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ME-EM 2012-13 Annual Report

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MECHANICAL ENGINEERING - ENGINEERING MECHANICS

ENERGY

AEROSPAC

(3)

2012-13 ANNUAL REPORT

MULTISCALE

Collaborative Research: Bridging University Boundaries





Growing Beyond Traditional Limits

Welcome to the 2012-13 Annual Report of the Department of Mechanical Engineering-Engineering Mechanics at Michigan Technological University.

I am proud to report on the many new developments since our last annual report. This issue covers a longer span of time as we shift our coverage from calendar years to academic years. Our department has been very dynamic over this period, as we are committed to continuous improvement and increasing our level of excellence beyond benchmark institutions. Our faculty have begun a process of revising our undergraduate ME curriculum, building innovative course designs along a more flexible, dynamic path for future engineers. The new curriculum design includes many concepts from American Society of Mechanical Engineer's Vision 2030 and the National Academy of Engineering's Engineer 2020 initiatives.

Our research activities have likewise developed rapidly, with our research centers increasingly focused on problems at the interface of disciplines, and collaboration blurring academic boundaries. This broader vision of research also underlies our goal of growing one or more of these centers to a national level, supported by federal agencies and industry.

We also feature in this report the numerous awards achieved by the ME-EM faculty and staff, and we welcome several new faculty and staff members. Our Presidential Council of Alumnae and our Academy continue to grow with new inductees, and we look forward to their guidance in coming years. In our next annual report we will discuss our plans for substantially growing our MS and PhD programs.

As state appropriations continue to shrink, we rely ever more on donations from alumni and industry sponsors to achieve our vision. Because donors often wish to direct their gifts, the enclosed envelope provides several categories to choose from, including the Peace Corps Master's International Program fund and the Undergraduate Curriculum Revision fund, both featured in this report. On behalf of the students, faculty, and staff, thank you for your interest and support.

William W. Jredeben

William W. Predebon, Professor and Department Chair wwpredeb@mtu.edu

ANNUAL REPORT COMMITTEE Dr. William Predebon Marlene Lappeus

Dr. William Predel Kimberly Geiger Kathy <u>Goulette</u> Marlene Lappeus Jo Anne Stimac Connie Tuohimaa DESIGN Monte Consulting www.monte.net PHOTOGRAPHY Michigan Tech Monte Consulting WRITING Monte Consulting Other Contributors

ME-EM Research

Diverse research funding sources support multiphysics and core research activities despite federal sequester.

ME-EM research expenditures have held steady throughout the federal sequester. This is a testament to the value of this work to our industry and government partners, who chose to reduce their costs elsewhere. Our culture of collegiality and innovation have paid dividends in the form of trust and commitment.

Our research centers, as the following pages illustrate, play a leading role in advanced technology development by fostering the depth of partnership and collaboration demanded by multiphysics research. By pressing ever-further into the nano- and molecular levels, the phenomena defy university silos. We serve society by reaching beyond traditional boundaries and advancing education through research, not only at Michigan Tech, but also through our collaborative efforts with university and industry partners worldwide.

ME-EM RESEARCH EXPENDITURES: 2001-2013



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MISSION

Prepare engineering students for successful careers

VISION

Be a nationally recognized mechanical engineering department that attracts, rewards, and retains outstanding students, faculty, and staff—be a department of choice nationally

ON THE COVER

Dr. Mark Griep ('08) conducted his MS and PhD research through the Multi-Scale Technologies Institute before embarking on his career with the US Army Research Lab in Baltimore, MD.





ME-EM Research Centers

How bridging university boundaries can bring about rapid innovation: Q&A with ME-EM Department Chair William Predebon

Q: The research centers are the focus in this report. Why highlight them now?

It is an important and critical time for research across disciplines. The National Science Foundation and other agencies are becoming more and more competitive, and in order to continue to receive funding, our centers have put an emphasis on multidisciplinary research. The centers are a vehicle for faculty collaboration on large-scale funding opportunities. In addition, one of our departmental goals for the next five years is to establish a national center through university and industry collaboration.

Q: How do the research centers impact graduate education? The centers create opportunities for multidisciplinary research, which then provides graduate students an avenue to get involved in the research process with faculty in a range of departments and colleges. The centers encourage graduate students to engage in peer-to-peer collaboration across departments and disciplines. Since the research centers involve many faculty members, there is more opportunity for large-scale funding, which in turn provides greater research potential for graduate students.

Q: What aspects of Michigan Tech make it a suitable environment for interdepartmental research?

The University's small size works to our advantage and makes us more agile. Our faculty can collaborate with other faculty and researchers across departments, college- and schoolwide, and together we form a tight-knit community. There is an acknowledgement and appreciation for interdepartmental research across the Michigan Tech campus.

Q: Why is it important to bridge university boundaries? Bridging university boundaries is important because we know very well that we do not have all the answers. However, we do have the broader ecology of trust rooted in our relationships nationwide. In the environment we are creating, these nationwide partners will innovate more rapidly than anywhere else in the nation.

Q: Is this the new focus of the department?

Bridging university boundaries has been our focus for some time, and now, in terms of establishing a national center, it is critical because no university has all the expertise required to solve the major challenges our nation faces.

Q: What collaborations does Michigan Tech currently have in place?

Many of our centers have already begun collaboration with other departments at Michigan Tech and at universities

across the United States. The Michigan/AFRL Center of Excellence in Electric Propulsion (MACEEP), for example, is working with researchers from the University of Michigan, Penn State, Colorado State, University of Washington, and UCLA to encourage partnerships that advance innovation.

Q: What feedback do you have from industry on the research centers?

Our research centers provide industry partners with a one-stop shop for research in an area or areas that are of interest to them. These industry partners display a true willingness to work with our centers, in some cases because of the level of graduate student involvement.

Q: ME-EM research is substantially funded by industry. Does this make your research teams more accountable in terms of delivering innovation?

Industry-based research traditionally helps to ground the faculty, and those innovations help advance fundamental research as well. Having our graduate students involved in this process helps to obtain a new level of practical knowledge and innovation for our industry partners.

Q: What impact have the research centers had so far? We have been keeping track of metrics since we transitioned to centers, and the data shows that, in several cases, the number of proposals has increased, more of our faculty are engaged in research, and grant funding has risen, which means more support for graduate students.

Q: Many universities have lost funding for research through the sequester, but ME-EM research funding has held steady. What accounts for this stability? Our funding has remained steady because of the diversity of research within the department. In addition to Mechanical Engineering, our department houses Aerospace Engineering, Manufacturing, Industrial Engineering, and Engineering Mechanics. At many universities, our department would be divided into many departments. So, while some areas in Mechanical Engineering have reduced funding, other areas have offered increased funding.

Q: An alumnus is featured on the cover of this report. What does that signify?

Our success is measured by the success of our alumni. Dr. Mark Griep, on the cover, is an example of our many alumni who have been very successful in their fields.



CENTER FOR AGILE & INTERCONNECTED MICROGRIDS (AIM)



Co-Director: Dr. Gordon P. Parker, ME-EM (left)

Co-Director: Dr. Rush D. Robinett III, ME-EM (right)

Mission: Solving future, long-term technical challenges of our nation's energy objectives through microgrid modeling, control, and optimization.

Purpose: Agile microgrids of the future will efficiently use stochastic generation, stochastic loads, and minimal energy storage to deliver power in both structured and unstructured environments. Their intelligent, multimode use of vehicles, high penetration of renewable sources, and system-level efficiency offer the promise of reducing fossil-fuel consumption.



aim.mtu.edu

THE AIM TEAM:

Dr. Jason Blough, ME-EM

Dr. Laura Brown, Computer Science

Dr. Dan Fuhrmann, Electrical and Computer Engineering

Dr. Lucia Gauchia Babe, Electrical and Computer Engineering, ME-EM

Dr. Steven Goldsmith, ME-EM

Dr. Myounghoon "Philart" Jeon, Cognitive and Learning Sciences

Dr. Nina Mahmoudian, ME-EM

Jay Meldrum, Keweenaw Research Center Dr. Michele Miller, ME-EM Dr. Gordon Parker, ME-EM Dr. William Predebon, ME-EM Dr. Rush Robinett, ME-EM Dr. Mahdi Shahbakhti, ME-EM Dr. Allan Struthers, Mathematical Sciences Dr. Mark Vaughn, ME-EM Dr. Wayne Weaver, Electrical and Computer Engineering

For a list of the team members' research focuses, visit aim.mtu.edu/people



ADVANCED POWER SYSTEMS RESEARCH CENTER (APSRC)



Director: Dr. Jeffrey D. Naber, ME-EM

Mission: Developing critical technologies for clean, efficient, and sustainable power systems.

Purpose: As a multidisciplinary organization, the APSRC fosters large, collaborative research efforts in the areas of clean, efficient, and sustainable power systems technologies. The center develops fundamental and applied knowledge that is required for the next generation of low-emission, high-efficiency vehicles and power generation.

me.mtu.edu/research/power



THE APSRC TEAM:

Dr. Jeff Allen, ME-EM Dr. Carl Anderson, ME-EM Dr. Susan Bagley, Biological Sciences Dr. Ezra Bar-Ziv, ME-EM Dr. John Beard, ME-EM Dr. Jason Blough, ME-EM Dr. Bo Chen. ME-EM Dr. Bahne Cornilsen, Chemistry Dr. Jim DeClerck, ME-EM Robert DeJonge, ME-EM Dr. William Endres, ME-EM Dr. Stephen Hackney, Materials Science & Engineering Dr. John Hill, ME-EM Dr. Gopal Jayaraman, ME-EM Dr. Dana Johnson, School of Business Dr. Jaclyn Johnson, ME-EM Dr. John Johnson, ME-EM Dr. Mark Johnson, School of Technology Dr. Seung-Hyun Kim, ME-EM Dr. V.C. Rao Komaravolu, ME-EM Dr. Pasi Lautala, Civil & Environmental Engineering Dr. Seong-Young Lee, ME-EM Dr. Nina Mahmoudian, ME-EM Dr. Charles Margraves, ME-EM Dr. Dennis Desheng Meng, ME-EM Dr. Scott Miers, ME-EM Dr. Jeff Naber, ME-EM Dr. Amitabh Narain, ME-EM Dr. Greg Odegard, ME-EM Dr. Gordon Parker, ME-EM Dr. Fernando Ponta, ME-EM Dr. William W. Predebon, ME-EM Dr. Mohan Rao, ME-EM Dr. Tony Rogers, Chemical Engineering Dr. Mahdi Shahbakhti, ME-EM Dr. Reza Shahbazian-Yassar, ME-EM Dr. David Shonnard, Chemical Engineering Dr. Kazuya Tajiri, ME-EM Dr. Franz Tanner, Mathematical Sciences Charles Van Karsen, ME-EM Dr. Wayne Weaver, Electrical and Computer Engineering Jeremy Worm, PE, ME-EM

For a list of the team members' research focuses, visit me.mtu.edu/research/power/investigators

MICHIGAN/AFRL CENTER OF EXCELLENCE IN ELECTRIC PROPULSION (MACEEP)



Director: Dr. Lyon B. King, ME-EM

Mission: Advancing spacecraft propulsion as a USAF Center of Excellence.

Purpose: MACEEP is focused on four thrust areas: Advanced Plasma Propulsion

Systems for large spacecraft; Advanced Electrospray Propulsion Systems for microsats, nanosats, and picosats; Modeling and Simulation to support the advanced propulsion thrust areas; and Spacecraft Power Electronics for plasma and electrospray propulsion power processing.







THE MACEEP TEAM:

Dr. Jeff Allen, Michigan Tech, ME-EM Dr. Jain Boyd, Michigan, Aerospace Engineering Dr. Chang Kyoung Choi, Michigan Tech, ME-EM Dr. John Foster, Michigan, Nuclear Engineering Dr. Alec Gallimore, Michigan, Aerospace Engineering Dr. Lyon B. King, Michigan Tech, ME-EM Dr. Deborah Levin, Penn State, Aerospace Engineering Dr. Richard Wirz, UCLA, Aerospace Engineering Dr. Azer Yalin, Colorado State, Mechanical Engineering For a list of the team members' research

focuses, visit me.mtu.edu/MACEEP



MULTI-SCALE TECHNOLOGIES INSTITUTE (MuSTI)



Director: Dr. Craig R. Friedrich, ME-EM

Mission: Creating knowledge leading to functional systems that incorporate nanotechnologies and microtechnologies, and disseminating that knowledge.

Purpose: MuSTI brings together functional elements to form systems where the relative size of the components within the system spans from the nano through the micro and into the macro domain. The systems focus of MuSTI integrates technologies with relative feature sizes that are orders of magnitude apart, and operating characteristics that are size dependent.

me.mtu.edu/institutes/MuSTI

THE MuSTI TEAM:

Dr. Ossama Abdelkhalik, ME-EM Dr. Jeffrey Allen, ME-EM Dr. Paul Bergstrom, Electrical & Computer Engineering Dr. Jason Blough, ME-EM Dr. Chang Kyoung Choi, ME-EM Dr. Qingli Dai, Civil & Environmental Engineering Dr. Craig Friedrich, ME-EM Dr. Ashok Goel, Electrical & Computer Engineering Dr. Mahesh Gupta, ME-EM Dr. Patricia Heiden, Chemistry Dr. John Jaszczak, Physics Dr. Lyon B. King, ME-EM Dr. Seong-Young Lee, ME-EM Dr. Miguel Levy, Physics, Materials Science & Engineering Dr. Haiying Liu, Chemistry Dr. Dennis Desheng Meng, ME-EM Dr. Gregory Odegard, ME-EM Dr. Ravindra Pandey, Physics Dr. Gordon Parker, ME-EM Dr. Ranjit Pati, Physics Dr. Mo Rastgaar, ME-EM Dr. Reza Shahbazian-Yassar, ME-EM Dr. Tolou Shokuhfar, ME-EM Dr. Kazuya Tajiri, ME-EM Dr. Yoke Khin Yap, Physics

For a list of the team members' research focuses, visit me.mtu.edu/institutes/MuSTI/research





New Classrooms Provide Increased Interactivity

The ME-EM Department celebrated the opening of two state-of-the-art multimedia classrooms with a dedication and ribbon cutting during Michigan Tech's 2013 Winter Carnival.

Thanks to a generous donation from the families of Paul ('65), Sean ('90), and Todd ('92) Fernstrum, rooms 402 and 406 in the R.L. Smith Building are now fully renovated.

The new classrooms reflect the department's revision of its undergraduate curriculum, including course changes and pedagogical changes that involve the use of modern instructional technology. "I approached Paul Fernstrum, explained our vision, and asked for his help to fund the new classrooms," says ME-EM Department Chair William Predebon. "Paul and his family really stepped up to the plate."

Room 402, named the Fernstrum Family Adaptable Classroom, features a seamless combination of interior and technical design. The room was remodeled, redesigned, and equipped with stunning technology. Two stateof-the-art projectors, two projector screens, two LCD monitors, Echo360 lecture-capture hardware and software, and a podium with a PC and Creston controller all work together to allow more faculty interaction with students and course material. The classroom design and layout lends itself to small-group work with whiteboards on each of the four walls, many of them portable for student use. The comfortable and stylish desks can be adapted easily and/or moved to accommodate group discussions, teaming, or traditional lecture layouts. Electrical outlets in the floor and along each wall allow students to power laptops or other electronic devices. The well-designed color scheme and new carpet establish a professional and comfortable atmosphere that promotes creativity in teaching and learning.

Rooms 406 and 407 were combined and renovated to create one large classroom—now room 406—named the Fernstrum Family Classroom. Previously the two classrooms had no technology and were minimally utilized, if at all. Now the room is furnished with many of the same features as room 402 and was booked solid for its first semester. An impressive team of ME-EM faculty and staff, Michigan Tech Facilities staff members, and a design consultant worked together to plan the renovation and maximize the impact of the Fernstrum donations. "The goal was to offer faculty the opportunity to break the traditional mold of a lectureonly approach to teaching," says ME-EM Associate Professor Greg Odegard. "Instructors now have the ability to adapt the room layout to their needs. They can easily switch from lecturing to roaming the room to helping individual groups of students."

The renovations have not only given faculty more opportunity for teacherstudent interaction, they've also allowed instructors to cover more curriculum in class. Thanks to the new technology, John and Cathi Drake Professor Gordon Parker discovered that he could cover about thirty percent more material during his first semester in the remodeled 402. "It's a remarkable space," Parker says. "Thanks to the Fernstrum family, I've changed my whole approach to teaching—and students learn faster and deeper than ever before."

Evolving ME Student Course Work

Three forces drive the ME-EM Department's decision to revise the undergraduate curriculum: the rapid pace of technological change, the complexity of problems that engineers face, and the need for innovation.



Dr. Michele Miller

The ME-EM Curriculum Revision Committee, currently led by the Director of Undergraduate Studies, Associate Professor Michele Miller, recognizes that the dynamic nature of business and technology requires an adaptive approach.

Published studies call for a change in mechanical engineering curriculum, as incoming students bring a different profile of abilities, computer literacies, and motivations to the classroom and lab. "We need more integration of professional practice and engineering science," says Miller. "In addition, we want to do a better job giving students practice with predictive modeling tools from the first to fourth years."

