ME@MSU

DEPARTMENT OF MECHANICAL ENGINEERING

New Technology at Work: Designing Efficient, Flexible Combustion Systems

MSU is a national leader in energy research, and researchers in the Department of Mechanical Engineering are playing key roles in finding not only alternative sources of energy but also ways to make energy consumption more efficient. Faculty members are excited about the results, and students see the possibilities for the future.

One example of the cutting-edge research being done is the work of ME assistant professor Tonghun Lee in the Laser Diagnostics Laboratory. He completed his graduate studies at Stanford University just as the MSU College of Engineering was opening the Energy and Automotive Research Laboratories. His work with diagnostics and combustion were a good fit with other research being undertaken. Since arriving at MSU, Lee and his research team have moved ahead with experiments that are making a difference in energy consumption.

"Since the beginning of my graduate studies, I have believed that energy is the main problem to solve—and I still do," says Lee. Energy, as Lee points out, ensures the quality of life in the United States. "We have a high quality of live because we expend more energy than any other country in the world per person. It's time to make dramatic changes in our infrastructure in terms of energy. In addition, there have to be fundamental changes to our combustion-based infrastructure to find alternative systems and pursue more efficient systems." That's because there is a large part of society that is dependent on combustion-driven devices or systems. "The push to electrical vehicles and

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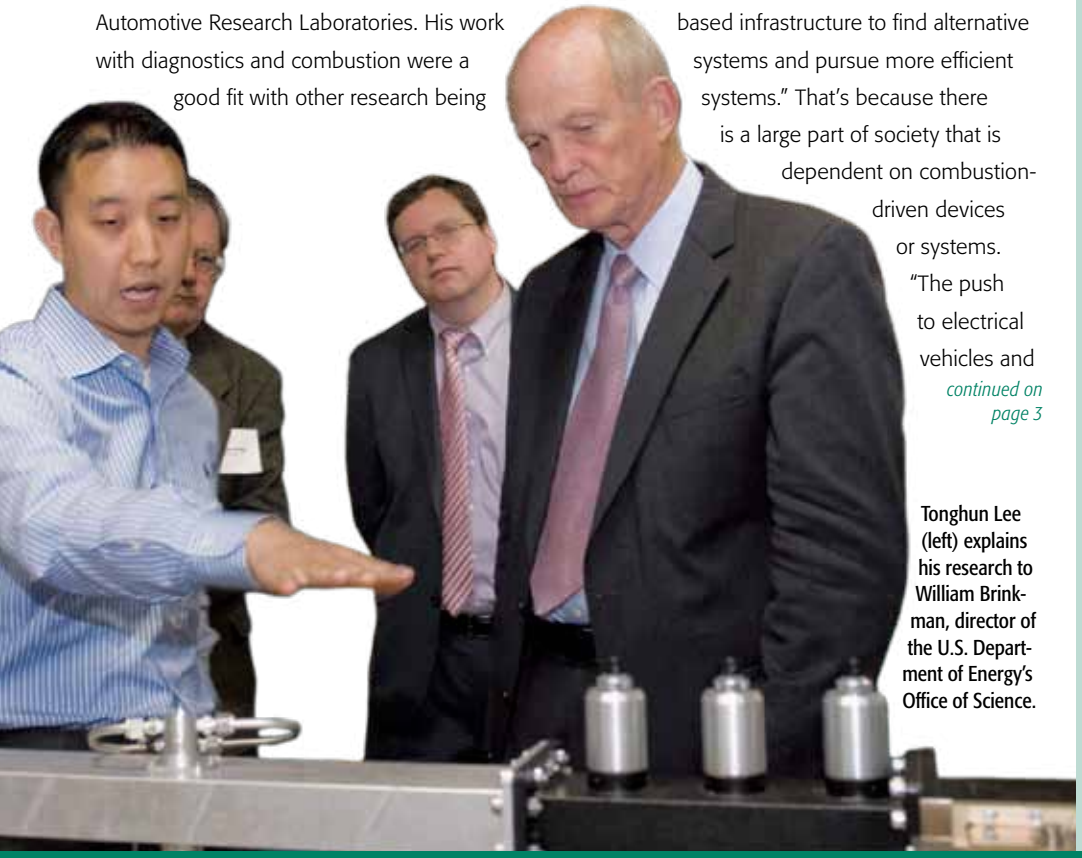

Tonghun Lee (left) explains his research to William Brinkman, director of the U.S. Department of Energy's Office of Science.

