin, Nobuyuki Fujiwara, Steven Gerrish.

Third Place: “The Soaring Cycle: A Recumbent Push-Pull Cycle.” Sponsors: Shell Oil and MidMichigan Medical Center of Midland. Industrial advisers: Peggy Essex and Amy Sommer. Academic adviser: Craig Somerton, associate chair and associate professor. Team members: Grace Fitzpatrick, Michael McDonnell, Shawn Miller, Daniel Mutschler.

ME 481 Mechanical Engineering Capstone Design, Oral

Presentation:

First Place: "Relative Humidity and Air Pressure Gauge for a Paint Spray Gun." Sponsor: DeVilbiss Automotive Refinishing, Inc. Industrial advisers: Marvin Burns and Mark Charpie. Academic adviser: John Lloyd, University Distinguished Professor. Team members: Jeff Bazzi, Jerrod Braman, Caryn Pytleski, Erica Villegas.

Second Place (Tie): Improved Clamp Design for ASTM D3763." Sponsor: Dow Chemical. Industrial adviser: Mark Chappell. Academic adviser: Dahsin Liu, professor. Team members: Joel Cook, Shawn Klann, Pranav Mokashi, Marco Vagani.

Second Place (Tie): "Railcar Speed-Restricting Capsule Analysis Device." Sponsor: Union Pacific Railroad. Industrial adviser: John Manutes. Academic adviser: Brian Feeny, associate professor. Team members: Daniel Bak, Teresa Franklin, Nobuyuki Fujiwara, Steven Gerrish.

ME 481 Thomas Alva Edison Undergraduate Design Award

Scholars:

Matthew Carlson, Richard Humphries II, Dennis Suminski II, Nathan Zeigler.

Leonardo Da Vinci Undergraduate Design Scholars:

Jimmy Chen, Nicholas Harrington, Michael Nicley, Scott Miller, Jared Scott.



Danny Francis, Sparrow Hospital Pediatric Rehabilitation patient, gets Sparty's help to demonstrate the Upper and Lower Extremity Cycle built as part of an ME 481 Shell Humanitarian Project.

Students @ ME Continued from Page 4

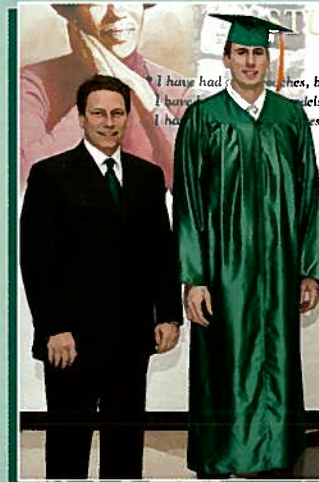
2006 Mini Baja SAE Team Turns In Great Performances



The 2006 Mini Baja SAE West Team

The MSU Mini Baja Team turned in stellar performances during the 2006 season. Team leaders Pete Schupska and Tim Locker led the Spartans to solid finishes in the Baja Society for Automotive Engineering (SAE) East, West, and Midwest competitions. Baja competitions involve small off-road vehicles built by teams of students from around the world. The MSU team finished 12th overall out of 65 teams in the East, taking an impressive 2nd place in the suspension and traction category. They finished 9th out of 141 teams in the Midwest, but turned in their best performance in the West—taking 2nd place in the hill climb, 3rd place in the endurance competition, and 4th overall out of 84 teams. The group capped off the season with the Mike Schmidt Memorial Iron Team Award. This national honor recognizes the top three teams who attended all of the year's competitions. MSU Mini Baja competitors racked up the 3rd-highest combined score out of 20 eligible teams.

Izzo Bids Farewell to 2006 ME Grad



Tom Izzo (left), MSU men's basketball team head coach, gives his personal congratulations to Jason Aerts, spring 2006 mechanical engineering graduate and men's basketball team forward.



**DEPARTMENT OF
MECHANICAL ENGINEERING**

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Card number: _____

Expiration Date: _____

Name on card: _____

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