First-year and fourth-year ME students undertake a significant amount of project work in their engineering courses. The second and third years, however, contain less project experience. The middle years are heavily focused on math and theory, with less application. To remedy this, teams of faculty are developing four new second- and third-year classes that integrate laboratory and project-based experiences involving open-ended problems. This integration requires team-teaching, as solutions often necessitate a blend of simulation, instrumentation, and analysis.

Other notable changes include decreasing the number of core courses from eleven to eight, and increasing the number of technical electives from three to five. Miller hopes the

flexibility will motivate students even more. "Students will be able to further customize their program and develop an area of expertise," she says.

The committee has spent the past three years identifying requirements, benchmarking other innovative programs, proposing and considering a variety of approaches, and finally working out the details of the new and revised courses. A faculty vote in spring 2013 to proceed with the revision kept the momentum going. The new curriculum will be implemented in a two-year rollout, starting with the second-year courses in 2014 and the third-year courses in 2015. It simultaneously builds on Tech's historical strengths and responds to the forces of change, thus advancing the ME-EM Department's leadership position in engineering education.

If you would like to support the curriculum revision, please designate your Tech Fund gift to this endeavor using the center envelope or give online at mtu.edu/mechanical/crf.



MS with an International Impact

The ME-EM Department's investment in the Peace Corps Master's International (PCMI) Mechanical Engineering program is yielding substantial returns, and the benefits of this singular program come in many forms.

The department is helping the young program evolve, with a number of students making immediate and notable impacts on those around them. Brennan Tymrak is the 2012 National Science Foundation fellowship winner. With this prestigious three-year award, Tymrak is conducting research on various open-source technologies, some of which he intends to incorporate into his PCMI activities abroad. Three more ME students—Donald Norris in Malawi, Kevin Hale in Mozambique, and Wade Aitken-Palmer in Ghana—are working on water-related projects during their two-year Peace Corps service.

Program co-directors Associate Professor Michele Miller and Professor John Gershenson appreciate the meaningful relationships these students forge both abroad and here, with their peers, in the classroom. "When teaching a course with the kind of student who is motivated to undertake such a unique endeavor, the whole class dynamic changes," says Gershenson. "These students have a passion for uncovering meaningful challenges, and their perspective energizes the whole group." The program, now in its fourth year, continues to grow by drawing from a nationwide pool of uniquely qualified candidates. "Our students appreciate that the master's in mechanical engineering is combined with their Peace Corps service. It's a way for them to gain practical experience and deepen their impact while earning their master's degree," says Miller. Many aspire to engineer solutions in the developing world for a living. PCMI student Wade Aitken-Palmer, currently serving in Ghana, is considering a water project for a small fishing community that lost its clean water access eight years ago. After he completes the PCMI ME program, Wade hopes to work with an international agency, company, or nongovernmental organization (NGO) on community-based, small-scale alternative energy. "I enjoy projects that can both benefit the environment and the local population," says Aitken-Palmer. "My experiences abroad have only increased my affinity for living and working in developing countries. This is where I will make a difference."

Miller and Gershenson are working to build awareness of this alternative route to a master's degree. It poses several recruiting challenges, chiefly the enlistment of motivated students who are willing to venture to parts of world that offer few conveniences and comforts. Because PCMI ME students fall outside the traditional master's degree funding mechanisms—such as research and teaching assistantships—the program also requires awareness to build financial support.

Gershenson is passionate about how these students are changing the culture of the classroom and impacting nations in development: "PCMI students have a different kind of impact than traditional students, enriching the campus environment and helping the poorest of the poor. Support for this program pays a double dividend."

The faculty have established a fund to assist these unique individuals and are seeking donors who would like to directly support this program with financial gifts or establishment of scholarships. If you would like to partner with us, please designate your Tech Fund gift in the center envelope or give online at mtu.edu/mechanical/pcmi.







ME-EM Enrollment

BS ENROLLMENT

Note: In a few cases, the BS enrollment data shown below differs from past publications because the official final enrollment data is only available after this publication goes to press.



MS ENROLLMENT



PhD ENROLLMENT



18

ME-EM Degrees



MS DEGREES





PhD DEGREES

Graduate Seminar Series

A committee of Michigan Tech faculty members organizes the ME-EM Graduate Seminar Series each year, offering graduate students opportunities to expand their knowledge base to areas of study outside their specific research. Composed of a diverse mix of renowned leaders from academia, industry, and government, the 2012-2013 Academic Year Seminar Series featured the following speakers:

EXTERNAL SPEAKERS

Brett Chouinard, Altair Engineering, In Pursuit of Lightweight Design

Hugh Blaxill, MAHLE Powertrain LLC, *Turbulent Jet Ignition: An Efficient, Clean Combustion Concept for the Future?*

Dr. Venkat Krovi, SUNY-Buffalo, Cooperative Payload Transport by Robot Collectives

Sean Egmon, AVL North America, Success in Engineering is More Than an Equation

Dr. Steve Przesmitzki, United States Department of Energy Vehicle Technologies Program, *DOE Fuels and Lubricants Subprogram*

Dr. Thomas Wallner, Argonne National Laboratory, Alternative Fuels for Transportation – Drivers, Options and Trends

Dr. Greg Shaver, Purdue University, Model-Based Engine Algorithm Development for Control and Virtual Sensing

Dr. Steven W. Shaw, Michigan State University, Using Nonlinear Torsional Vibration Absorbers to Improve Automotive Fuel Economy

Dr. Ilias Belharouak, Argonne National Laboratory, *Lithium Batteries: Current State and Beyond*

Dr. Chris Cotting, US Air Force Test Pilot School, *An Overview of the USAF Test Pilot School, and A Framework for UAV Flying Qualities*

Dr. Todd Murphey, Northwestern University, *Control Synthesis for Discrete Mechanical Systems* **Dr. Waruna D. Kulatilaka,** Spectral Energies LLC and Air Force Research Laboratory, *Fiber-Based Optical Diagnostics for Real-World Applications*

Marie Cleveland, FedEx, Promote your Work with a Powerful Presentation

Dr. Alexander Yarin, University of Illinois at Chicago, From Electrospinning to Thermal Management in Microelectronics, from Co-Electrospinning to Nanofluidics

Dr. Arnold Lumsdaine, University of Tennessee, *Making a Star on Earth – the Future of Fusion Energy*

Dr. Robert Santoro, Pennsylvania State University, Soot Formation Studies Using JP-8 and JP-8 Surrogate Fuels

Dr. Robert F. Klie, University of Illinois at Chicago, *Chemical Analysis with Sub-Å Resolution: The Power and Challenges of Aberration-Corrected Scanning Transmission Electron Microscopy*

Dr. Chongmin Wang, Pacific Northwest National Laboratory, *Nanoscale Designing Towards High Capacity, High Power Rate, Long Cycle Life, and Safe Operation for Lithium Ion Battery*

Dr. Rafael Fierro, University of New Mexico, *Coordination Strategies for Robotic Networks*

Dr. Cortino Sukotjo, University of Illinois at Chicago, *Current Research Trend in Implant Dentistry*

Dr. Christopher S. Johnson, Argonne National Laboratory, *Advanced Materials to Enable High-Energy Li- and Na-Ion Batteries* **Ed Zentner,** General Motors (Retired), *Being a Life-Long Student*

Dr. Eric Funkenbusch, 3M, Membrane Electrode Assembly Development for Low Temperature Proton Exchange Membrane Fuel Cells

Dr. Donggang Yao, Georgia Institute of Technology, *General Maxwell Model with Logarithmic Strain Measurements*

Dr. Zachary Folcik, Massachusetts Institute of Technology Lincoln Laboratory, *Predicting Close Approaches in Geosynchronous Orbit*

Dr. Jon Pharoah, Queen's University, Fuel Cells and Renewable Energy... and Multi-Scale Modelling of Solid Oxide Fuel Cell

Dr. Greg McKenna, Texas Tech University, Using Mechanics to Interrogate the Physics of Soft Matter: From the Glassy to the Rubbery States and from the Macroscale to the Nanoscale

Dr. Hong G. Im, University of Michigan, Understanding Auto-ignition and Combustion Characteristics Through High-fidelity Simulation

Dr. Stephen W. Rouhana, Ford Research & Advanced Engineering, Engineering Considerations in Automotive Safety - A Case Study in Ford's Inflatable Seat Belts

Kurt Schneider, General Motors, Importance of Structural Vibrations to Mechanical Engineers

ORDER OF THE ENGINEER

Spring 2012

Dr. John Soyring Retired Vice President, Global Industry Solutions IBM Corp.

Fall 2012

Eric Roberts Vice President, Operations Good Technology

Spring 2013

Colleen Jones-Cervantes Vice President of Global Products, Supplies and Trading Chevron Inc.

GRADUATE STUDENT FELLOWSHIPS

Fall 2011-Spring 2013

Aneet Dharmavaram Narendranath Distinguished Teaching Fellowship

> **Ryan Foley** Cummins Engine Fellowship

> > **Qi Gao** Finishing Fellowship

Joseph Hernandez Alumni Fellowship

Mark Hopkins National Science Foundation Fellowship

Robin Johnson-Cash King-Chavez-Parks Fellowship

> Michael Kivisalu Finishing Fellowship

> > Anza Mitchell GEM Fellowship

Sunand Santhanagopalan Finishing Fellowship

Kenneth Shiel Cummins Engine Fellowship

> **Iltesham Syed** Winnikow Fellowship

Brennan Tymrak National Science Foundation Fellowship

> Andrew Willemsen NASA Fellowship

MICHIGAN TECH SPEAKERS

Dr. Mark R. Vaughn, ME-EM Research Professor, *Energy Storage for Power Grid Integration of Renewables*

Dr. Joshua M. Pearce, Associate Professor, Department of Materials Science and Engineering/Department of Electrical and Computer Engineering, *The Rise of Open-Source 3-D Printing* (Or How We Can Make Everyone a Mechanical Engineer)

Sunand Santhanagopalan, ME-EM Graduate Student, Scalable Nanomanufacturing for Energy Storage and Conversion Based on High-Voltage Electrophoretic Deposition

Dr. Mahdi Shahbakhti, ME-EM Assistant Professor, *Low Temperature Combustion Engines: Opportunities, Challenges, and Solutions*

Dr. Ezra Bar-Ziv, ME-EM Professor, *Biocoal: A Drop-In Fuel in Coal-fired Power Plants*

Dr. Nina Mahmoudian, ME-EM Assistant Professor, *Multi-Vehicle Motion Control for Underwater Gliders*

Dr. Yun Hang Hu, Charles and Caroll McArthur Professor, Department of Materials Science and Engineering, *Li-N Compounds for Energy Applications*

Dr. Karen Roemer, Assistant Professor, Department of Kinesiology and Integrative Physiology, *The Interaction of Sports Equipment and the Human Being*

Dr. Tomas B. Co, Associate Professor, Department of Chemical Engineering, *Stabilization and Bifurcations of Unstable Processes with Time Delay*

PhD Graduates

Summer 2011 (6)

Bicak, Mehmet Advisor: Mohan D. Rao *Analytical Investigation of Squeeze Film Dampers*

Gad El Sayed Gad, Ahmed

Advisor: Ossama Omar Abdelkhalik Space Trajectories Optimization Using Variable-Chromosome-Length Genetic Algorithms

Johnson, Jaclyn

Advisor: Jeffrey Donald Naber Diesel Spray Mixing Limited Vaporization with Non-Ideal and Multi-Component Fuel Thermophysical Property Effects

Kurita Nagasawa, Jorge

Advisor: Amitabh Narain Experimental Results on Gravity Driven Fully Condensing Flows in Vertical Tubes, their Agreement with Theory, and their Differences with Shear Driven Flows' Boundary-Condition Sensitivities

Momeni, Kasra

Advisor: Reza Shahbazian-Yassar Experimental and Theoretical Study of Microstructure Effect on Piezoelectric Property of One Dimensional ZNO Nanostructures

Ross, Jerry

Advisor: Lyon Bradley King Probe Studies of a Hall Thruster at Low Voltages

Fall 2011 (4)

Mir Shah Ghassemi, Seyyed Hessam

Advisor: Reza Shahbazian-Yassar In Situ Electrical, Mechanical and Electrochemical Characterizations of One-Dimensional Nanostructures

Morrow, Duane

Advisor: Tammy Lynn Haut Donahue Development of a Continuum Mechanics Model of Passive Skeletal Muscle

Pakzad, Anahita

Advisor: Reza Shahbazian-Yassar Nanomechanics of Cellulose Crystals and Cellulose-Based Polymer Composites

Rivera, Julio

Advisor: John W. Sutherland A Sustainability Study of Nanomaterials Including Societal and Occupational Implications

Spring 2012 (4)

Fritz, David

Advisor: Jeffrey Allen An Implementation of a Phenomenological Evaporation Model into a Porous Network Simulation for Water Management in Low Temperature Fuel Cells

Lago, Lucas

Advisor: Fernando Luis Ponta Structural Response and Dynamics of Fluid-Structure-Control Interaction in Wind Turbine Blades

Mitra, Soumya

Advisor: Amitabh Narain Development of One-Dimensional and Two-Dimensional Computational Tools that Simulate Steady Internal Condensing Flows in Terrestrial and Zero-Gravity Environments

Syed, Iltesham

Advisor: Abhijit Mukherjee Numerical Investigation of Effects of Addition of Ethanol to Gasoline on Laminar Flame Speed (LFS), Autoignition, and Wall Quenching

Summer 2012 (4)

Dingeldein, Joseph

Advisor: Craig R. Friedrich Direct Write Fabrication of Waveguides and Interconnects for Optical Printed Wiring Boards

Goh, Shu Ting

Advisor: Seyed Alireza Zekavat Algorithms for Spacecraft Formation Flying Navigation Based on Wireless Positioning System Measurements

Smith, Robert

Advisor: Edward Lumsdaine Computational Fluids Domain Reduction to a Simplified Fluid Network

Walber, Chad

Advisor: Jason R. Blough Torque Converter Turbine Noise and Cavitation Noise Over Varying Speed Ratio

Fall 2012 (4)

Chen, Liu Advisor: Fernando Luis Ponta *Vortex Shedding Dynamics in Long Aspect-Ratio Aerodynamics Bodies*

Hill, Carrie

Advisor: Lyon Bradley King Translation Studies on an Annular Field Reversed Configuration Device for Space Propulsion

Li, Chengzhang

Advisor: Michele H. Miller Design and Fabrication of Resonant Gas Sensor for High Sensitivity in the Presence of Air Damping

Washeleski, Robert

Advisor: Lyon Bradley King Laser Thomson Scattering Measurements of Electron Temperature and Density in a Hall-Effect Plasma

Spring 2013 (3)

Hepokoski, Mark Advisor: Jason R. Blough Development of an In Situ Measurement Device for Obtaining Material Thermal Properties

Herescu, Alexandru

Advisor: Jeffrey Allen Two-Phase Flow in Microchannels: Morphology and Interface Phenomena

Wagner, Scott

Advisor: William John Emblom Analysis of a Non-Traditional Micro Tube Hydroforming Process

MS Graduates

Summer 2011 (19)

Addanki, Neelima

Advisor: Ossama Omar Abdelkhalik Orbits Design for LEO Space Based Solar Power Satellite System

Anand, Nikhil Kaushik

Advisor: Gregory M. Odegard Experimental Study of Physical Aging Effects on Properties of EPON 862-DETA

Gopinath, Greeshma Advisor: Craig R. Friedrich *Course work only*

Gunjari, Venkata Surya Advisor: Craig R. Friedrich *Course work only*

Jagadale, Pankaj Advisor: Fernando Luis Ponta

Effect of High Order Interpolation in the Stability and Efficiency of the Time-Integration Process in Vorticity-Velocity CFD Algorithms

Jaryal, Vivek Advisor: Jeffrey Donald Naber Course work only

Kantor, Adam Advisor: John E. Beard Implementation of a Variable Compression Ratio Mechanism in a Four Cylinder Engine

More, Sushant Advisor: Amitabh Narain Course work only

Norconk, Michael Advisor: Seong-Young Lee A Comprehensive Review and Application of Particle Image Velocimetry

Parikh, Nishith

Advisor: Reza Shahbazian-Yassar Local Degradation of Mechanical, Electrical and Structural Properties of Membrane Electrode Assembly in Polymer Exchange Fuel Cells

Patel, Siddharth

Advisor: Spandan Maiti Numerical Modeling of the Failure Mechanisms in Si Thin Film Anode for Li-Ion Batteries

Pethe, Aamod

Advisor: Gordon G. Parker Dynamic Modeling of Active Regeneration in Catalyzed and Non-Catalyzed Diesel Particulate Filters

Potter, Jennifer

Advisor: Charles D. Van Karsen Comparison of Modal Analysis Results of Laser Vibrometry and Nearfield Acoustical Holography Measurements of an Aluminum Plate

Rajan, Anurag

Advisor: Fernando Luis Ponta Effect of Mesh Distortion on the Accuracy of High Order Vorticity-Velocity CFD Approaches

Salzman, Jonathan Advisor: John David Hill Evaluation of Factors Affecting Speed Perception in a Driving Simulator

Thunes, James Advisor: Spandan Maiti *Topological Changes in 2D Simplicial Meshes for the Simulation of Fracture*