DOE Officials Visit ME Projects

Representatives of the U.S. Department of Energy made two visits to the MSU campus in the fall of 2010 and visited with researchers from the Department of Mechanical Engineering about their projects.

In August, officials from the U.S. Department of Energy Advanced Research Projects Agency-Energy (ARPA-E), including Arun Majumdar, ARPA-E director, and Eric Toone, ARPA-E deputy director and chief technology officer, saw a demonstration by Norbert Mueller, associate professor, of his wave disk engine project

Earlier in the year, Michigan State University engineers and scientists received $2.5 million from the agency to build and develop the wave disk engine, which uses turbo combustion "shock wave" technology to convert either liquid fuel or compressed natural gas or hydrogen into electrical power. With this engine, fuel efficiency for hybrid vehicles could increase five times compared to internal combustion engine vehicles on the road today, while reducing costs by 30 percent. The goal of Mueller's team is to produce an engine that would give hybrid vehicles a 500-mile driving range and reduce carbon dioxide emissions by as much as 90 percent. In addition to Mueller, ME professors Patrick Kwon, Indrek Wichman, and Tonghun Lee, in collaboration with electrical engineering faculty, work on the project.

In October, William Brinkman, formerly a senior research physicist in the Department of Physics at Princeton University and now director

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from the Chair

ALEJANDRO DIAZ

It seems as if it was only last week that I was writing this column. Instead, it's been six months and we are already welcoming the arrival of 2011. For many, the start of a New Year brings excitement and anticipation of the good things that the New Year may bring. It also brings back memories and opportunities to reflect on the events of the year that we just left behind. I hope that you find many reasons to be grateful for the past year and the opportunities it brought you and also many reasons to be excited by the arrival of 2011 and the opportunities it will bring you.

Some notable events took place since our last meeting in this space. In September the College of Engineering was visited by the ABET evaluation team, the culmination of several months of intense preparation. As many of you know, ABET is the agency that accredits the vast majority of the engineering programs in the United States. ABET accreditation gives assurance that our program meets the quality standards established by the mechanical engineering profession for which we prepare our students.

Several programs in the college, including ours, went through this, the final step of the six-year accreditation cycle. During their three-day visit the evaluators met with students, faculty, and staff and went over supporting documentation. The visit ended with an exit interview with President Simon where the evaluators presented their preliminary findings. We were all very pleased to learn that there were no weaknesses or deficiencies reported in the feedback provided by the ABET team to President Simon, so based on the preliminary findings, the ME program is currently in compliance with all ABET criteria. This is a very good outcome. This is not the final report. For that we will have to wait until this summer, but we expect that the final report will simply confirm the exit statement and the program will be accredited for six years, the maximum possible.

In the fall we also welcomed the new incoming classes of freshmen and graduate students. Our program remains very strong and continues to attract outstanding applicants. The largest group of freshmen expressing an interest in engineering chose ME as their main interest among all other engineering programs. The graduate program is growing very rapidly. It grew by 17 percent between 2009 and 2010 alone, going from 126 to 148 ME graduate students enrolled in the fall of 2010. The growth in the PhD program was even more dramatic, with enrollment jumping from 71 to 90 students between 2009 and 2010. This is a clear sign of the strength of the graduate program and of the research program that supports it.

The most recent research expenditure figures available show a remarkable increase, jumping from $8.3 million to $11.3 million in annual expenditures during the last reporting cycle. This is an extraordinary achievement of the members of our faculty, a reflection of the high quality of their research, and the result of their dedication and hard work.

I do find many reasons to be excited by the arrival of 2011 and look forward to the opportunities that the New Year will bring the department. I will report on some of these when we meet next time, in these pages.

DOE Officials (continued from page 1)

William Brinkman (left), director of the U.S. Department of Energy's Office of Science, walks with Harold Schock, MSU professor of mechanical engineering and director of MSU's Energy and Automotive Research Laboratories.

of the U.S. Department of Energy's Office of Science, visited MSU, meeting with university officials and researchers who oversee DOE-funded research projects worth more than $600 million.