Trinklein, Eddy Advisor: Gordon G. Parker Post Processing of Multiple GPS Receivers to Enhance Baseline Accuracy

Wlodyka, Joseph Advisor: Gregory M. Odegard Finite Element Analysis on Titan STL3 OTR Tires

Wyatt, Michael Advisor: Craig R. Friedrich *Course work only*

Fall 2011 (24)

Ajotikar, Nikhil Advisor: Amitabh Narain A Synthesis of Computations and Experiments for Obtaining Pulsatile Gas Flow Rates from Dynamic Pressure Difference Measurements Across an Orifice-Plate Meter

Chen, Wei Advisor: Jeffrey Donald Naber Course work only

Devanayaka, Swetha Advisor: Craig R. Friedrich

Course work only

Feng, Yiping

Advisor: Desheng Meng Preparation of Silicon-Metal Nanocomposites Based on Electrophoretic Deposition

Gorgitrattanagul, Patcharapol

Advisor: Amitabh Narain The Length of the Annular Regime for Condensing Flows Inside a Horizontal Channel -The Experimental Determination of its Values and its Trends

Gumaste, Rohan

Advisor: Amitabh Narain Computational Simulations of Latent Heat Thermal Energy Storage Systems - with Innovative and First-Principles Based Simulation for the Underlying Unsteady Melting (and Solidification) Process

Guo, Hanmeng Advisor: Craig R. Friedrich *Course work only*

Kodgule, Nikhil Sunil Advisor: Craig R. Friedrich *Course work only*

Kulkarni, Siddharth Advisor: Craig R. Friedrich *Course work only*

LeRoy, Tyler

Advisor: Jason R. Blough Muffler Characterization with Implementation of the Finite Element Method and Experimental Techniques

Mortazavi Zanjani, Seyedmehdi

Advisor: Craig R. Friedrich *Course work only*

Narang, Vikas Advisor: Jeffrey Donald Naber Course work only

Potdar, Saurabh Advisor: Craig R. Friedrich *Course work only*

MS Graduates (cont'd)

Roberts, Melissa Advisor: Jeremy Goldman Selective Matrix Remodeling to Increase Interstitial Flow in Lymphedema

Sabharwal, Abhishek Advisor: Craig R. Friedrich Course work only

Sahasrabhojane, Mihir Advisor: Gopal Jayaraman Course work only

Sawai, Rohan Advisor: Craig R. Friedrich *Course work only*

Stank, Jordan Advisor: Scott Andrew Miers Analysis of In-Cylinder Pressure Transducer Data Quality Utilizing a SIDI Turbocharged Engine

Sukumar, Ganesh Advisor: Song-Lin Yang Implementation of Monotonic Higher Order Upwind Scheme in KIVA 4

Tayal, Komal Advisor: Craig R. Friedrich *Course work only*

Virdi, Jaspreet Singh Advisor: Craig R. Friedrich Course work only

Wang, Shuo Advisor: Chang Kyoung Choi Course work only

Yan, Rui Advisor: Jeffrey Donald Naber Course work only

Zhang, Fengli Advisor: Dana Mary Johnson Development of an Optimization Model for Biofuel Facility Size and Location and a Simulation Model for Design of a Biofuel Supply Chain

Spring 2012 (53) Athipatla, Harish Chowdhary Advisor: Scott Andrew Miers Course work only

Aulakh, Harsimran Advisor: Craig R. Friedrich *Course work only* Balram, Anirudh Advisor: Desheng Meng Course work only

Barot, Ankit Jitendra Advisor: Craig R. Friedrich *Course work only*

Bhardwaj, Rahul Advisor: Craig R. Friedrich *Course work only*

Chakravartula, Vasista Advisor: Craig R. Friedrich Course work only

Chaudhari, Nilesh Advisor: Gregory M. Odegard Course work only

Chavan, Ashish Advisor: Craig R. Friedrich Course work only

Chen, Guang Advisor: Craig R. Friedrich *Course work only*

Chen, Jieyin Advisor: Craig R. Friedrich *Course work only*

Condle, Jasdeep Advisor: Scott Andrew Miers *Analysis of Novel Waste Heat Recovery Mechanism for an I.C. Engine*

Dammann, John Advisor: Craig R. Friedrich Course work only

Deshpande, Saurabh Advisor: Craig R. Friedrich *Course work only*

Dorle, Swapnil Advisor: Craig R. Friedrich *Course work only*

Jadhav, Nitin Advisor: Reza Shahbazian-Yassar Course work only

Jalan, Gaurav Advisor: Gregory M. Odegard Course work only

Kakstis, Kyle Advisor: Craig R. Friedrich Course work only Kalra, Himanshu Advisor: Craig R. Friedrich *Course work only*

Kanakamedala, Aravindh Advisor: Craig R. Friedrich *Course work only*

Krueger, Jason Advisor: Craig R. Friedrich Course work only

Kulkarni, Prasad Advisor: Craig R. Friedrich *Course work only*

Kulkarni, Mandar Dilip Advisor: Gregory M. Odegard Finite Element Analysis of a 2D Representative Volume Element

Kuvalekar, Muktesh Advisor: Craig R. Friedrich Course work only

Lawyer, Kristina Advisor: Jeffrey Donald Naber Course work only

Lemmens, Ryan Advisor: Desheng Meng Microfluidic Fabrication of Advanced Microcapsules for Use in Self-Healing Material

Liu, Xinyu Advisor: Craig R. Friedrich *Course work only*

Marathe, Salil Advisor: Craig R. Friedrich *Course work only*

Moyer, John Advisor: Tammy Lynn Haut Donahue Regional Comparisons of Nano-Mechanical Properties of the Human Meniscus; Structure and Function

Nandal, Sanjeev Advisor: Craig R. Friedrich *Course work only*

Nayak, Anit Advisor: Craig R. Friedrich *Course work only*

Patel, Nimesh Advisor: Craig R. Friedrich *Course work only* Patil, Ratnesh Advisor: Craig R. Friedrich Course work only

Patil, Suhas Advisor: Craig R. Friedrich *Course work only*

Revandkar, Vinay Advisor: Craig R. Friedrich *Course work only*

Rittenour, Michael Advisor: Scott Andrew Miers *Cold-Start Emissions Testing of Snowmobiles Using Ethanol and Gasoline*

Ruke, Tejas Advisor: Craig R. Friedrich *Course work only*

Sapra, Sumit Advisor: Craig R. Friedrich Course work only

Shankarlingaiah, Bharath Byranahalli Advisor: Craig R. Friedrich *Course work only*

Sharma, Abhinav Advisor: Kazuya Tajiri *Course work only*

Shiel, Kenneth Advisor: John H. Johnson A Study of the Effect of Biodiesel Fuel on Passive Oxidation in a Catalyzed Particulate Filter

Soman, Puneet Advisor: Gregory M. Odegard Mechanical Modeling of Intraneural Ganglion Cyst

Sundar Ram, Anand Advisor: Craig R. Friedrich Course work only

Ubale, Aniket Advisor: Craig R. Friedrich *Course work only*

Uppala, Udaya Bhanu Advisor: Craig R. Friedrich *Course work only*

Utturkar, Aditya Advisor: Craig R. Friedrich *Course work only* Vaidya, Abhijeet Advisor: Craig R. Friedrich *Course work only*

Vats, Shekhar Advisor: Craig R. Friedrich *Course work only*

Vemuri, Ananth Padmanabha Rao Advisor: Scott Andrew Miers Performance and Emission Testing of a Small Two-Stroke Engine Using Mid-Level Ethanol Blends

Weber, James Advisor: Scott Andrew Miers Impact of E22 on Two-Stroke and Four-Stroke Snowmobiles

Yi, Ye Advisor: Mahesh Gupta *Course work only*

Zadgaonkar, Sagar Advisor: Craig R. Friedrich *Course work only*

Zhao, Yiqian Advisor: Jeffrey Allen Preparation of Highly-Ordered TiO2 Nanotube Arrays and their Application in Dye-Sensitized Solar Cells

Zheng, Jun Advisor: Craig R. Friedrich *Course work only*

Summer 2012 (19)

Armstead, John Advisor: Scott Andrew Miers Cylinder Wall Waste Heat Recovery from Liquid-Cooled Internal Combustion Engines Utilizing Thermoelectric Generators

Babaria, Kaushal Advisor: Craig R. Friedrich *Course work only*

Bates, Marshall Advisor: Craig R. Friedrich *Course work only*

Claus, Michael Advisor: Craig R. Friedrich Course work only

Eick, Steven Advisor: Craig R. Friedrich *Course work only* Gray, Sarah

Advisor: Seth W. Donahue Treatment of Osteoporosis in a Mouse Model of Duchenne Muscular Dystrophy using Black Bear Parathyroid Hormone

Jadhav, Koustubh Advisor: Craig R. Friedrich Course work only

Jamy, Md Advisor: Craig R. Friedrich *Course work only*

Kshirsagar, Aniruddha Advisor: Craig R. Friedrich Course work only

Maslach, Dan Advisor: Kazuya Tajiri *Course work only*

Nagapurkar, Tejas Advisor: Craig R. Friedrich *Course work only*

Nelson, Kelsey Advisor: Robert O. Warrington Course work only

Peitzmeier, James Advisor: Mahesh Gupta *Automated Optimization of Polymer Extrusion Dies using Finite Element Analysis*

Poramapojana, Poowanart Advisor: Bo Chen *Predictive Control of Hybrid Vehicle Powertrain for Intelligent Energy Management*

Roberts, Laura Advisor: Gregory M. Odegard Use of Manual Adaptive Remeshing in the Mechanical Modeling of an Intraneural Ganglion Cyst

Sali, Rohan

Advisor: Song-Lin Yang Two Dimensional Lattice Boltzmann Simulation of Fluid Flow through an Idealized Micro-Structure of Disordered Media

Sawant, Sachin Advisor: Craig R. Friedrich Course work only

MS Graduates (cont'd)

Sriram, Suraj Advisor: Craig R. Friedrich Course work only

Tan, Yang Advisor: Craig R. Friedrich *Course work only*

Fall 2012 (20)

Abis, Cagri Advisor: Gordon G. Parker Kalman Filter Approaches on Crane Swing

Arvanitis, Anastasios Advisor: Craig R. Friedrich *Course work only*

Hackstock, Tobias Advisor: Craig R. Friedrich *Course work only*

Hargapurkar, Mihir Advisor: Gopal Jayaraman Course work only

Kreh, Kristopher Advisor: Craig R. Friedrich *Course work only*

Loveland, Dustin

Advisor: Jeffrey Donald Naber Development of a Predictive Combustion Model of a Spark Ignited Engine with Gasoline Direct Injection, Variable Valve Timing, Duration and Lift Technologies

Madison, Daniel

Advisor: Scott Andrew Miers Thermal Characterization of Combustion Chamber Components in a Gasoline Turbocharged Direct Injection (GTDI) Engine

Meyer, Edmond Advisor: Lyon Bradley King Course work only

Moharir, Priyanka Advisor: Craig R. Friedrich *Course work only*

Rice, Andrew

Advisor: Amitabh Narain Assessments and Computational Simulations in Support of a Time-Varying Mass Flow Rate Measurement Technique for Pulsatile Gas Flow Schultz, Ashley Advisor: Craig R. Friedrich Course work only

Sevik, James Advisor: Scott Andrew Miers Exhaust Emissions of Low Level Blend Alcohol Fuels from Two-Stroke and Four-Stroke Marine Engines

Solanki, Yash Advisor: Craig R. Friedrich *Course work only*

Suravaram, Raghu Mohan Reddy Advisor: Craig R. Friedrich Course work only

Surdi, Kaustubh Advisor: James P. DeClerck *Spatial Understanding of Matrix Inversion for Inverse Force Estimation*

Suresh Srikant, Sagar Advisor: Craig R. Friedrich Course work only

Wang, Yanyu Advisor: Jeffrey Donald Naber Course work only

Wiegand, Andrew Advisor: Scott Andrew Miers Conversion of a Micro, Glow-Ignition, Two-Stroke Engine from Nitromethane-Methanol Blend Fuel to Military Jet Propellant (JP-8)

Worm, Jeremy Advisor: Jeffrey Donald Naber Course work only

Zhang, Anqi Advisor: Seong-Young Lee Effect of Electrical Discharge Pattern on Spark Ignited Flame Kernel Development

Spring 2013 (49)

Agarwal, Balmukund Advisor: Craig R. Friedrich Course work only

Bhagat, Meghraj Advisor: Seong-Young Lee Course work only

Bhalla, Jaskaran Singh Advisor: Craig R. Friedrich *Course work only* Bhatt, Satya Advisor: Craig R. Friedrich *Course work only*

Bordeau, Kyle Advisor: Gordon G. Parker Agent Based, Distributed Control Strategies and Optimization of Plug-In Electric Vehicles on Smart/Microgrid Architectures

Borle, Hiren Advisor: Craig R. Friedrich *Course work only*

Chauhan, Nirdeshkumar Advisor: Craig R. Friedrich *Course work only*

Chen, Shiran Advisor: Craig R. Friedrich *Course work only*

Chen, Boxiong Advisor: Craig R. Friedrich *Course work only*

Desai, Chintan Advisor: Craig R. Friedrich *Course work only*

Dudhwal, Ishant Advisor: Craig R. Friedrich *Course work only*

Gaikwad, Mayur Advisor: Craig R. Friedrich *Course work only*

Garimella, Saikiran Advisor: Seong-Young Lee *Course work only*

Gawande, Swapnil Advisor: Craig R. Friedrich *Course work only*

Gulve, Yatin Advisor: Gregory M. Odegard Course work only

Gurram, Swaroop Kumar Advisor: Craig R. Friedrich *Course work only*

Joshi, Ravi Advisor: Craig R. Friedrich *Course work only*

Jumde, Kedar Advisor: Craig R. Friedrich *Course work only* Jyothi, Shashank Advisor: John David Hill Course work only

Kanikdale, Subodh Advisor: Jeffrey Donald Naber *Course work only*

Karadkar, Ajinkya Advisor: Craig R. Friedrich *Course work only*

Knoblauch, Christopher Advisor: Craig R. Friedrich *Course work only*

Kudupley, Harshal Advisor: Jeffrey Donald Naber Course work only

Lahiri, Abhirup Advisor: John David Hill *Course work only*

Lahurikar, Omkar Advisor: Craig R. Friedrich *Course work only*

Laijawala, Aditya Advisor: Craig R. Friedrich *Course work only*

Lokhande, Sachin Advisor: Gregory M. Odegard Simulating Large Deformation of Intraneural Ganglion Cyst Using Finite Element Method

Lukade, Maulali Advisor: Craig R. Friedrich *Course work only*

Mahajan, Saleel Advisor: Craig R. Friedrich *Course work only*

Millard, David Advisor: Craig R. Friedrich *Course work only*

Mukkirwar, Ratnadeep Advisor: Mahesh Gupta Course work only

Nikam, Abhijit Advisor: Jeffrey Donald Naber Course work only

Pachunoori, Makarand Advisor: Craig R. Friedrich *Course work only*

Patil, Shirish Advisor: Craig R. Friedrich *Course work only* **Peddinti, Shashank** Advisor: Craig R. Friedrich *Course work only*

Pidgeon, James Advisor: Jeffrey Donald Naber An Experimental Investigation into the Effects of Biodiesel Blends on Particulate Matter Oxidation in a Catalyzed Particulate Filter during Active Regeneration

Plunger, Bryan Advisor: Chang Kyoung Choi Course work only

Rege, Nandan Advisor: Craig R. Friedrich *Course work only*

Sarkar, Andrew Mintu Advisor: Kazuya Tajiri Course work only

Sontakke, Sarang Advisor: Craig R. Friedrich Course work only

Srivastava, Sanchit Advisor: Craig R. Friedrich Course work only

Su, Hao Advisor: Craig R. Friedrich *Course work only*

Terhune, Kurt Advisor: Lyon Bradley King *Course work only*

Upare, Pritam Advisor: Craig R. Friedrich *Course work only*

Vasudev, Puneet Kumar Advisor: Craig R. Friedrich *Course work only*

Zhang, Gaowei Advisor: Craig R. Friedrich *Course work only*

Zhou, Zhuohao Advisor: Craig R. Friedrich *Course work only*

Zhou, Zhuoyu Advisor: Seung Hyun Kim Course work only

Zhu, Zhengshu Advisor: Craig R. Friedrich *Course work only*



BS Graduates

Summer 2011 (12)

Brandon Scott Armstrong Hasti Asayesh Ardakani -Magna Cum Laude Megan C. Beyer Michael David Engesath -Magna Cum Laude Kane A. Johnson Levi A. Miller Colin J. Neese Jordan Keller Porter Jeffrey R. Schumacher Paul F. Shenkosky Craig VanSickle Dale Patrick Wawrzyniec -Magna Cum Laude

Fall 2011 (58)