The visit provided an opportunity for Brinkman to tour some of the Office of Science's grants in operation, including the Energy and Automotive Research Laboratories, and discuss the status of several DOE investments.

"Michigan State University is a national leader in research funded by the Department of Energy," said Ian Gray, MSU's vice president for research and graduate studies. "We are pleased to host Dr. Brinkman and brief him on the outstanding work of our faculty and researchers."

The DOE Office of Science is the single largest supporter of basic research in the physical sciences in the United States, providing more than 40 percent of total funding in this vital area. It is the principal federal funding agency for the nation's research of high-energy physics, nuclear physics, and fusion energy sciences, as well as a variety of energy-related projects.

Arun Majumdar (far right), director of the Department of Energy Advanced Research Projects Agency-Energy (ARPA-E), asks questions as Norbert Mueller (center), associate professor of mechanical engineering, explains the wave disk engine technology. At far left is Janusz Piechna, MSU visiting associate professor from Warsaw.

New Technology (continued from page 1)

fuel cells, that is probably the future of automotive engineering, but we also need to bring fundamental changes to our combustion-based infrastructure."

The overarching themes in Lee's research include plasma ignition and flame stabilization for hypersonic scramjets, energetically enhanced combustion using exothermic nanoparticles, and thermal oxidation of alternative and renewable biofuels. Efforts are also being made to investigate innovative energy conversion concepts such as plasma driven fuel cells and shock wave driven motors.

In order to design more efficient and flexible combustion systems that can operate on a wider range of fuels and will pollute less, new technology is required to actively enhance the chemical energy conversion process. This is particularly important with the dramatic increase in new renewable and alternative fuels, such as biofuels. One promising way to achieve this is by using electromagnetic energy to generate a stream of ionized energetic gas, otherwise known as a plasma discharge, which can enhance the combustion chemistry. Lee's research uses highly sensitive laser and optical diagnostics to investigate which chemical pathways are actually influenced by the plasma and novel ways of efficiently coupling the plasma energy to the flame.

"The use of a plasma discharge can lead to dramatic improvements in ignition, flame stability, pollution reduction, and combustion efficiency," explains Lee. "Unlike a spark discharge, which only helps the combustion process by adding heat to the chemistry, a plasma discharge essentially changes the chemical pathways in an efficient manner by targeting specific chemical reactions without heating up all the gases involved in the mix."

"The use of a plasma discharge can lead to dramatic improvements in ignition, flame stability, pollution reduction, and combustion efficiency." — Lee

The dramatic improvements that can be achieved using a plasma discharge can be used to power the new hypersonic aircraft of the future, which operate outside what is considered feasible with modern ignition and flame stabilization technology. Likewise, they can be used to integrate a wide range of new alternative fuels, which may not burn as well as conventional petroleum-based products.

This work is part of a grant from the Air Force Office of Scientific Research's Young Investigator Program Award. Lee and his research team are working with Air Force researchers at Wright Patterson Air Force Base in Dayton, Ohio. While much of the research addresses fundamental science, there is a strong push to implement the technology into practical combustion systems, including efforts to test a plasma ignition system on an actual unmanned aerial vehicle (UAV) scale engine in collaboration with the Air Force.

Lee and his research team—which includes five PhD students, one post-doc, and several undergraduate students—are also investigating the use of a plasma discharge system for other energy applications such as fuel reforming. Electromagnetic energy can be used not only for combustion but to split the hydrocarbon fuel into hydrogen molecules that can then be used to power fuel cells.

In addition to his research, Lee's teaching skills are winning praise from students and offering them a look at what the future could be like. He teaches thermal science courses and says that students acknowledge the fact that basic thermodynamics and combustion forms the basis for our energy infrastructure. "Students key in on that fact and they approach problems from that angle. They see it as an energy issue, not just a problem with a gas turbine."