Drew Daniel Aiken Aaron David Andersen Rushil Basavaraj - Cum Laude Avery T. Becker - Summa Cum Laude David Marc Bentoski Kyle Bertil Berggren Jason Edward Bernard Daniel Kenton Buck - Cum Laude Bryan D. Cook Tyler Brian Daavettila -Magna Cum Laude Cory John Feivor Evandro Maicon Ficanha Michael David Geiersbach Robert D. Gordon Eric D. Hagedorn - Magna Cum Laude Bruce James Read Hall - Cum Laude Samuel Paul Handschke - Cum Laude Izaak J. Harvey John H. Hatch Nathan K. Helwig Benjamin Michael Herlache -Magna Cum Laude Alexander Mark Hetteen Steven Gerard Heymes Gareth Bradley Johnson -Summa Cum Laude Wesley Robert Johnson Brittany S. Labinski Maxwell Richard Lent Qianyu Liang - Magna Cum Laude Thomas Joseph Lindholm Christine N. Lundberg Benjamin R. Martens Kelsey Lynne McComb Grace E. Neuburg

Mark David Nordstrom **Christopher Samuel Paguette** Stephen H. Pardus Fei Pi Brittany Sharon Potton -Magna Cum Laude Shaun Michael Range -Magna Cum Laude Jacob Edward Rauser **Dennis Michael Reich** Anthony Giovanni Rossetto Aaron Michael Roznowski **Kyle Schounard** Eric David Sorenson Randall Glenn Stroop Jason Brian Susick Darrin Traczyk - Magna Cum Laude James David Trippett Brandon J. Vick John R. Visser - Cum Laude Bernhard Georg-Otto Walker Mingrui Wang - Cum Laude Chet I. White - Cum Laude Joshua R. Wiljanen Brent Logan Woodard - Cum Laude Daniel John Woodford - Cum Laude Jiongxun Zhang - Magna Cum Laude

Spring 2012 (117)

Nicholas J. Anderson Jeremy J. Anderson -Summa Cum Laude Michael Andrew Maxted Bork Troy Michael Bouman -Magna Cum Laude Louis Michael Braun Douglas Alan Brynsvold **Richard A. Casing** Sarah Jean Cavanagh John Alan Cladas - Cum Laude Alexander Neal Cotton - Cum Laude Grant James Cox Corson Cramer - Magna Cum Laude Mary C. Czysen David Allan DeGroat-Ives Joseph D. DeHaan -Magna Cum Laude Paul William DeMay Victoria Marie Demers Keith P. Driscoll **Michael James Farrell** Devan R. Faust Robert Joseph Ferris -Magna Cum Laude

Brvan John Finn Joseph M. Gallo Braden Giacobazzi -Magna Cum Laude Lynn R. Giesler Matthew J. Goldsworthy Brent T. Guimont Patrick Gregorio Haas Christopher Brandon Hathaway John Patrick Hefferon Peter D. Henning Michael David Hojnacki - Cum Laude Christopher S. Hughes Zacharey J. Hussong -Summa Cum Laude Craig Douglas Jeplawy -Magna Cum Laude Steven R. Johns Brian Thomas Judson Alex Kaidan - Magna Cum Laude Ruiyu Kang Jeffrey A. Kangas Ronald R. Kaunisto Marcel A. Kerkove -Summa Cum Laude Sean Gregory Keyes Mitchell Jerome Knudson Su Ting Lau - Cum Laude Allison Marie Lebovsky Eric Bradley Link - Cum Laude Hanchen Liu Evan Gordon Lucas Lukas Jacob Lund Alexander Dominick-Kenneth MacDonald Alexander Kei MacLeod Laura Lee Maciosek Drew W. Maki Joshua R. Manninen Mikel Brian Marshall Christopher Eric Martin - Cum Laude Samantha E. Meader Michael G. Mermuys Anna Marie Miller -Summa Cum Laude Aaron P. Moore Tyler James Muckenhirn - Cum Laude Jessica Ashley Nelson Michael Paul Neuville - Cum Laude Kyle William Nordling -Summa Cum Laude Jason J. Norkoli **Emily Nicole Paquette -**Summa Cum Laude

Michael Justin Pelletier Matthew H. Rebandt Adam John Reich - Cum Laude Daniel L. Reichert - Cum Laude Alexandrea Kari Reid Timothy R. Reinke Bryan Bernard Rocheleau Jesse Richard Rosenow Brian M. Rukkila - Magna Cum Laude Neil Allen Rumschlag - Cum Laude Kelsy Lynn Ryskamp Melinda Kay Saxton Steven A. Schmiedeknecht Jan Schneewind Justin B. Schrand - Magna Cum Laude Kyle L. Schroeder Bret T. Schulte Joseph Alan Selbig James Michael Sevik - Cum Laude **Zhuang Shao** Cody James Skog Steven D. Slater Dallas Jilianna Smolarek Joseph Ryan Spice Travis A. Spilling Jeffrey Thomas Squires Tyler J. Stickland Matthew Allan Stilwell -Magna Cum Laude Robert J. Strobel Myles Cameron Strong Paul Sturmer - Magna Cum Laude Yi Sui Colleen Marie Switlik Joshua Adam Taggart Lance Paul Taylor - Summa Cum Laude Jacob G. Truitt Brennan M. Tymrak -Summa Cum Laude Jesse Ray Vandenberg Ross Alan Vandenbosch -Magna Cum Laude Kenneth M. Vanmaanen Collin Paul Veele - Summa Cum Laude David Perry Vipond Shaun Michael Vsetula Nathan Todd Wastell -Magna Cum Laude Stephen Dean Whittaker Baifan Wu - Magna Cum Laude Haofei Xie Zhi Zhang - Cum Laude Zechen Zhang Michael John Zukoff

Summer 2012 (11)

Eric James Boylan Yu Ge Daniel Franklin Green -Summa Cum Laude Minglei Guan Cory Wilson Karosa Aram Kim Benjamin Gerard Madsen Christopher William Pollock Nicholas D. Pomeroy Douglas Yutaka Yossida Binxin Zhang

Fall 2012 (82)

Majed Farhan Shalal Al-Shammari **Elizabeth Anne Andrews** Matthew George Balling Andrea Sharon Barendreght Stefanie C. Bass - Magna Cum Laude **Gregory Dean Belshaw** Andrew J. Bitely Abdulrahman Blaisi **Christopher Wayne Borns** Adrienne Lynn Breisacher Drew Dosson Brennan -Magna Cum Laude Seth Thomas Brezee Garret Robert Brondyke Mitchell Thomas Brown Andrew C. Buday Jacob William Ceh Han Cheng Zachary Michael Coffman David B. Cook Kalysta Jean Davis - Magna Cum Laude Jesse Robert Dillon James M. Doornbos **Robert Paul Drever** Joshua Thomas Ehlert John Michael Feldpausch Andrew Owen Glaeser Jason Daniel Hainer Ryan D. Harris Clayton M. Hendricks Jacob Michael Henke Josiah W. Hooker **Brett Jacob Jenkins** Kyle J. Kestila Brian E. Killian John J. Kosmatka Benjamin J. Kronberg Joshua John Landwehr Laura C. Larsen

Brock Raymond Larson Daniel Wayne Lorentz Eric M. Maddelein James V. Maercklein Sean M. Mazuchowski - Cum Laude David Ira OConnor -Summa Cum Laude Brian Edward Oestreich Timothy John Palosaari Kellene T. Perry - Cum Laude Michael Joseph Pertile Craig R. Pietila Gary William Pleyte - Cum Laude Philip D. Potter - Cum Laude Nicholas Allen Ragsdel Scott Kenneth Rhudy -Magna Cum Laude Steve Joseph Schaenzer - Cum Laude Jared M. Schlueter - Cum Laude Angela Nicole Schwaiger Sagib Jawad Sheikh Venkatesh Vijaykumar Shetty Wenlong Shi **Tongzhou Shi** Paul B. Sleik - Cum Laude **Brett Joseph Sruba** Karl Patrick Stauty -Summa Cum Laude Alicia Marie Steele Thomas James Stutts - Cum Laude Craig H. Suydam Jeffrey Jay Thompson -Magna Cum Laude John Charles Tilleman Alexander Drake Toy Eric Mitchell VanDrie -Magna Cum Laude Brittany Nicole Voshol - Cum Laude Andrea J. Walvatne David Joseph Warakomski -Magna Cum Laude Bryan David Warju II **Emily Ann Westerman** Robert Clayton Williams -Magna Cum Laude David M. Woller Shiran Wu Zhe Yang Alexander Anthony Yosick Yachan Zhang Chad James Zunich

BS Graduates (cont'd)

Spring 2013 (122) Bethany Marie Aebli Christopher John Anten Dominic D. Augustine **Reid Addison Barber** Matthew Ronald Barry Tory Duane Baughan -Magna Cum Laude Eric Franz Baumeler Amanda Beam - Magna Cum Laude Lukas Linggi Bell - Cum Laude **Dylan James Beyrle** Paul James Bork Matthew Frederick Brechting Francis Henry Bremmer Kyle Curtis Broetzmann **Clayton Benjamin Brown** Jacob Andrew Bruggink Jacob Ryan Budnick - Cum Laude Beau William Byers Caleb B. Carlson - Magna Cum Laude James Elder Clevenger -Magna Cum Laude James Robert Cook Robert Donald Cooper David Paul Couillard Benjamin Hugo Daavettila -Magna Cum Laude **Gregory Colin DeVillers** Mark DeYoung David Charles Deisenroth -Magna Cum Laude Peter Kelly Denney - Cum Laude Joseph K. Diehl **Thomas Charles Dionne** Carl Thomas Drache -Magna Cum Laude Thomas John Dulak - Cum Laude Brian Casey Dvorak - Cum Laude Joseph Norton Eckstein Stewart David Eddy Justin Michael Engwis -Summa Cum Laude Heather Flak **Thomas Michael Freeman** Mary Perkins Gardner -Magna Cum Laude Karl Peter Gubert - Cum Laude Zachary Thomas Halverson James Francis Hartel Brandon Lee Hein

Kevin Gregory Hency Zachary T. Hersch Daniel Mason Hirst Philip Gerald Hohnstadt - Cum Laude Michael Fay Hubble Robert Scott Jane Jonathon Rene Juszkiewicz Benjamin Mark Kalis -Magna Cum Laude Jacob Michael Kemppainen -Cum Laude Chadwick Joseph Kern - Cum Laude David Ronald Kiekintveld Benjamin Henry Kloster Andrea Sue Klumpp Evan Nathaniel Kobman Nathan Daniel Koetsier -Summa Cum Laude Ryan John Koll **Kyle Scott Kovacs** David Matthew Kravis Andrew James Kremkow Jacqueline Ann Kukulski -Magna Cum Laude Jacob A. LaSarge Jeffrey Scott LaTulip Lorenzo Humberto Labourdeth Aaron J. Lilly Eric Michael Lindholm - Cum Laude Tyler J. Losinski Tyler Joseph Lunsford Benjamin Alan Maguire - Cum Laude Bradley John Massie -Magna Cum Laude Paul Franklin Mayes -Summa Cum Laude John E. Messina - Cum Laude Ryan Andrew Mikolaizik Lauren E. Nasca Huajun Ni Andrew Mark Nienow Miriam Elizabeth Paquet James Joseph Parisot Zachary M. Peck **Dylan Richard Penn** Justin Robert Poirier **Daniel Andrew Polovich** Michael William Ponte Nathan Roscoe Ralph Elizabeth Mary Reinke **Michael Scott Richards**

Jordan D. Ridge - Magna Cum Laude Chelsea Nicole Ruff -Summa Cum Laude Nathan Joseph Saliga -Magna Cum Laude John Edward Sand Preston James Sanford Katherine Ann Schattl - Cum Laude Craig William Schmid **Thomas Joseph Schmidt** Andrew Michael Schrader -Cum Laude **Glen Thomas Shaw** Xiaoyu Song **Ryan Allen Stheiner** Songhao Tang Scott Steadmon Thompson Gareth Michael Tomlinson Joseph Patrick Trapp Justin D. Tumberg Andrew Z. VerSteeg Matthew Scott Verbiscus Jonathon Michael Vince Alicia Marie Walby Craig Michael Watson Erik A. Weigel Logan Alexander Weisend Brian J. Weisner Alexander Michael Weldum **Douglas Frank Weyher** Neil Joseph White Michael L. Wood Andrew Michael Wybo Xiaofan Ye Jonathon D. Zarafonitis Yiming Zhu - Magna Cum Laude Paul Andrew Zimmerman -Magna Cum Laude





Communicating for the Future

From newspaper reporter to published mystery author to PhD student in Rhetoric and Technical Communication, Nancy Barr has spent much of her life building relationships with audiences. Her latest endeavor is to help ME-EM students communicate more effectively as the Communications and Senior Design Program Advisor.



Nancy Barr

In her new role, Barr has launched two writing initiatives targeted at graduate students: The ME-EM Lab Graduate Teaching Assistant (GTA) Training Program and, a one-credit seminar, ME-EM 5990: Writing Skills for Graduate Research Assistants (GRA). Both initiatives have a ripple effect, greatly impacting ME-EM undergraduate and graduate students.

Undergraduate students enrolled in lab classes benefit from a new writing framework that provides GTAs with a set of guidelines, grading rubrics, and tools to deliver effective feedback. "In the past, we haven't done a lot of instruction on how to write lab reports," says Barr. She hopes the training program will improve consistency across courses and help GTAs build more valuable studentteacher relationships. Barr is pleased with the early results: "Graduate teaching assistants need to be comfortable with all aspects of teaching: the relationships, the communication, the material. The new training program has been very successful in helping GTAs provide feedback to their students, and it gives them more confidence in the classroom." To evaluate the effectiveness of the program, Barr is planning a full-scale assessment of the initiative's impact in 2015, when she can compare the final reports from fall 2012 senior design students (who weren't affected by the new training) to the final reports from spring 2015 students (who will have gone through all three labs under the new model).

The second initiative, a one-credit writing course, targets PhD students who conduct research with faculty members. The seminar disambiguates precision-valued technical writing, focusing heavily on sentence structure, word choice, paragraph construction, and how to prepare results for publication. The course also includes a strong ESL component to address the unique needs of many PhD students. With this instruction, GRAs can deliver more focused, accurate, and effective writing and have a stronger impact on peer audiences.

The future of both programs depends largely on resource allocations, but Barr hopes the new initiatives will continue to develop and shift to mentorship programs that encourage PhD students to pursue careers in academia. "We need to effectively mentor our PhDs as teachers and researchers," says Barr.

Whether grad students are teaching an undergraduate lab or publishing journal articles, these programs will give them the tools they need to have a greater impact on their audience. As Barr knows from experience, impact is what counts.

Aerospace Enterprise: The Path to Space

The Aerospace Enterprise, advised by Dr. Lyon B. King, continues on the path to space that began with the Air Force Research Laboratory's University Nanosatellite 6 competition.



After the team's *Oculus-ASR* took first place in early 2011, the Aerospace Enterprise was awarded a two-year follow-on contract from the Air Force Office of Scientific Research (AFOSR) to prepare for a 2015 launch.

The team secured a launch date through the Space Experiments

Review Board (SERB) that ranks experiments from crucial to least important. Then the Department of Defense's (DOD) Space Test Program evaluates and ranks each of the competing satellites and payloads. Tech's *Oculus-ASR* ranked thirtieth out of the sixty-two government agency experiments vying for space flight. "It's very impressive," says Dr. King. "That's not sixty-two student satellites. It's sixty-two satellites coming from big government agencies—like NASA and the Air Force and our student-designed vehicle finished in the middle of the pack."

In order to be ready for the 2015 launch and retain the AFOSR funding, the sixty kilogram Oculus-ASR must pass a series of reviews including the recent preintegration test. Despite a few anomalies, the enterprise's nanosat passed the review and is on to the next phase. During the 2013-2014 school year, the team will implement a deorbit mechanism, finalize assembly, fix the pre-integration anomalies, complete the final integration of the vehicle, and run a series of tests on the fully integrated vehicle to ensure all the systems operate as designed. Before the 2015 launch in Cape Canaveral, Florida, the nanosat must pass a pre-ship review. If it passes the review, the Oculus-ASR will be on its way to Albuquerque, New Mexico, for testing in the Air Force Research Lab. Finally the nanosat will be integrated with the launch vehicle and lifted into space, where the Oculus-ASR's primary mission is to serve as a cooperative imaging target. By observing the Oculus-ASR, the Air Force can improve its ability to predict what any given satellite is doing by simply watching it from the ground. Tech's Aerospace Enterprise will carry out two such data campaigns for the Air Force.

The challenges of space are unforgiving. "We are pleased to have passed so many milestones over the years," says King. "It has taught the students to fully engage every challenge and to take nothing for granted along the path to space."

New Faculty



DR. RUSH D. ROBINETT III

Rush D. Robinett III is the Richard and Elizabeth Henes Chair Professor in Energy Systems and the department's new Director of Research. He specializes in nonlinear control and optimal system design of energy, robotics, and aerospace systems.

In the energy arena, Robinett is focused on the distributed, decentralized nonlinear control and optimization of networked microgrids with up to 100 percent penetration of transient renewable energy sources (i.e., photovoltaics and wind turbines). At 100 percent penetration, the optimal design of energy storage systems is critical to the stability and performance of networked microgrids because all of the spinning inertia and fossil fuel of the generators have been removed from the system.

In the robotics area, his interest lies in the collective control of teams of simple, dumb robots that solve complicated problems. In the aerospace area, he is currently investigating system identification, trajectory optimization, guidance algorithm development, and autopilot design.



DR. MAHDI SHAHBAKHTI

Mahdi Shahbakhti joins the Department of Mechanical Engineering-Engineering Mechanics as an assistant professor. He comes to Michigan Tech from the University of California, Berkeley.

Shahbakhti holds a PhD in Mechanical Engineering from

the University of Alberta, and a MSE and BSE from KNT University of Technology. He taught a course on combustion engines and alternate fuels, for which he received the Zita and John Rosen Teaching Excellence Award.

Shahbakhti worked as a research and development engineer at Iran Khodor Powertrain Company for three years. He has published in journals including the International Journal of Automotive Engineering; ASME Journal of Dynamic Systems, Measurement, and Control; and the International Journal of Engine Research.

His research addresses some of the challenges of hybrid electric vehicles, including increasing fuel saving in hybrid drive-trains, reducing the control complexity of hybrid drive-train systems and increasing flexibility in using alternative fuel mixes.



DR. TOLOU SHOKUHFAR

Tolou Shokuhfar accepted a tenure-track position as assistant professor in the Mechanical Engineering-Engineering Mechanics Department in December 2011. She was previously a post-doctoral research assistant at Michigan Tech.

Shokuhfar received her PhD in Mechanical Engineering from Michigan Tech. She holds a MS and BS in Materials Science and Engineering from Sharif University of Technology.

Shokuhfar is a member of the Biomedical Engineering Society, the Society for Biomaterials and the Materials Research Society. Her research interests include nanotechnology, nanomedicine, and orthopedic implants. She has published in journals such as *Nanomedicine: Nanotechnology, Biology, and Medicine, Applied Physics and Advanced Science Letters.*



DR. PAUL VAN SUSANTE

Paul van Susante joins the Department of Mechanical Engineering-Engineering Mechanics as a lecturer. He comes to Michigan Tech from the Colorado School of Mines.

He received his PhD and MS in Engineering Systems from

the Colorado School of Mines. He holds a MS and BS in Civil Engineering from Delft University of Technology. Van Susante has published in journals such as *Aerospace Engineering, Terramechanics* and *Engineering Mechanics*. He holds memberships in the American Society of Civil Engineers and the American Institute of Aeronautics and Astronautics.

New Research Faculty



DR. STEVEN Y. GOLDSMITH

Steven Goldsmith is a Research Professor with dual appointments in the Department of Mechanical Engineering-Engineering Mechanics and the Department of Electrical and Computer Engineering. He is also a Senior Fellow at the Technological Leadership Institute at the University of Minnesota.

Goldsmith spent thirty-two years with Sandia National Laboratories and retired as Distinguished Member of the Technical Staff in 2011. While at Sandia he developed information and control systems for many different

applications including nuclear weapons testing, particle beam accelerators, intelligent signal processing, seismic array monitoring, arms control and treaty verification, cryptography, environmental life-cycle analysis, e-commerce and international trade, electric grid coordination, collective robotics, information warfare, and cyber security.

His current research efforts are focused on intelligent agent systems and technology, particularly the development of adaptive and multi-agent systems. His current projects involve the application of intelligent agents to "smart" electric grid controls and microgrids, critical infrastructure security, automated cyber defense, and life-cycle analysis of renewable energy systems.



DR. MARK R. VAUGHN

Mark Vaughn is a Research Professor in the Department of Mechanical Engineering-Engineering Mechanics. Vaughn holds a PhD in mechanical engineering and a MS in biomedical engineering from The University of Texas at Austin, as well as a BS in biomedical engineering from the University of New Mexico. He began his career at the Center for Electromechanics in Austin designing and building pulsed power flywheel inertial energy storage

systems and railguns. This work required him to invent new hydrostatic bearing technology.

Vaughn spent twenty-six years at Sandia National Laboratories working on a wide range of projects including advanced nuclear weapon use control systems, missile payloads, medical devices including prosthetics, wound healing, and wheelchair assistive devices, robotics, and energy storage for microgrids. He holds ten US patents.

His research interests include machine design, shock and vibration isolation, renewable energy including geothermal, grid energy storage, flywheel energy storage, hydrostatic bearings, biomedical engineering, wheelchair assistive technologies, oxygen concentrators, topical hyperbaric oxygen treatment, continuously variable transmissions, tamper detection technologies, rocket payloads, robotic joints, FEM, and heat transfer.

Faculty & Staff Awards

Dr. Ezra Bar-Ziv

Received the 2012 Russell Ackoff Award for his paper "Torrefied-Biomass (Biocoal) from Municipal Solid Waste for Power Production" in the Journal of Solid Waste Technology and Management at the Twenty-Seventh International Conference on Solid Waste Technology and Management on March 11-14, 2012, in Philadelphia, PA.

Along with Dr. John Diebel, assistant director of technology commercialization at Michigan Tech, and Jordan Klinger (ME-EM PhD candidate), awarded the top team designation by the National Science Foundation Innovation Corps (I-Corps), a new public-private partnership to help develop scientific and engineering discoveries into useful technologies. The program connects academic researchers with the technological, entrepreneurial, and business communities.

Dr. Jason Blough

Selected to receive the 2011 Society of Automotive Engineers (SAE) Faculty Advisor Award. The award recognizes dedication and contributions to SAE and Blough's SAE Collegiate Chapter. The award was presented at the SAE 2012 World Congress and Exhibition on April 25, 2012, in the Cobo Center, Detroit, MI.

Dr. Bo Chen

Promoted to Associate Professor with Tenure.

Dr. Mahesh Gupta

Selected to be Fellow of the Society of Plastics Engineers (SPE). He is the first faculty member from Michigan Tech to be named a Fellow of SPE.

Together with Atakan Altinkaynak (ME-EM PhD '10), M. Spalding (Dow), and S. Crabtree (Dow), authored "Melting in a Single Screw Extruder: Experiment and 3D Finite Element Simulations," the second most read paper in the International Polymer Processing Journal.

Dr. John Johnson

Selected to receive the 2013 ASME Internal Combustion Engine Award. The society awards the honor for "leadership in innovative research in the modeling of diesel engine particulate filters and after treatment systems based on extensive experimental data; for dedication in educating graduate students on diesel engines; and for leading and participating in the national studies of technology to reduce internal combustion engine fuel consumption." The award consists of a \$1,000 honorarium. Johnson will be honored at the ASME 2013 Internal Combustion Fall Technical Conference, set for Oct. 13-16 in Dearborn, MI.

Dr. Lyon B. King

Promoted to Professor with Tenure.

William Langdon

Received the Innovative Solutions Award at the Michigan Tech Staff Council *Make a Difference Award* reception.

Dr. Seong-Young Lee

Promoted to Associate Professor with Tenure.

Dr. Nina Mahmoudian

Invited to speak at the Academic Forum of the National Instrument Convention in Austin, Texas, held August 6-9, 2012.

Dr. Charles Margraves

Honored as 2012 ME Teacher of the Year by the ME students.

Dr. Desheng Meng

Promoted to Associate Professor with Tenure.

Along with Dr. Amitabh Narain,

Xiaobao Geng (PhD student, ME-EM), and Pragnesh Patel, authored an article, "A self-adaptive thermal switch array for rapid temperature stabilization under various thermal power inputs," selected for publication in the Journal of Micromechanics and Microengineering's "Highlights of 2011." Only twenty-four of the 403 articles published in 2011 were selected.

Dr. Scott Miers

Received the 2012 SAE Ralph R. Teetor Educational Award. The award letter states: "The credentials and standards of excellence in education of this year's candidates were extremely high and brought about some very keen competition. Your outstanding contributions have distinguished you as one of the top engineering educators." Miers received the award at the 2012 SAE World Congress in Detroit, Michigan.

Selected as a 2013 finalist for the Michigan Tech Annual Teaching Award in the Assistant Professor/Lecturer/ Professor of Practice category. The selections were based on over 51,000 student rating-of-instruction forms.

Honored as 2013 ME Teacher of the Year by the ME students.

Dr. Michele Miller

Accepted the additional appointment of Associate Chair and Director of Undergraduate Studies in the Department. She replaces Associate Professor Charles Van Karsen who stepped aside to return to full time teaching and research.

Dr. Jeffrey Naber

Promoted to Professor with Tenure.

Presented at the Engineering Society of Detroit's Hybrid Vehicle Systems Course held on November 12, 2012, in Southfield, Michigan.

Dr. Amitabh Narain

His research, "High Effectiveness Microscale Condensers and Boilers for Terrestrial and Space Applications," was highlighted on the NSF website (CBET Thermal Systems).

Dr. Fernando Ponta

Promoted to Associate Professor with Tenure.

Highlighted in the September ASME article "Small Wind Turbines Fulfill Their Promises."

Dr. Reza Shahbazian-Yassar

Promoted to Associate Professor with Tenure.

Selected by the NSF-International Materials Institute at Northwestern University to give an invited talk at the International Conference of Young Researchers on Advanced Materials in Singapore July 1-6, 2012. Awarded a travel grant by the International Materials Institute for Solar Energy and Environment to support his trip.

Selected as a panelist at the Rush University Mentoring Program seminar. The seminar, "Tips on Getting National Science Foundation (NSF) Funding: Panel presentation from NSF Awardees," was held on February 21, 2013.

Jillian Spagnotti

Received the Rookie Award at the Michigan Tech Staff Council *Make a Difference Award* reception. Her award recognizes staff members who have been at Michigan Tech for two or fewer years and have made a significant contribution.

Dr. Kazuya Tajiri

Selected as a 2013 finalist for the Michigan Tech Annual Teaching Award in the Assistant Professor/Lecturer/ Professor of Practice category. The selections were based on over 51,000 student rating-of-instruction forms.

Dr. Paul van Susante

Selected as a 2012 Outstanding Reviewer for the ASCE's *Journal* of Aerospace Engineering. ASCE's reviewer recognition program gives the editors of the Society's journals an opportunity to express their gratitude to these reviewers and to commend them for their efforts.

Jeremy Worm

Joined the Mobile Lab Coalition, an international coalition of traveling, laboratory-based STEM education programs. A write-up on the Michigan Tech Mobile Lab appeared in the coalition's newsletter.

Highlighted in the Michigan Tech News article "Hot Rods, Cool Technology: Michigan Tech and the Green Racing Initiative" regarding his green technologies research for the motor sports industry.

Along with a team of graduate and undergraduate students and members of the Michigan Tech Chapter of the National Society of Black Engineers, brought the Michigan Tech Mobile Lab to Detroit. They met with engineers and training coordinators from two companies to showcase the Mobile Lab's offering of hands-on short courses. The lab also provided funfilled STEM activities for inner city youth at the Parental Boot Camp organized by Heroes Alliance of Detroit.

Faculty & Staff Directory

Faculty biographies and research interests are available online at **mtu.edu/mechanical/department/faculty-staff**

ME-EM FACULTY



Ossama Abdelkhalik Assistant Professor



Jeffrey S. Allen John & Joan Calder Associate Professor



James DeClerck Professor of Practice



William J. Endres Associate Professor



Carl L. Anderson Professor Associate Dean for Research and Graduate Studies, College of Engineering



Ezra Bar-Ziv Professor



John E. Beard Associate Professor



Jason R. Blough Associate Professor



Bo Chen Associate Professor



Chang Kyoung Choi Assistant Professor



Craig R. Friedrich Richard and Bonnie Robbins Chair, Professor, Associate Chair and Director of Graduate Studies



John K. Gershenson Professor



Thomas R. Grimm Associate Professor



Mahesh Gupta Professor



John D. Hill Assistant Professor, Adjunct Assistant Professor, Cognitive and Learning Sciences



Gopal Jayaraman Professor



V.C. Rao Komaravolu Principal Lecturer



Seung-Hyun Kim Assistant Professor

Lyon B. King



Michele H. Miller Associate Professor, Associate Chair and Director of Undergraduate Studies Adjunct Associate Professor, Materials Science and Engineering



Ibrahim Miskioglu Associate Professor



Jeffrey D. Naber Ron & Elaine Starr Professor in Energy Systems Director, Advanced Power Systems Research Center



Seong-Young Lee Associate Professor

Systems Engineering

Ron and Elaine Starr Professor of Space

Director, Space Systems Research Group



Amitabh Narain Professor



Edward Lumsdaine Professor



Nina Mahmoudian Assistant Professor



Charles H. Margraves Lecturer



Dennis Desheng Meng Associate Professor



Scott Miers Assistant Professor



Gregory M. Odegard Associate Professor Adjunct Associate Professor, Materials Science and Engineering



Gordon G. Parker John & Cathi Drake Professor



Chris E. Passerello Professor



Fernando Ponta Associate Professor



William W. Predebon Department Chair Professor

ME-EM FACULTY (cont'd)



Mohan D. Rao Professor



Mo Rastgaar Assistant Professor



Charles D. Van Karsen Associate Professor



Paul van Susante Lecturer



Rush D. Robinett III Richard and Elizabeth Henes Chair Professor in Energy Systems Director of Research



Mahdi Shahbakhti Assistant Professor



Carl R. Vilmann Associate Professor



Song Lin (Jason) Yang Professor



Reza Shahbazian-Yassar Associate Professor Adjunct Associate Professor, Materials Science and Engineering



John H. Johnson **Research Professor** Professor Emeritus

ME-EM RESEARCH FACULTY



Tolou Shokuhfar Assistant Professor



Kazuya Tajiri **Assistant Professor**



Madhukar Vable Associate Professor



Steven Y. Goldsmith **Research Professor**



Mark R. Vaughn **Research Professor**



Sheryl Sorby Research Professor Professor Emeritus

ME-EM STAFF



Nancy Barr Communications and Senior Design Program Advisor



Karen E. Bess Staff Assistant



Peter Bingham Senior Design Training Specialist



Robert DeJonge Senior Research Engineer II Senior Design Projects Coordinator



Paula Feira-Zenner Director of Operations and Finance



Kathy Goulette Executive Assistant



Danise Jarvey Senior Engineering Academic Advisor



Jaclyn Johnson Research Engineer



Paul Kilpela Research Associate



Michael LaCourt Research Engineer Scientist II



Bill Langdon Training Specialist - Senior Design



Marlene Lappeus Program Coordinator Academic Advisor



Robert W. Page Laboratory Facilities Manager Advisor, Hybrid Electric Vehicle Enterprise



Miron Perelman Research Engineer



Tina Sarazin Staff Assistant



Jillian M. Spagnotti Office Assistant



JoAnne Stimac Administrative Aide



Martin Toth Master Machinist



Ryan A. Towles Academic Advisor



Eddy Trinklein Research Engineer



Connie Tuohimaa Research & Accounting Coordinator



Jeremy Worm Research Engineer - Grant Writer Formula Car Enterprise



Alumni Awards

2011 HUMANITARIAN AWARD-DR. TERRY J. WOYCHOWSKI



The first Michigan Tech Alumni Humanitarian Award was bestowed upon Dr. Terry J. Woychowski in recognition of his outstanding volunteer leadership and service to improve and enrich the lives of others.

Terry earned a Bachelor of Science degree in Mechanical Engineering, took postgraduate studies at Wayne State University, and attended the Global Executive Development Program at the Duke University School Of Business. In 2003 he received an Honorary Doctorate in Business Management from Indiana Wesleyan University.

After spending more than thirty years with General Motors Company, Terry retired in 2012 as vice president for global quality. He is a four-time recipient of the GM Chairman's Honors.

Terry has long been active in civic and volunteer work. Just after the fall of communism in 1992, he went to northern Albania with a group from Grace Community Church in Detroit. "Of all the Eastern block countries, communism had its tightest grip on Albania," he recalls. "It had retarded progress by what seemed like 100 years." They helped establish a small church, which is still serving the city of Shkoder today.

Terry returned with the same group a few years later, this time traveling to the border of Northern Albania during the War in Kosovo—a time when ethnic cleansing was taking place. He helped set up a refugee camp, and transported supplies, food, clothes, medicine, and key personnel. "Many ethnic Albanian men in Kosovo had been either imprisoned or killed, or were fighting in the KLA, the revolutionary force. Their wives, children and the elderly were on their own, and Serbian military would come in and order them to leave. They walked across the Prokletije mountain range with only the clothes on their backs into Albania—a country that was itself destitute and impoverished," he explains.

Terry received EMT training as a young engineer at GM. "I have some knowledge of medical terminology and equipment, which enables me to have higher-quality conversations with medical personnel as I try to help fulfill their needs," he explains.

Immediately following the 2010 earthquake Terry traveled to Haiti to provide help to those in need. "Because GM had recently closed some plants, the medical facilities in those plants had supplies that were now basically 'scrap'. The doctor in charge gave them to me—bandages, sutures and more—two large duffel bags full." Terry used some of the supplies to treat individuals he encountered in Haiti, including the crushed hand of a girl, Marie Michelle, who had been trapped in a three-story building. But most of the contents were given to a makeshift hospital his team encountered a few days into their trip. "Those two duffel bags became the hospital's entire inventory," he says.

With his immediate family, Terry founded the Woychowski Charitable Foundation, sponsoring a Michigan Tech ME senior design team to build a human-powered grain processor. He formed a partnership with the World Hope organization to deploy them in sub-Saharan Africa to assist local villages in the preparation of their food staple. Yet another senior design team designed a second version, and Terry's daughter Jamie traveled to Zambia to manufacture and distribute the grain processors.