Fast Facts about Tonghun Lee

- Lee earned his PhD and MS degrees in mechanical engineering at Stanford University.
- Prior to joining MSU, Lee was a graduate research assistant in the High Temperature Gasdynamics Laboratory at Stanford.
- Lee was the recipient of the 2010 SAE Ralph R. Teetor Education Award, which honors young faculty who are among the top engineering educators.
- In 2009, Lee received the Withrow Teaching Excellence Award from the MSU College of Engineering.
- Lee was the recipient of the Air Force Office of Scientific Research (AFOSR) Young Investigator's Program Award in 2008 for research in plasma enhanced combustion for scramjets.

About the Energy and Automotive Research Laboratories

- The Energy and Automotive Research Laboratories, located adjacent to the Engineering research Complex, just south of the MSU Clinical Center, opened in 2007. It is a $10 million, 29,000-square-foot research complex.
- Laboratories feature a powertrain lab and two engine test cells, one of which can accommodate a large SUV or small military vehicle.
- Harold Schock is director of the lab and it is a result of his efforts, along with others in the ME department, to expand facilities to perform energy and automotive research and teach students the skills needed for 21st century careers in engineering.

Alumni @ ME

In Memoriam

Charles "Chuck" Brady (BS '48), who spent his entire career at General Motors as a prolific scientist and engineer, died December 31, 2010. Brady began playing "proving grounds" in his backyard sandbox at the age of four. Later he often accompanied his father on deliveries to the nearby General Motors Proving Grounds.

Brady graduated as valedictorian from Brighton High School in 1941 and worked that summer at the proving grounds before entering MSU in the fall of 1941. When the United States entered World War II, Brady left MSU and enlisted in the Army Air Corps, where he served until 1945. He returned to MSU, graduated in 1945, and immediately began his full-time career with General Motors, retiring in 1988, after 42 years of service.

At General Motors, Brady rose from the engineering staff to manage the Desert Proving Grounds in Mesa, Ariz., until 1965, when he returned to Michigan to manage the Milford Proving Grounds. In 1984 he was elected vice president of Current Engineering and Manufacturing Staff, widening his responsibilities to include GM's air fleet and Argonaut Realty, while maintaining oversight of the worldwide proving ground operations.

Under Brady's tenure, the Desert Proving Grounds developed into a fully equipped vehicle development and testing operation used by all automobile and truck divisions of GM. As director of the Milford Proving Grounds, Brady spearheaded safety and performance criteria for radial tires, as well as the introduction of radial tires across all GM product lines.

In 1985 Brady was named a fellow of the Society of Automotive Engineers (SAE) in recognition of his tire performance and safety criteria development work. He received the Claude R. Erickson Distinguished Alumni Award from the MSU College of Engineering in 2008, in recognition of his outstanding contributions to vehicle safety development and lifelong support of the college.

When giving a speech to the 2008 MSU graduation class, he impressed upon them the importance of integrity and honesty. Having taken part in the evolution of the auto industry, Brady understood the need for trust and a solid foundation. In addition to the College of Engineering, Brady was also an ardent supporter of Michigan State University athletics, and a member of the John A. Hannah Society.

NAVSEA Scientist of the Year

Andrew Hull (BS '83, MS '85, and PhD '90) has been selected as the 2009 Naval Sea Systems Command (NAVSEA) Scientist of the Year. The annual award program, sponsored by NAVSEA, honors an engineer, scientist, or a team of engineers/scientists whose contributions have enhanced their respective profession.

Over his 20-year career, Hull, a NUWC Division Newport employee from the Autonomous & Defensive Systems Department, has continually advanced the knowledge base of structural acoustics. During 2009, his tireless efforts resulted in the completion of two major broad-frequency elastic acoustic models derived for geometrical shapes that are of supreme importance to the U.S. Navy and provide significant cost avoidance.

In the area of basic and applied research, Hull has developed closed form analytical solutions for complex mathematical problems that address torpedo sonar, towed arrays, structural acoustics, parameter estimation, dynamic system models, medical imaging, material measurements and active noise control. These advances notably enhance the reputation of Division Newport for innovation and technical excellence, and advance the undersea warfare capabilities of the U.S. Navy.

Hull is a biannual visitor to MSU and the ME department and has funded a series of research projects with the department.

RNASA Stellar Award

Kakuska (left) receives his award from Captain Michael Foreman USN (ret.)