As a member of the Board of Directors for the Engineering Society of Detroit (ESD), Terry formed a partnership between General Motors, Michigan Tech, and ESD to offer a tuition-free retraining program for displaced engineers in southeast Michigan.

As GM's key executive liaison with Michigan Tech, Terry worked with the University in recruitment, financial grants, curricular development, and special projects. In addition, he also served as a member of the Michigan Tech College of Engineering Industrial Advisory Board. He is now a member of the Michigan Tech Board of Control.

Terry recently joined American Axle Manufacturing in Detroit as senior vice president for engineering and quality. He and his wife, Rochelle Ann, have three children and reside in Commerce Township, Michigan.

2012 OUTSTANDING SERVICE AWARD-TANYA WAREHAM KLAIN



The 2012 Outstanding Service Award posthumously honored Tanya Wareham Klain, who died on December 7, 2008.

Tanya earned a Bachelor of Science in Mechanical Engineering in 1990 and was a vibrant presence on Tech's campus. She was active in her sorority, Alpha Gamma Delta,

Undergraduate Student Government, residence hall councils, the Alpine Ski Club, and the Michigan Tech Student Foundation. Besides earning a degree, she made friendships that endured. "Tech is famous for that people staying together," she recalled.

After graduation, Tanya went to work for General Motors, where she advanced through several leadership positions and most recently held the position of engineering group manager in the area of body and exterior components. She was also a member of GM's university relations and recruiting team. An ardent supporter of Michigan Tech, she was GM's key contact with the Department of Mechanical Engineering-Engineering Mechanics.

As a Tech alumna, Tanya served on the Board of Directors of the Alumni Association and was very active in alumni events in the Detroit area. In 2004, Tanya was inducted into the Presidential Council of Alumnae in recognition of her professional accomplishments and her support for the University.

Her stewardship and leadership were based on fond memories of the University and a commitment to serve the institution. She always said that Michigan Tech transformed her life. "Coming to Tech was the best decision I ever made," she once said. "I owe the University a lot—pretty much everything."

2013 DISTINGUISHED ALUMNI AWARD—PAUL W. FERNSTRUM



The 2013 Distinguished Alumni Award went to Paul W. Fernstrum, who graduated from Michigan Tech with a Bachelor's Degree in Mechanical Engineering in 1965.

Paul is chairman and past president of Menominee-based R.W. Fernstrum & Co., a thirdgeneration family-owned company that invented—and continues

to manufacture and market—the Gridcooler keel cooler, a marine engine heat exchanger, which was developed during World War II for landing craft.

Paul began his career at RW Fernstrum as a draftsman. In 1975, he designed the first of a series of engineering programs for the Gridcooler. Today, some of the applications of the Gridcoolers include cooling of hydroelectric stations, engines, offshore wind and tidal generators, pump stations, and electronics on tsunami early-warning buoys and ROV submersibles. In 1995, he became president of the company.

As a student, Paul was in the Air Force ROTC, the American Society of Mechanical Engineers, and Alpha Phi Omega. Paul is a Michigan Tech Fund trustee, and his commitment to Michigan Tech continues in many other ways. He has sponsored Senior Design teams and most recently helped create two incredible, new classrooms in the R. L. Smith ME-EM Building (see page 14).

He has been active in local and civic organizations as a director of the Stephenson National Bank & Trust, past president of the Rotary Club, past commander of the US Power Squadron, and an elder at the Presbyterian Church. Paul is also a past Scoutmaster and district chairman for the Boy Scouts of America and has received the Boy Scouts of America Silver Beaver Award.

Sandy and Paul's two sons, Sean and Todd, are also Tech alumni and work with their father. They also support various Michigan Tech initiatives, including School of Technology and Department of Humanities laboratories.

Lisa, Sean's wife, is also a Tech alum. Their children, Jeremy and Rachel, will be attending Michigan Tech this fall—third generation at Tech.

Featured Alumni



DOUG PARKS, GM

The fundamentals of engineering, paired with ambition and innovation, have carried Doug Parks a long way throughout his tenure at General Motors. In August 2012, Parks was promoted to Vice President, Product Programs. His new position was created after some restructuring in GM's Global Product Development organization. The new structure eliminates redundancy, clarifies accountability, and streamlines the decision-making process. Now, twelve executive chief engineers report to Parks, each overseeing his or her product program from inception to production.

Parks, who graduated from Michigan Tech with a BSME degree in 1984, began his career at GM immediately after graduation. He has excelled in various positions at GM, from tooling engineer to global vehicle chief engineer for compact vehicles to global vehicle line executive and global vehicle chief engineer for electric vehicles, but he has always relied on the fundamentals. "Michigan Tech provided a great foundation for me," says Parks. "The fundamentals of getting the design capable, having the right understanding to meet the requirements in an efficient manner, the fundamental underpinning of learning the trade and taking it from the classroom into the lab—those are the basics of engineering. That's how I learned my craft."



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DR. PAUL ROGERS, TARDEC

As the Director of the US Army Tank Automotive Research, Development and Engineering Center (TARDEC), Dr. Paul Rogers understands the value of education. Rogers, who earned his PhD in Mechanical Engineering-Engineering Mechanics from Michigan Tech in 2004, leads a 1,700-person workforce of engineers, scientists, researchers, and support staff that focuses on research and development engineering for both manned and unmanned ground vehicle systems within the Army and across the Department of Defense. With an annual budget of more than \$475 million, Rogers sets the strategic direction for a full range of investments that affect more than 270 Army vehicle systems. Previously Rogers served as Deputy Program Executive Officer for Ground Combat Systems and TARDEC Executive Director for Research and Technical Integration.

Rogers, also a decorated Commander in the Michigan National Guard, brings a combination of academic strength and ground truth to his work at TARDEC and can move effortlessly from a room full of executives to a room full of soldiers. "Education is crucial to being successful," says Rogers. "We need to be students of our profession, seeking new knowledge, ideas, and experiences, so we are prepared as the uncertainties fold out in front of us." Those experiences come from both the workforce and academia. Rogers highly values investment in academics, especially Science, Technology, Engineering, and Mathematics (STEM): "STEM is very important to the future success of our nation and crucially important to TARDEC."

2012 ME-EM Academy Inductees



TIMOTHY P. COFFIELD

After graduating from Michigan Tech, Timothy P. Coffield (BSME 1984) went to work as a research engineer for five years at IBM Research in Rochester, Minnesota. Following that he was the principal engineer and business group manager at Cascade Engineering

for seven years. In 1998, he founded Dahti Technologies out of his house, which established itself as a leader in the seating industry. Dahti Seating has worked mostly in the office-chair environment, but is developing in recreation, automotive, juvenile, marine, stadium, mass transit, and other applications. In 2006, Dahti was purchased by Illinois Tool Works Inc. Tim is currently Vice President for Product Development at Illinois Tool Works Inc. in Rockford, Michigan.

Tim has applied his innovations across a wide range of industries including automotive, office furniture, marine, tractor, aerospace, bicycle, orthotics, and health care industries. In 2008, he invented a unique orienting process allowing for the use of elastomer in demanding applications.

He is inventor or co-inventor of more than eighty US and foreign patents. His inventions are primarily in the area of manufacturing processes, plastics, and design innovations. In 1987, while working as an IBM Research & Development engineer, he co-invented IBM's advanced suspension system, which became an industry standard disk drive design. In 1992, he invented the elastomeric encapsulation manufacturing process for Herman Miller's famous Aeron Chair. He also co-developed an award winning bicycle seat that was highlighted in a *Time Magazine* annual design issue.

While a student at Michigan Tech, Tim was a ski coach for the Ski Club. Tim resides in Grand Rapids, Michigan. He has also completed a business degree from the University of Colorado.



COLLEEN L. JONES-CERVANTES

Colleen L. Jones-Cervantes (BSME 1983) is Vice President for Product Supply & Trading for ChevronTexaco, with global responsibility for the supply of non-crude oil feed stocks to Chevron's refining system, refined

products supply and trading, marine fuels marketing, and biofuels supply and trading.

Colleen started working at Chevron after graduation and has spent her career there in positions of increasing responsibility-often the only woman in those positions. She started as a project engineer in San Francisco in Chevron's retail marketing department, and then became General Manager, Retail West, North America marketing, responsible for gasoline marketing and retail sales at nearly 3,000 Chevron and Texaco-branded stations in nine western continental states and Hawaii. She was also General Manager of Company-Owned Stores and President of Chevron Stations Inc., in which she oversaw all aspects of a network of more than 700 retail outlets. In the mid-90s Colleen spent nearly two years as a District Sales Manager with Caltex Philippines Inc. and was promoted to Vice President, Global Marketing, Asia Pacific region. While in Asia she also served on the Board of Directors for Caltex Australia Ltd., the largest refining and marketing company in Australia.

In addition to delivering business results, Colleen has a keen interest and passion for developing young professionals. She mentors employees new to Chevron, serves on the company's Advisory Board for the Hispanic employee network, and is a frequent speaker at the women's network events. During her time in Asia, Colleen supported "Caring for Cambodia," a charity focused on improving education and providing basic needs for school age children around Siem Reap, Cambodia.

Colleen was inducted into the Michigan Tech Presidential Council of Alumnae in 2011 and joined the ME-EM External Advisory Board in 2012. Colleen resides in Spring, Texas, with her husband, Winston, and their two daughters, Kyndra and Lauren.

2012 ME-EM Academy Inductees (cont'd)



ANTHONY F. RAIMONDO

Anthony F. Raimondo (Tony) (BSME '62) is currently Chairman & CEO of Behlen Manufacturing Company, a manufacturer of prefabricated buildings, grain bins, silos, and other structures, and is headquartered in Columbus, NE.

After graduation, Tony joined

General Motors in 1962 as a production supervisor. He then joined Moog Inc., progressing from Manufacturing Engineer to Quality Assurance Manager to Manufacturing Manager of this unique, people-oriented aerospace company. He then spent several years at Sperry Corporation as General Manager of Vickers, a \$90 million hydraulic products manufacturing operation in Omaha, Nebraska. He joined Wickes Corporation in 1982 as General Manager and led efforts to complete a successful management buyout of Behlen Manufacturing Company in 1984—a time when Behlen experienced major losses due to market changes and Wickes emerged from Chapter 11.

Tony served as chair of the Nebraska Economic Development Commission, chairman of the Department of Labor Workers Training Board, and chairman and director of the Nebraska Industrial Competitive Alliance. In 2004, President George Bush nominated Tony for the position of Assistant Secretary of Commerce for Manufacturing and Services (manufacturing czar), a new position created to address the ailing factory sector. Tony subsequently withdrew due to presidential politics. He also ran for the US Senate in 2008.

Tony lives in Columbus, Nebraska and Bradenton, Florida with his wife, Jeanne. They are very proud of making education a family tradition: the two have four grown children, all with graduate degrees.



DONALD G. WHEATLEY

Donald G. Wheatley (BSME '62 & MSME '63) went to work for General Motors in 1963. He worked on the guidance systems doing vibration and fatigue analysis for the Apollo project. Out of the sixty new hires on the project, he was the only one remaining at the

end. He also did some work on the main battle tank. Don then accepted an offer from Ford, where he worked on a small team to define the new Ford Maverick. He later led the team that designed and developed the Ford Bronco.

In 1982, Don invested \$350 to start a business in his basement with his son, making clear and tinted Euro-Lens line headlight covers (thermo-formed) for trucks and cars, both to protect the bulb and to improve appearance. In 1984, he founded and became President of Extang Corp, making Extang's famous "No Damage, No Drilling, Clamp-On Aluminum Frame" truck bed cover system, a tonneau cover. Extang was the first to sell this truck accessory product nationwide. Extang grew to 128 employees with three plants and sales of \$18-20 million. He sold Extang in 2007.

Extang Corp. had built a fifty-foot carbon fiber catamaran, but it was not financially viable and was sold, although it continues to win races today. The resulting boat technology and patents launched Fortress Stabilization Systems, which is owned by his son Edward. His daughter, Anneb and her husband Dave then spun off Wahoo Composites/Wahoo Walls from Fortress. Wahoo builds custom carbon fiber beams for robots and has launched an energy-saving wall system. While at the helm of his business, Don liked to hire young kids who had problems in their lives and give them the chance to turn their lives around.

Don has over fifty-three patents as inventor or as coinventor while at Ford Motor Co. and Extang. He lives with his wife Patricia in Punta Gorda, Florida.

2013 ME-EM Academy Inductees



JOHN M. BEATTIE

John M. Beattie (BSME '63) took his first job upon graduation with the Louis Allis Company in Milwaukee, Wisconsin, where he was a design engineer on a variety of commercial, military, and NASA space projects. His expertise was in ball bearing technology and

V-belt technology. In 1968, he joined the Toro Company in Bloomington, Minnesota, as a project engineer for the Riding Greensmower 3 and Groundsmaster 322. A few years later he was promoted to Director of Manufacturing and Engineering of the Turf Products Division and was instrumental in the development of the Sandpro, Greensmaster 1000, and Hydroject machines. He became Vice President of Operations of the Raincat Irrigation Division for Toro in Evans, Colorado.

John left Toro in 1976 to head his own company, Hyland Pet Products in Greeley, Colorado. He also was doing contract manufacturing at the time. In 1986, he started his own firm, Concept Engineering Corporation, specializing in consulting and new product development. He also served as an expert witness in product liability litigation.

A golf course mechanic approached Concept Engineering, asking the firm to build a service lift for mowers and turf equipment. John's market research demonstrated substantial potential in this area of turf management, and in 1991 he established Trion Lifts Inc. John is currently the President and Chief Executive Officer of Trion Lifts Inc. He was the designer and lead engineer in the development of the Trion workstation as well as Trion's DL 1300 Mobile Lift Table, the revolutionary Reel Conditioner, and an expanding line of maintenance tools for productive turf equipment service. Trion's current product line includes lifts and work stations. Trion products are distributed worldwide and are found on every continent but Africa.

John is either the inventor or the co-inventor on fifteen patents. He is active as an elder in the First Presbyterian Church in Greeley, Colorado, and is the leader of various bible studies. His hobbies include skiing, sailing, house remodeling, and designing on the backs of placemats and napkins.

On July 25, 1964, John married Marilyn Cramer. They have one son, Scott, who attended Michigan Tech's Summer Youth Program in 1986 but went on to earn his PhD in Statistics at Penn Sate.



RAY H. HERNER

While at Tech, Ray H. Herner (BSME '54) received a Teaching Fellowship for Mechanical Engineering. After graduation he lived and worked in Alpena, Michigan, for twentytwo years. Ray's career included working at Abitibi, a wood product plant, where he held the position

of mechanical superintendent, at Petch Manufacturing Co., and as general manager at King Valve Co. He also taught evening courses for eight years at Alpena Community College as an adjunct faculty member. He developed and taught the first engineering courses there, all accredited by Michigan Tech and the University of Michigan.

In 1976, Ray accepted the position of vice president and later president of Mosier Industries in Brookfield, Ohio, a manufacturer of fluid power cylinders and actuators. While at Mosier, Ray broadened the offerings of the standard product lines and directed the design and startup of a new product line. He built the company by innovation and solving problems for his customers. He designed two complete cylinder lines, a complete valve line, and many various applications specific to individual companies. He retired from Mosier in 1993 but retained his seat on the Board of Directors and held a consulting contract with them until 2002.

When Ray graduated from Michigan Tech, the buzz word was "automation." In the '80s and '90s, it became "computer." Ray had the opportunity to design devices that successfully interfaced with computer control to increase product production. Over the years, his career gave him the opportunity to travel to various manufacturing companies and make extensive business contacts throughout the United States, Canada, England, France, Germany, Mexico, and Taiwan.

Ray is an inventor of eight patents in the field of fluid power. Ray has served as an advisory board member at Ohio State University. He has also established the Ray H. Herner Scholarship at Alpena Community College, a scholarship that is awarded to students enrolled in preengineering with plans to transfer to a four-year university.

While at Michigan Tech, Ray married his wife LaNora, who passed away in 1988. They have two children, Catherine and Steven. His grandson Ken Herner graduated from Michigan Tech in 2008 with a degree in Computer Science.

2013 ME-EM Academy Inductees (cont'd)



TOM B. MOORE

Tom B. Moore (BSME '66) actually began his mechanical engineering career at an early age, repairing farm machinery and building hot rods in the small farming community of Marinette, Wisconsin, where he grew up. That interest led him to

pursue automotive engineering as a career. He was greatly influenced by his parents to do one's best, to work hard, and to always respect others.

He went to work for Standard Oil, now Chevron, as a plant engineer in Richmond, California, right after graduation, working on major plant expansions for two years. He took a year off and traveled to twenty-one countries. He returned to Denver to work for Behrent Engineering for one year and then joined Stearn Rogers Inc., an international design/ construction firm, now part of Raytheon. He worked on special projects that included plutonium waste sites, natural gas facilities, and central heating plants for eight years.

Tom joined the consulting firm of RMH Group Inc. in 1978 as manager of the mechanical department. Within nine years he became a major owner and president of RMH and was president until 2006. While president, he diversified RMH to become a leader in sustainable energy design, net zero or energy neutral design, and renewable energy use in design, including solar panels, evaporative cooling, and more. As president Tom grew the business from forty employees to 120 and doubled company profits. RMH Group quickly gained recognition locally and nationally for their exceptional designs in energy efficient buildings, winning numerous awards in design, energy, lighting and environmental categories, and RMH was included in *Engineering News-Record*'s list of top 500 design firms in the US.