Reed Kakuska (BS '81) received a 2010 RNASA Stellar Award for his "unwavering pursuit of innovative approaches to complex propulsion issues enabling sustained mission success for Atlas V and Delta IV upper stage launch vehicles." Reed is the chief engineer of the RL10C-1 Rocket Engine Program at Pratt & Whitney Rocketdyne.

Each year the Rotary National Award for Space Achievement solicits nominations for Stellar Awards for individuals and teams from the government, military, and industry. In order to ensure recognition of individuals at all stages in their careers, nominations are solicited in four categories—Early Career, Middle Career, Late Career, and Teams. Reed won a middle career individual award.

The winners were announced at an awards ceremony held at the Hyatt Regency in Houston, Texas. The keynote speaker at the award ceremony was NASA Administrator Charles Bolden Jr. The awards were presented by Shuttle astronauts Captain Michael Foreman USN (ret.) and K. Megan McArthur, PhD.

Edward N. Cole Innovation Award

Arvin F. Mueller (BS '65), former group vice president of Powertrain Operations at General Motors, has been named the recipient of SAE International's Edward N. Cole Award for Automotive Engineering Innovation.

Mueller received the prestigious award for his lifetime of achievement in the global automotive industry. His leadership led to the establishment of General Motors' Vehicle Development Process, which linked the cross-functional efforts of engineering and manufacturing.

Mueller served on GM's North America Strategy Board, the Automotive Strategy Board, and the board of directors for the Saturn Corporation. He also was a member of the board of directors of the Fiat-General Motors Powertrain Joint

Venture and for Isuzu Motors Limited, in which General Motors had an equity partnership.

Mueller joined General Motors' Chevrolet Motor Division in 1960. While there, he earned his bachelor's degree in mechanical engineering from Michigan State University in 1965.

In a career that spanned 40 years, Mueller held a variety of engineering positions with General Motors. In 1997, Mueller became group vice president for GM Powertrain, where he established an innovative global business management process based on closed-loop learning cycles, which is still in use today. He retired from General Motors in October 2000.

ESD Harold Slaight Elington Leadership Award

Roy H. Link (BS '67 MBA '68) was recognized by the Engineering Society of Detroit (ESD) and Harley Ellis Devereaux, an architecture and engineering firm, for his legacy of outstanding leadership. He was awarded the prestigious ESD Harold Slaight Ellington Leadership Award.

"I am honored to receive this distinguished award, which signifies the brilliance and accomplishments of Harold Slaight Ellington, a true innovator and contributor to Detroit," says Link, president and CEO of Link Engineering Company, a family-owned multinational organization that designs and manufactures precision test equipment and provides comprehensive testing services. It is headquartered in Plymouth, Mich.

After Link received his mechanical engineering degree and his MBA, he worked for Burroughs for three years as a senior systems analyst before joining the family business, which was established in 1935 by Roy Link's father, Herbert. Over the years, Roy has been deeply involved in the promotion of engineering and technology in many capacities. He is past president of ESD and current chairman of the Rackham Foundation, which provides essential support and financing for the society.

The ESD Harold Slaight Ellington Leadership Award honors the memory and dedication of Harold Slaight Ellington, PE, president of Harley Ellis Devereaux for thirty years and past two-term president of ESD. Through Ellington's leadership, grants were secured to build the Rackham Memorial Building and ultimately to establish the Rackham Engineering Foundation. Ellington was dedicated to the encouragement and development of young engineers. To that end, the award bearing his name includes a $500 contribution, on behalf of the recipient, to the college of engineering of his or her choice. Link has selected MSU's College of Engineering to receive this contribution.

"I provided MSU with this financial stipend to help promote the outstanding work of Dean Udpa and his team at the College of Engineering," says Link. "We need more quality engineers to lead us into a challenging new way of life in the United States."

Dean Udpa was also very complimentary of Link and his company. "Roy's company is at the forefront in providing some of the most innovative solutions to technical problems in the automotive industry," says Udpa. "By selecting the College of Engineering to receive this contribution, Roy will help the college continue its tradition of training the next generation of creative engineers."

From left to right: Michael F. Cooper, with Harley Ellis Devereaux and ESD board member; Roy Link, president and CEO of Link Engineering Company; and Satish Udpa, dean of Michigan State University's College of Engineering.

Golf's 40 Under 40

Nate Radcliffe (BS '99, MS 2001) was selected by *Golf Magazine* as one of the magazine's 40 under 40. These are young people who are designing technology or doing other work that makes golf easier and more fun to play. The magazine calls them "the game's up-and-coming generation of influencers, trendsetters, and newsmakers, an eclectic mix of talent worth watching today and for many years to come."

Radcliffe, who is the son of ME professor Clark Radcliffe, is the metalwoods development manager for Cleveland Golf in Huntington Beach, Calif. He is the co-developer of the HiBORE driver, which led golf into the geometry era of drivers and woods. Radcliffe currently is leading a team of industrial designers, mechanical engineers, and CAD specialists in the development of metalwoods (drivers, fairway woods, and hybrids), graphite shafts, grips, and headcovers.

"Growing up, I played hockey, golf, baseball, and football and did a lot of mountain biking, snowboarding, and wakeboarding. I was more inclined to tinker with my gear than open the hood of a car. Although Michigan offered many opportunities to work in the automotive industry, I knew that my passion was in sports equipment," says Radcliffe.

He joined Cleveland Golf in 2001 and his initial work was to develop finite element modeling capabilities. "We are now able to precisely model ball club impact and predict impact sound, durability, and performance using computers before we test with robots and humans," says Radcliffe. His daily work takes him from the R&D offices to the PGA Tour as well as to appointments with retailers, golf professionals, and suppliers in Taiwan and China. He also makes trips to the company's offices in Japan.

It was his father and grandfather, who was also an ME professor, now retired from the University of California at Berkeley, who convinced Radcliffe that ME could power a career in many fields. "When I got a chance to meet Dr. (Bob) Hubbard (an ME professor, now retired) in my freshman year, I realized how interesting and important his work was in automotive racing safety," says Radcliffe. "I knew that what he could teach me could be applied to anything in sports."

Faculty and Staff @ ME

New Faculty

The ME Department welcomes two new members who will strengthen the interdisciplinary focus of the department.

John Weisend II is a professor of engineering in the National Superconducting Cyclotron Laboratory and the department of mechanical engineering. He is the Cryogenics Group Leader for the Facility for Rare Isotope Beams (FRIB) Project. He will be instrumental in strengthening ties between the ME department and the National Superconducting Cyclotron Laboratory at MSU.

Weisend is a mechanical engineer by training and a world expert in cryogenics. He received his PhD in nuclear engineering and engineering physics from the University of Wisconsin – Madison, where he investigated engineering applications of He II. He has worked at the SSC Laboratory, the Centre D'Etudes Nucleaires Grenoble, the Deutsches Elecktronen-Synchrotron Laboratory (DESY), the Stanford Linear Accelerator Laboratory (SLAC), and the National Science Foundation. His research interests include He II and large-scale helium cryogenics.

James Mason is with the Van Andel Institute in Grand Rapids. Prior to joining the Van Andel Institute, he was a professor of mechanical engineering at the University of Notre Dame. Mason does research in bioengineering and orthopedic biomaterials and will collaborate on research projects in biomedical sciences with other faculty in the department and in the college.

He received his BS degree in mechanical engineering and materials science from the University of California, his master's degree in materials science from the University of California at Berkeley, and his PhD degree in applied mechanics from the California Institute of Technology.

Engineers Team Up with Physicians to Study Osteopathic Treatments

Jongeun Choi

Clark Radcliffe

Jongeun Choi, assistant professor, and **Clark Radcliffe**, professor, are part of a multidisciplinary team of Michigan State University researchers awarded $4.2 million to develop accurate clinical research tools for studying osteopathic manipulative medicine, a hands-on approach to the diagnosis and treatment of musculoskeletal disorders.

Using a five-year grant from the National Institutes of Health, principal investigator Jacek Cholewicki of the College of Osteopathic Medicine is leading a team to research OMM, which focuses on improving patient function and mobility. What is unique is the team's use of systems science, a branch of engineering that studies complex systems in a way that not only includes their parts but also how the parts interact to affect the entire system.