Tom was a board member and President of the American Consulting Engineers Council of Colorado, an organization representing 250 Colorado consulting firms. Now retired, Tom supports the Jeffco Action Center in Jefferson County, Colorado—a non-profit agency providing basic human services to people in financial need. He has written numerous articles for engineering and business publications and was professionally registered in ten states.

He married his wife, Wendy, on October 9, 1970. They have three grown children, Erin, Rani, and Justin, and numerous grandchildren.



DR. VIJAY K. SAZAWAL

After completing his doctoral degree in structural mechanics at Michigan Tech, Vijay K. Sazawal (PhD '75) joined Westinghouse Electric Corporation in the Advanced Reactors Division as part of the design and technology team working on the Clinch River

Breeder Reactor Project. His tenure at Westinghouse lasted twenty years during which time he rose through successive management positions with responsibility for fast reactors, advanced terrestrial and space reactors, nuclear defense programs, and US government programs to promote safety upgrades of Russian-built reactors in Central and Eastern Europe.

In 1995, he took a job with COGEMA Inc. as VP, Engineering and Technology, and then in 2002 went to work for US Enrichment Company Inc. (USEC) as Director, Government Programs, his current position. USEC, a leading supplier of enriched uranium fuel for commercial nuclear power plants worldwide, was a federal agency but is now privatized. Vijay coordinates and pursues advocacy for existing and new business initiatives. He is a member of the management team involved in the American Centrifuge Project, the leading initiative by USEC Inc. to build a state-of-the-art centrifuge nuclear enrichment plant based on American technology. His advice had been sought by the US State Department and US Department of Energy on nuclear export trade to India and other major commercial nuclear markets in the world. In 2011, he was appointed to the Civil Nuclear Trade Advisory Committee (CINTAC) to advise the US Commerce Department on trade issues facing the industry.

Vijay is a founding member of the Indo-American Kashmir Forum (IAKF) and its past president. He is the Overseas Coordinator of three Kashmiri expatriate organizations: the US-based IAKF, the Indo-Canadian Kashmir Forum (ICKF) based in Ottawa, and the Indo-European Kashmir Forum (IEKF) based in London and Geneva. These nongovernmental organizations participate in the United Nations Commission on Human Rights (UNCHR) Working Group on Minorities. He frequently speaks on human rights issues in Geneva. He works closely with the Kashmiri Pandit community in Jammu and Kashmir and has addressed their plight with the US Administration, the US Congress, and the media.

Vijay and his wife, Meenakshi, have three children and three grandchildren.



MAURICE M. TAYLOR, JR.

Maurice "Morry" M. Taylor (BSME '68) was first employed by General Motors as a mechanical engineer in Saginaw. A few years later he joined Morweld Steel Products and, in 1972, became part owner of the American Steel Impact Corp. in Detroit. Then, in

1974, he started Maurice Taylor & Associates and was a representative for steel products manufacturers.

In 1983, Morry became President/CEO of CanAM Industries. CanAM moved its headquarters to Quincy, Illinois, in 1990 and changed its name to Titan Wheel International Inc. At that time, Morry led a leveraged buy-out in concert with Masco Industry. In 1992, Morry and MascoTech purchased the remaining interest in the company. Under Morry's entrepreneurial leadership, Titan has successfully acquired and recreated previously-failed businesses in the off-highway wheel and tire markets. Morry led the company through its initial public offering on the NASDAQ National Market System. After enjoying successful trading on NASDAQ, Titan moved to the New York Stock Exchange. Morry was nicknamed "The Grizz" by Wall Street analysts for his tough negotiating style. He has transformed Titan from a small wheel manufacturing business to a global producer of off-highway wheel and tire systems.

Morry ran as a Republican candidate for President of the United States in 1996, campaigning to bring sound fiscal management and business know-how to Washington. He wrote the book *Kill All the Lawyers and Other Ways to Fix the Government* about the campaign. Morry's philosophy: Hard work and a little luck are the greatest combination for success and can always make up for brains—but never forget to keep learning.

He has established the Brent Taylor Charitable Trust serving educational institutions—named for Morry's brother who was killed in an auto accident in 1997. He also established the Maurice & Michelle Taylor Foundation which awards college scholarships to children of Titan employees, as well as the Maurice Taylor & Brent Taylor Loan-Scholarship Fund and the Titan Tire/Titan Wheel Engineering Annual Scholarship at Michigan Tech.

Morry married Michelle Callahan on August 16, 1975. They have three children, a son Anthony who attended Michigan Tech, and two daughters, Maureen Sredl and Katie Rivers.



RAYMOND M. TREWHELLA

Raymond M. Trewhella (BSME '56) began his career with Cliff Naturals (Cleveland Cliffs) in 1956 where he was responsible for mechanical and electrical maintenance for forty skilled associates and the startup of the first pelletizing iron ore

plant in Michigan. He left in 1960 to assume the position of senior engineer with General Electric Company in Irmo, South Carolina. While at GE, he received the General Electric Company Managerial Award for Development of the Hermetically Scaled Tantalum Capacitor.

At the age of thirty-two, Ray accepted an offer to join Glassmaster Company in Lexington, South Carolina, as executive vice-president. A few years later, he became president, and then one year later, president and CEO of the company. He retired in 2007.

In 1973, he received the State of Oklahoma, US Senator Dewey F. Bartlette, OKIE Award. Ray was chairman of the Manufacture Council in Columbia, South Carolina, and Director of the Chamber of Commerce for the Greater Columbia area in South Carolina. The Alumni Association of the University of Oklahoma, College of Medicine honored him with the Amicus Medicine Award in 1980. He is listed in the National and Heritage Registry of Who's Who. He also served as Church School Superintendent of St. Michael and All Angels Episcopal Church.

While at Michigan Tech, Ray played basketball and was elected to the Michigan Technological University Sports Hall of Fame in 2003. Ray holds patents for innovative electrical component design.

Ray was married to Julianne (Julie) Anderson Trewhella for fifty-nine years. He lost her to cancer on February 11, 2013. They have three daughters: Debbie, Joanne, and Kathleen. He has five grandchildren and three great grandchildren.

ME-EM Academy List

* Only Michigan Tech degrees listed

Frank Agosti, BSME '58 Carl Avers, BSME '62 Richard Bayer, BSME '44 John M. Beattie, BSME '63 Wilfred Bobier, BSME '43 John Calder, BSME '67, MBA '76

Timothy P. Coffield, BSME '84 John Cook, BSME '42

Charles Cretors, BSME '63 Charles Cronenworth, BSME '44

Robert D'Amour, BSME '48

Dean Diver, BSME '65 John Drake, BMSE '64,

MBA '69

Theodore Edwards, BSME '50 Paul W. Fernstrum, BSME '65 Edward Gaffney, BSME '51 Joseph Gemignani, BSME '53 Dr. James C. Gerdeen, BSME '59 **Dr. John Hallquist,** MSEM '72, PhD ME-EM '74

PhD ME-EM '74 Douglas J. Hamar, BSME '84 William Hartwick, BSME '48 Gerald Haycock, BSME '68 Ralph Hayden, BSME '33 Richard Henes, BSME '48 Ray H. Herner, BSME '48 David Hill, BSME '65 Colleen L. Jones-Cervantes, BSME '83 Daniel R. Kapp, BSME '76 Raymond Kauppila, MSME '60 Pete Knudson, BSME '64 Martin Lagina, BSME '77 Charles Lamoreaux, BSME '56

Charles Laurila, BSME '59 Gary Lawrey, BSME '79 Craig Lazzari, BSME '42 Albert Maki, BSME '48 Paul Masini, BSME/BBA '69 Tom McKie, BSME '47

Fred Mitchell, BSME '61

Bob Monica, BSME '50

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Eric Nielsen. BSME '80

Merle Potter, BSME '58, MSEM '61

Norman Pratt, BSME '42

Anthony F. Raimondo, BSME '62

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PhD EM '79

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James Vorhes, BSME '47

Thomas Walker, BSME '68

Donald G. Wheatley, BSME '62, MSME '63

Harold Wiens, BSME '68

Dr. Terry J. Woychowski, BSME '78

Dr. Hussein M. Zbib, BSME '81, MSME '83, PhD ME-EM '87



Pictured top, right (from left to right): Tony Raimondo, Don Wheatley, Tim Coffield, Colleen Jones-Cervantes, and ME-EM Department Chair Bill Predebon

Pictured bottom, right: Art Weaver and Don Wheatley



Standing (left to right): Paul Wiczynski, Jason Verboomen, Tom Williamson, Seth Newlan, Colleen Jones-Cervantes, Alan Frank, James Heldt, and Department Chair Bill Predebon. Seated (left to right): Pete Sandretto, Brian Weller, Brian Johnson, Melissa Marszalek, and Jeff Zawisza.

External Advisory Board: Sharing Professional Insight and Expertise

The ME-EM External Advisory Board is a select group of corporate, university, and government leaders, many of whom are Michigan Tech alumni. EAB members share their expertise and provide assistance with curriculum direction, research topics, resource development, and education-industry partnership. They offer professional insight and provide valuable input—shaping the state-of-the-art engineering education that takes place in the ME-EM Department. Members can serve a maximum of two four-year terms.

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Brian Weller Caterpillar

Paul Wiczynski Cummins

Thomas Williamson Kimberly-Clark

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Presidential Council of Alumnae

Laura K. Farrelly, Pamela Klyn, and Sylvia Salahutdin are the most recent ME-EM alumnae to be inducted into the Presidential Council of Alumnae (PCA) at Michigan Tech. The PCA recognizes successful Michigan Tech women graduates for their educational excellence, past student service, professional accomplishments, and community contributions.



LAURA K. FARRELLY

In her most recent position as Vice President of the Microsoft Alliance at NewsGator Technologies, Laura K. Farrelly (BSME '93) was responsible for securing NewsGator's position as a "Globally Managed" Microsoft partner. She also helped NewsGator to earn Microsoft's 2011 US Partner of the Year award and secured \$1.2M in funding from Microsoft.

As a Powertrain Product Development Engineer at Ford Motor Company, Laura developed engine and transmission programs for the heavy-duty truck and sport utility vehicle segments.

Laura has also held executive-level positions in marketing, product management, and business development at software companies ranging from \$10M to \$75M in revenue. She is a founding member of the Colorado CMO Group and has served as a program director of the Boulder Marketing Group.

Farrelly earned a master's degree in Mechanical Engineering from the University of Michigan-Dearborn and an MBA in marketing and finance from Northwestern University's Kellogg School of Management. Laura and her husband Brad Beck live in Boulder, Colorado with their two daughters, Lyra and Kate.



PAMELA KLYN

During nineteen years with Whirlpool, Pamela Klyn (BSME '93) has held advancing roles in engineering, product development, global innovation, and sales and marketing. During this time, Pam was the first female technology director in Whirlpool's history and also achieved certification as an OPEX Six Sigma Black Belt. Her current role is General Manager of Cooking Products for North America. In this role she is responsible for the P&L of the business as well as a multi-year business plan and product strategy.

Pam was recognized as one of the "Top 40 under 40" Business Leaders in Michigan in 2005 and in early 2012 she was profiled in the *Wall Street Journal* article "From Rising Star to Senior Manager."

A member of the Michigan Tech Presidents Club, Pam has been a long-time advocate and supporter of Michigan Tech, serving as the Whirlpool Corporate Agent in the University's Matching Gift Competition for ten years.

She has served on the Board of Directors for the United Federal Credit Union for seven years and also serves on the Renaissance Fund Board for Harbor Shores, an organization dedicated to revitalizing the Benton Harbor area.

Pam earned a master's degree in Mechanical Engineering from the University of Michigan and an Executive MBA from Bowling Green State University. She lives in St. Joseph, Michigan, with her husband Steve and her stepchildren Parker and Cara.



SYLVIA SALAHUTDIN

Sylvia Salahutdin (BSME '91) is the owner of seven LLCs operating under the DBA Little Caesars Pizza franchise.

Sylvia started her career "saving lives" while working for AlliedSignal selling seat belts, air bags, and electronics to various OEMs. In 1993, she was recruited by a Japanese supplier, Takata, to help start their North American sales and program management group and later was recruited by Autoliv, a Fortune 500 safety restraint company.

At Autoliv, Sylvia was the global

negotiator for the General Motors Worldwide Business Unit conducting negotiations in Asia, Europe, and North America. At age thirty, she was the youngest director running the General Motors Business Unit and then the Ford Business Unit, which included sales, engineering, and program management. In 2005, Sylvia became the Director of Purchasing, managing groups in the United States and Mexico, and then was asked to help organize, train, and develop the purchasing group and strategies for Asia Pacific, which included groups in China, Japan, India, and Thailand.

After several years living and working in Shanghai, Sylvia and her husband decided to become Little Caesars franchisees as a side business. Due to the success of the first store opening, Sylvia ended up retiring from her automotive career and moving back to the US to open six more. Sylvia and her husband, Rashid ('91 Mechanical Engineering) live in York, Pennsylvania, with their two children Alexis and Nikko.

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Donors are critical to our success. With support from alumni and friends, we can continue to provide an outstanding educational experience for our students. This year, please consider directing your donation to the ME Undergraduate Curriculum Revision Fund or the ME Peace Corps Master's International (PCMI) Fund using the enclosed, self-addressed envelope. You may also donate to these two funds online at mtu.edu/mechanical/crf and mtu.edu/mechanical/pcmi. Every gift counts and will be used to make a difference.

The following list encompasses the many people who have generously shared their treasure to create an outstanding ME-EM Department. We are extremely grateful for their ongoing support. *Those contributing from November 2011 to April 2013 are listed below.*

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James & Markeita Hedstrom Michael & Susan Herbert Robyn & Jacob Hiatt Peter & Kristin Hockin Michael J. Holmi **Robert & Janis Howard** Fred & Jacqueline Huston Marvin & Jacquelyn Hyma Susan & Thomas Ilax Fred & Connie Irish Loren D. Isley Jr. Mark & Dianne Jarmus Danise & Gerald Jarvey Gopal & Manimegalai Jayaraman Philip & Anna Jerzyk Nicholas & Kelly Jordache David & Joann Karle Raymond & Irene Kauppila Robert & Shigeko Keefer Kim & Susan Keith William & Paula Kell Alvin & Elizabeth Kempainen Raymond & Monica Klein John & Joyce Kline Keith & Karen Knickerbocker Steve & Anne Koch Stephen & Audrey Kohel Stephen & Kris Kolpacke Steven M. Lamphear Paul & Christine Latvala John & Joan Leinonen Paul & Vera Lempio Todd J. List Gregory & Rebecca Loesche Angel & Dian Lopez Michael & Audrey Lovell David & Nancy Low Joseph & Joyce Manning Keith & Michelle Martens **Timothy & Diana Martin** David & Mary Martinkewiz James M. Marzonie Mark & Rebecca Matsco Donald L. Matz Joseph & Carolyn McAnallen Chalmers & Rosemarie McGreaham David & Linda McInnis James & Barbara McKenna Robert J. Mechon Shreves & Siri Gauri Melkote Randall K. Melvin Daniel J. Michalik Joseph & Linda Mikols Janice & Michael Milosh

Dvlan P. Moran Alexander Morson **Richard & Jan Motoligin** Wendy & Kurt Munson William & K. T. Murphy Brian Naszradi & Anne Shay-Naszradi John & Judith Nelson Thomas C. Newhouse Morey A. Nunn Kevin & Debbie Ohlrogge Arthur & Gretchen Ott John & Martha Pale **Timothy & Karen Palmer** Michael F. Paniagua **Theodore & Catherine Pardike** Peter & Kathleen Parlow Eszter Pattantyus & Tibor Nagy Bradley & Callie Patton **Robert & Clara Pawling** Walter & Joanne Pearson George & Nancy Peck Antonio & Heidi Perez **Gretchen & Jeffrey Peters** Stephen & Heidi Pillen Kristin M. Post Julia & David Powell Kevin & Sarah Predmore Suzanne & John Przybyla Zachary D. Punzel Allen & Elaine Putvin Jennifer & Todd Quigley William & Janis Redman **Gregg & Kathleen Richards** Alan & Lucille Richardson Tania M. Ridley Robert & Arla Rosso Aaron & Danielle Running David M. Russler **Ronald & Constance Sandrowicz** Michael & Pamela Savant Matthew & Michelle Schantz Paula & Craig Scheuern Michael & Julie Schneider Howard & Patricia Schuman **Bruce & Carolyn Sdunek** Thomas Seel & Heidi Jackson-Seel Ronald & Katherine Settimi John & Dolores Sheringer Zhiru Shi Michael & Sonia Shortz Christopher B. Shult George & Mary Jo Smiljanich Jerome & Kathleen Stawara Donald & Earlene Stefanelli

Charles & Anita Steffens Edward & Susan Stehulak JoAnne R. Stimac Michael & Carla Stremlow Jared M. Stull **Arvind Suresh** Edward & Bonnie Swanson Mark & Terri Terhaar Lisa Townsend-Moore & Timothy Moore Willard & Nathalie Tschantz David & Sarah Uitti John & Charlene Vohs Carl & Chervl Vuk John P. Wanhainen Julie & Michael Wank Raymond & Rebecca Ware Benjamin E. Westrope Joan & Gilbert Wirkner Xiangyu Zhou David & Ann Zielinski