"We need to apply well-established engineering concepts to develop objective tools that will allow for the rigorous study of OMM," says Cholewicki, who serves as a co-director of MSU's Center for Orthopedic Research at Ingham Regional Orthopedic Hospital in Lansing.

"While this form of osteopathic treatment is popular, its underlying physiological mechanisms are unknown," he added. "What does the evidence support? How can we optimize treatments and make better patient selection? Those are key questions."

Applying engineering concepts and systems science to osteopathic treatments provides an excellent framework for investigating the musculoskeletal system's performance, says Choi.

"The challenge is to develop methods that can measure changes in the body, are accurate, and are safe when applied on patients," adds Radcliffe.

MSU represents a unique environment for such research, according to Peter Reeves of the College of Osteopathic Medicine. "We have a major research university housing the nation's leading osteopathic college with extensive resources in engineering and in complementary/alternative medicine," he says. "Additionally, the aggressive research agenda of College of Osteopathic Medicine Dean William Strampel and the partnership with Ingham Regional Orthopedic Hospital have provided an ideal environment for this type of research."

The NIH grant will allow MSU to tackle three projects:

Osteopathic manipulative medicine and postural control: Preliminary studies suggest OMM improves postural control in patients; however, the mechanisms responsible are unknown. MSU researchers hypothesize OMM targets impaired functions of the neuro-musculoskeletal system that arise from a dysfunction in the muscle spindles; they will study that process.

OMM's effect on sudden events causing low back pain: Sudden, unexpected loading to the spine results in severe and costly back injuries. While appropriate postural control can spare the spine from harm, people with low back pain have impaired postural control, which suggests they are more likely to re-injure themselves. If osteopathic manipulative medicine can effectively reduce dysfunction and pain, then improvements in postural control, including faster responses of trunk muscles, should be realized, MSU researchers hypothesize. This improvement in postural control should then mitigate any adverse effects from an unexpected event. To test the hypothesis, researchers will develop objective performance measures of the postural control system.

Effects of osteopathic manipulative medicine on neuromuscular control of the head-neck system: Neck pain is one of the three most frequently reported musculoskeletal complaints, affecting 70 percent of individuals. OMM appears to be effective in relieving musculoskeletal pain in the head-neck area. However, the measures used to support those findings have been limited to subjective tests such as survey statements provided by patients. The overall goal of the project is to develop objective clinical research tools for the assessment of motor control of the head-neck system.

Students @ ME

2010-2011 Von Ehr Scholars Named

Mairin Chesney from Brighton, Mich., was one of four freshmen who have been named as the 2010-2011 Von Ehr Scholars. Chesney is majoring in mechanical engineering.

The James Von Ehr Scholars Program was established in 2006 by James R. Von Ehr II, a 1972 computer science graduate and entrepreneur. The $1 million endowed scholarship fund benefits undergraduates of the College of Engineering.

"I am in engineering in large part because of my dad. He is a computer science professor at that "other school down the road" and he has always brought home LEGOs and K'NEX and I just grew up loving the possibilities of engineering," says Chesney. She is in mechanical engineering because she believes there are an enormous range of opportunities for a career, and she likes the hands-on aspect of it.

Chesney originally planned to leave Michigan for college. "I loved a lot of the schools that I applied to, but Michigan State kept offering me opportunities that did not exist at the other schools I considered. Here, I am able to fully enjoy everything a Big Ten school has to offer, while participating in research and other activities that make Michigan State feel small."

She sings in the Women's Chamber Choir, plays violin in the Concert Orchestra, has a Professorial Assistantship, is a member of the Society of Women Engineers, and acts in Short Attention Span (an MSU Telecasters show).

The two classes that she likes best from her first semester are Elementary Chinese and Introduction to Programming. "Chinese is incredibly different and difficult, but I enjoy the break from engineering and the language itself," says Chesney. She already had some programming experience, but enjoys being able to write a program that will actually do something.

"I am so grateful to Mr. Von Ehr for the scholarship. It has significantly eased the difficulty of paying for college. I can fully enjoy my college experience without stressing about paying for college," says Chesney, who is the daughter of David and Jean Chesney.

University Distinguished Scholar

ME student **David Crouse** from Ponder, Texas, is one of the high school graduates from throughout the country who are MSU's newest University Distinguished Scholars. These scholarships are considered to be among the most competitive in the country and cover full tuition, room and board, and books for up to eight semesters of study.

Crouse, who is a first-year student with junior class standing, originally attended the High School Honors Science/Mathematics/Engineering Program in the summer of 2009 and worked with ME Professor Ranjan Mukherjee. "During that time, I fell in love with all aspects of MSU. When presented with the University Distinguished Scholarship and with the opportunity to resume my research through a Professorial Assistantship, I knew I had to return to MSU," says Crouse.

His interest in engineering was sparked when he was given his first LEGO set. "I enjoyed building models from the instructions, but I loved creating things for myself even more. When I learned about engineering, I realized that I had been an engineer all along," says Crouse.

During a research experience in 2008, he was introduced to controls and their applications in robotics. Because of that interest he chose to study mechanical engineering.

Crouse is already involved in campus activities. He is a member of IEEE and plans to join ASME. He is on the Honors College Programming Board and is a member of Honors Students Actively Recruiting (H-STAR), and even finds time to play intramural basketball.

Through his Professorial Assistantship Crouse is working the Mukherjee on a bipedal robot called the Synthetic Wheel and currently is making modifications to the robot's software to improve its performance.

He is the son of Daniel and Stacy Crouse.

Scholarships Reflects Family's Love of MSU

The son of two loyal alumni, **David (Dave) Spalding** (BS '67) grew up wearing, seeing, and being Spartan green. As a testament to his parents and for all MSU has meant to his family, Dave recently funded the Charles and Mary Jane Spalding Expendable Engineering Scholarships in their honor and became a member of MSU's Theophilus C. Abbot Donor Society.

"Engineering was tough," recalls Spalding. "I was glad to earn that degree. The social experience I gained at MSU taught me how to respect all people and stay well rounded. Now that I am in a position to do some charitable giving, I wanted to help others gain what I did."

He credits his parents with not only leading him to MSU, but also for instilling the value of the dollar, learning to treat people fairly and to work hard. Dave developed a straightforward and meaningful approach to living that has guided not only his success in business but also his style toward management, family and everyday life.

"I always felt here at the company that family is number one, then spiritual needs, community is next, and if those three are in balance the company will greatly benefit", he said. His family includes Betsy—his wife of nearly 40 years—and three children who he is proud to say are all college graduates.

The company is one Spalding built from the ground up, literally up. That is because his business develops, produces and distributes thermal and moisture protection products. He started out working for Uniroyal in a division for industrial products. An entrepreneur at heart, he purchased the rights to their unique waterproofing membrane formula. American Hydrotech, the company he built on that product, boasts its headquarters in downtown Chicago, but his business acumen has led to branches and associated businesses all over the world.

Spalding's affection for green goes far beyond his Spartan allegiance. He is currently involved in providing "green" garden roofing systems and employs several MSU plant and soil science alumni who are heading up this environmentally progressive approach.

This article first appeared in the Fall 2010 issue of Developments*, a publication for donors and friends of Michigan State University.*

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MSU Formula SAE Racing Team

Thousands of visitors to the North American International Auto Show (NAIAS) visited the MSU Formula Racing Team exhibit and met the students who will one day design, manufacture, and market the "concept cars" displayed at future NAIAS shows.

"The team's participation in the auto show is valuable to the university, to the students, and to our partners and sponsors in industry," says Gary Cloud, University Distinguished Professor of mechanical engineering and faculty adviser to the MSU FSAE Racing Team. "It gives students the chance to demonstrate their creativity in producing a new car every year under tight deadlines, and also to experience what is going on in the automotive field. Industry representatives and visitors are able to see for themselves the high quality of the work of our students, as well as the knowledge and maturity they exhibit while presenting it."

The team is made up of about 20 primarily undergraduate students with majors ranging from mechanical engineering to economics. In May, the team will join more than 125 student groups from around the world at Michigan International Speedway in competitions that test the design, efficiency, endurance, and performance of the vehicles they have engineered.

The MSU Formula Racing Team had an exhibit at the North American International Auto Show held in January in Detroit.