Contracts & Grants

ADVANCED POWER SYSTEMS RESEARCH CENTER (APSRC)

\$5,249,925

High Performance, Durable, Low Cost Membrane Electrode Assemblies for Transportation Applications	PI: Jeffrey Allen	3M Corporate R&D	\$653,620
Feasibility of a Novel Concept to Produce Biocoal for Power and Enhanced Bio-Oil	PI: Ezra Bar-Ziv	National Science Foundation	\$69,750
Compaction of Biocoal	Co-Pls: Ezra Bar-Ziv and Bo Chen	University of Michigan-MIIE	\$87,920
SEP: Sustainable Forest-Biofuel Pathways to Hydrocarbon Transportation Fuels: Biomass Production, Torrefaction, Pyrolysis, Catalytic Upgrading, and Combustion	Co-Pls: Ezra Bar-Ziv, Jeffrey Naber	National Science Foundation	\$2,034,814
Engine Sensor Testing	PI: Jason Blough, Co-PI: Jeremy Worm	PCB Piezotronics Inc.	\$12,547
Characterization of Torque Converter Cavitation Level During Speed Ratio Operation Phase I	PI: Jason Blough	General Motors Corporation	\$102,057
Characterization of Torque Converter Cavitation Level During Speed Ratio Operation Phase II	PI: Jason Blough	General Motors Corporation	\$94,985
Continued Research	PI: Bo Chen, Co-PIs: Jeffrey Naber, Jeremy Worm	Nostrum Energy LLC	\$50,296
Continued Engine Research - Summer 2012	PI: Bo Chen, Co-PI: Jeffrey Naber	Nostrum Energy LLC	\$48,070
Engine Studies Spring Semester	PI: Bo Chen, Co-PI: Jeffrey Naber	Nostrum Energy LLC	\$42,754
Nostrum Continued Work Summer 2013	PI: Bo Chen, Co-PI: Jeffrey Naber	Nostrum Energy LLC	\$75,600
2012 Michigan Seat Belt Observation Study	PI: John Hill	State of Michigan/Michigan State Police/ Office of Highway Safety Planning	\$116,511
Degradation Analysis and Optimization of Catalyst Layer in PEFC Based on Multiphysics Approach	PI: Seung Hyun Kim	Honda R&D Co. Ltd., Automobile R&D Center	\$218,326
Development of Segmented PEFC with Submillimeter Resolution	PI: Tajiri Kazuya	University of Chicago Argonne LLC	\$7,956
Water Management in Unitized Regenerative Fuel Cells	PI: Tajiri Kazuya	University of Michigan Space Grant Consortium	\$15,400
Experimental Engine Testing with Argonne National Laboratory	PI: Scott Miers, Co-PI: Jeffrey Naber	Argonne National Laboratory	\$86,457
Marine Engines Fueled with Gasoline/Alcohol Blends	PI: Scott Miers	University of Chicago Argonne LLC	\$16,445
Advanced Vehicle Characterization	PI: Scott Miers	University of Chicago Argonne LLC	\$101,805
Diesel Engine Studies - Investigation on 1.9L I4 for Combustion and Efficiency Baseline and Characterization	PI: Jeffrey Naber	Nostrum Energy LLC	\$8,845
IC Engine Test Stage V	PI: Jeffrey Naber	Nostrum Energy LLC	\$42,088
Rate of Injection Measurements - Comparison of Injector Nozzles/Injectors	PI: Jeffrey Naber, Co-PIs: Seong-Young Lee, Jaclyn Johnson	Ford Motor Company	\$16,857
Continued Research - Spring 2013	Pl: Jeffrey Naber, Co-Pl: Bo Chen	Nostrum Energy LLC	\$53,000
NG Engine Component Studies in Combustion Lab for Advanced Green Innovations	PI: Jeffrey Naber, Co-PIs: Seong- Young Lee, Jaclyn Johnson	Advanced Green Innovations LLC	\$149,130
Titan Tire Testing TP72 (5 Tires) and TP73 (4 Tires)	PI: Jeffrey Naber. Co-PIs: Gregory M. Odegard, Paul Dice	Titan Tire Corporation	\$27,315

Ford Experimental Study Low Temperature Fuel Mixture Ignitability	PI: Jeffrey Naber, Co-PIs: Seong-Young Lee, Jaclyn Johnson	Ford Motor Company	\$112,248
Comparison of Spray Characteristics for Six Diesel Injector Nozzles	PI: Jeffrey Naber, Co-PIs: Jaclyn Johnson, Seong- Young Lee, Seung Hyun Yoon	Nostrum Energy LLC	\$34,132
Independent Review of High Pressure Heat Exchanger Locomotive Test and Thermodynamic Simulation Data	PI: Jeffrey Naber, Co-PI: Jaclyn Johnson	US Department of Transportation, Federal Railroad Administration	\$37,986
Flow Prediction and Fluctuation-sensitivity Investigations for Quasi-steady Shear Driven Condensing Flows in Millimeter to Micro-meter Scale Two-Phase Systems	PI: Amitabh Narain	National Science Foundation	\$306,706
Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades	Co-PI: Fernando Ponta	National Science Foundation	\$331,286
Development and Delivery of High-Impact STEM Outreach Utilizing the Michigan Tech Mobile Laboratory in Support of TARDEC and Heroes Alliance	PI: Jeremy Worm, Co-PIs: Gregory M. Odegard, Jim DeClerck	US Department of Defense, Army TARDEC	\$35,847
Diagnosing Induction System Degradation and Evaluation of Remedial Chemicals in Automotive Engines	PI: Jeremy Worm, Co-PI: Jeffrey Naber	Illinois Tool Works Inc. (ITW)	\$103,977
Delivering STEM Outreach Through Inspirational Hands-On Activities	PI: Jeremy Worm	National Instruments Corporation	\$19,976
Short Course Delivery: Experimental Studies in Hybrid Electric Vehicles	PI: Jeremy Worm	Wisconsin Technical College System	\$25,015
Delivery of STEM Outreach with Michigan Tech Mobile Laboratory	PI: Jeremy Worm	General Motors Corporation	\$5,700
Short Course Delivery: Spark Ignition Engine Management Systems	PI: Jeremy Worm, Co-PIs: Jeffrey Naber, Mahdi Shahbakhti	DENSO International America Inc.	\$32,004
Michigan Tech-Nostrum (Phase III): Experimental Investigation of Hollow-Cone Injector at Engine Relevant Conditions in a Combustion Vessel	PI: Seong-Young Lee, Co-PIs: Jeffrey Naber, Jaclyn Johnson	Nostrum Energy LLC	\$19,600
CFD Modeling of Water Injection Sprays to Assess Three Different Injectors	PI: Seong-Young Lee, Co-PIs: Jeffrey Naber, Jaclyn Johnson	Nostrum Energy LLC	\$24,000
Michigan Tech-NOSTRUM: Characterization of Water Spray Injection at Elevated Temperatures	PI: Seong-Young Lee, Co-PIs: Jeffrey Naber, Jaclyn Johnson	Nostrum Energy LLC	\$28,900

CENTER FOR AGILE & INTERCONNECTED MICROGRIDS (AIM) \$2,734,567

Agent-Based Control with Application to Microgrids with High Penetration Renewables	PI: Gordon G. Parker, Co-PIs: Steven Goldsmith, Wayne Weaver	Sandia National Laboratories	\$450,000
Agent-Based Control with Application to Microgrids with High Penetration Renewables	PI: Gordon G. Parker, Co-PIs: Steven Goldsmith, Wayne Weaver	Sandia National Laboratories	\$100,000
Microgrid Modeling and Optimization for High Penetration Renewables Integration	PI: Gordon G. Parker, Co-PI: Wayne Weaver	Sandia National Laboratories	\$331,000
Distributed Agent-Based Management of Agile Microgrids	PI: Wayne Weaver, Co-PI: Gordon G. Parker	US Department of Defense, Army Research Laboratory	\$1,853,567

Contracts & Grants (cont'd)

ENGINEERING EDUCATION INNOVATION

TITLE	NAME	SPONSOR	AWARD
Senior Design: Agile Fan Assembly System	PI: William Endres, Co-PI: Charles Van Karsen	Revcor Inc.	\$30,000
Senior Design: Wireless Data Link	PI: William Endres, Co-PI: Robert DeJonge	US Department of Defense, Air Force Research Lab	\$33,121
Michigan Tech Capstone Design Program: Design Challenge	PI: William Endres, Co-PI: Robert DeJonge	US Department of Defense, Air Force Office of Scientific Research	\$19,983
Senior Design: Diesel Engine Air Shutoff Valve	PI: William Endres, Co-PIs: Charles Van Karsen, Charles Margraves	Cummins Inc.	\$25,717
Senior Design: Electric DEF Tank Header Heater	PI: William Endres, Co-PIs: Charles Van Karsen, Gordon G. Parker	John Deere Power Systems	\$25,717
Senior Design: Automated Carpet Cleaning Test Fixture	PI: William Endres, Co-PIs: Charles Van Karsen, Gordon G. Parker	Bissell Homecare Inc.	\$27,607
Senior Design: Helical Gear Differential Wear Test Rig	PI: William Endres, Co-PI: Charles Van Karsen	American Axle & Manufacturing	\$26,452
Senior Design: Material Sample Prep Device	PI: William Endres, Co-PI: Charles Van Karsen	Cliff's Natural Resources	\$30,420
Senior Design: Lightweight Swing Gate	PI: William Endres	Chrysler LLC	\$26,452
Senior Design: Automated Sealant System	PI: William Endres, Co-PI: Charles Margraves	HGS Aerospace	\$30,780
Senior Design: Foam Proportioning Delivery System (Team 13)	PI: William Endres, Co-PI: Jeffrey Allen	Tyco Fire Products LP	\$28,996
Senior Design: Lightweight Axle Carrier	PI: William Endres, Co-PI: Michael LaCourt	Meritor Inc.	\$26,021
Senior Design: Hatchback Rear Header Optimization (Team 12)	PI: William Endres, Co-PI: Charles Van Karsen	Chrysler Group LLC	\$26,765
Senior Design: Extendable Pipelayer Boom (Team 14)	PI: William Endres, Co-PI: Gordon G. Parker	Caterpillar Inc.	\$26,765
Senior Design: Low Cost Autonomous Cleaning System	PI: William Endres, Co-PI: Gordon G. Parker	Bissell Homecare Inc.	\$26,765
Senior Design: Deep Cleaner Lift-Off Pod	PI: William Endres, Co-PI: Gordon G. Parker	Bissell Homecare Inc.	\$26,765
Senior Design: Modular Low-Temperature Environment Chamber	PI: William Endres, Co-PI: Michael LaCourt	Flexsteel Pipeline Technologies Inc.	\$30,780
Senior Design: Rack Bearing Design Optimization (Team 10)	PI: William Endres, Co-PI: Charles Van Karsen	Nexteer Automotive Corporation	\$26,765
Senior Design: Composite Fifth Wheel Design (Team 1)	PI: William Endres, Co-PIs: Charles Van Karsen, Tammy L. Haut Donahue	Jost International Group	\$30,420
Senior Design: Dual Speed Auto-Shift Landing Gear	PI: William Endres, Co-PIs: Charles Van Karsen, Michele Miller	Jost International Group	\$30,420
Senior Design: Door Check Design (Team 4)	PI: William Endres, Co-PI: Charles Van Karsen	Chrysler Group LLC	\$26,452
Senior Design: Integrated Ladder-Leveler System	PI: William Endres, Co-PI: Charles Van Karsen	Jershon Inc.	\$28,656
Senior Design: Semi-Automated Multi-DOF Pipelayer Design	PI: William Endres, Co-PIs: Gordon G. Parker, Charles Van Karsen	Caterpillar Inc.	\$26,452

Senior Design: Modular Dishwasher Top Rack Design	PI: William Endres	Whirlpool Corporation	\$27,187
Fluidics, Power, and Logic Circuitry Design/Integration into Handheld Sensor Platform	PI: William Endres, Co-PI: Robert DeJonge	Battelle Memorial Institute	\$32,349
Enterprise: Professional Bicycle Chain Cleaner	PI: John Gershenson	Park Tool USA	\$11,022
Velovations Enterprise: Highrise	PI: John Gershenson	Saris Cycling Group Inc.	\$5,878
Enterprise: Trainer Comfort	PI: John Gershenson	Saris Cycling Group Inc.	\$4,409
Enterprise: Fork Displacement Sensor and Shock Integration	PI: John Gershenson	Cane Creek Cycling Components	\$7,348
Enterprise: Brake Vibration Research	PI: John Gershenson	SRAM Corporation	\$7,348
Enterprise: Rear End Bushing Replacement for Niner Bikes	PI: John Gershenson	Niner Bikes	\$7,435
Enterprise: Outdoor/All-Weather Bicycle Tire Pump	PI: John Gershenson	Park Tool USA	\$11,153
Enterprise: Disc Brake Vibration Isolator for Specialized Bicycles	PI: John Gershenson	Specialized Bicycle Components Inc.	\$14,870
Multi-disciplinary Systems Engineering: Engaging MSI STEM Students through Space-based Capstone Design (Additional Funding)	PI: John Gershenson, Co-PI: Michele Miller	Universidad del Turabo	\$171,452
Enterprise: Power Analysis	PI: John Gershenson	Saris Cycling Group Inc.	\$11,152
Enterprise: Brake Vibration Improvement	PI: John Gershenson	Saris Cycling Group Inc.	\$11,153
Enterprise: Stack Rack 2.0	PI: John Gershenson	Saris Cycling Group Inc.	\$11,152
NSF Graduate Research Fellowship - Technologies for Developing Countries	PI: Brennan Tymrak, Co-PI: Michele Miller	National Science Foundation	\$126,000

MICHIGAN/AFRL CENTER OF EXCELLENCE IN ELECTRIC PROPULSION (MACEEP)

\$241.046

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TITLE	NAME	SPONSOR	AWARD
Deposition Rate of Propellant Backflow from a Magnesium Hall-Effect Thruster Graduate Research Fellowship Program	PI: Mark Hopkins, Co-PI: Lyon B. King	National Science Foundation	\$126,000
Preparing the Oculus-ASR Nanosatellite for Flight	PI: Lyon B. King	US Department of Defense, Air Force Office of Scientific Research	\$112,546
Oculus-ASR	PI: Lyon B. King, Co-PI: Adam Funkenbusch	University of Michigan-MSGC	\$2,500

Contracts & Grants (cont'd)

MULTI-SCALE TECHNOLOGIES INSTITUTE (MuSTI)

\$2,993,702

TITLE			
Modeling and Data Acquisition Support for Active Motion Compensation Technology for Roll-On/Roll-Off Cargo Vessel Discharge to Floating Platforms SBIR Phase I	PI: Jason R. Blough, Co-PIs: Gordon G. Parker, Eddy Trinklein	Quantum Engineering Design Inc.	\$20,000
A New Experimental Model of Knee Joint Trauma	PI: Tammy L. Haut Donahue	National Institutes of Health	\$207,686
Center for Diagnostic Nanosystems Phase I & II	PI: Craig R. Friedrich, Co-PI: Chang Kyoung Choi	Marshall University Research Corporation	\$712,148
Modeling and Experimental Validation of Metal-Air Battery	PI: Tajiri Kazuya	Nissan Motor Co. Ltd.	\$121,516
Scalable Fabrication of Fractal Nanoparticles for Electrochemical Energy Storage	PI: Desheng Meng	National Science Foundation	\$352,650
Collaborative Research: Self-Circulating, Self-Regulating Microreactor for On-Chip Gas Generation from Liquid Reactants	PI: Desheng Meng, Co-PIs: Craig R. Friedrich, Steven Goldsmith	National Science Foundation	\$86,261
Multi-scale Modeling of Graphite/CNT/Epoxy Hybrid Composites	PI: Gregory M. Odegard	US Department of Defense, AFOSR	\$252,555
Finite Element Modeling of Internally-Reinforced Pressure Tanks	PI: Gregory M. Odegard	REL Inc.	\$167,371
Senior Design: Internally-Reinforced Pressure Tank Design	PI: Gregory M. Odegard, Co-PI: Michele Miller	REL Inc.	\$48,906
Multi-scale Modeling of Polymer Nanocomposites (Additional Funding)	PI: Gregory M. Odegard	NASA Langley Research Center	\$132,070
Multi-scale Modeling of Liquid Crystalline/Nanotube Composites	PI: Gregory M. Odegard	University of Oregon	\$47,441
Multi-scale Model Development and Validation of Graphene/ULTEM Composites for Structural and Noise Reduction Applications	PI: Gregory M. Odegard	National Aeronautics and Space Administration	\$351,634
Microsensor for Intramuscular Pressure Measurement	PI: Gregory M. Odegard	Mayo Clinic	\$50,314
Planning Grant: I/UCRC for Novel High Voltage Transmission Materials and Structures	PI: Gregory M. Odegard	National Science Foundation	\$11,500
Collaborative Research: Stronger Than Glass Fibers, Stiffer Than Steel Wires: A New Perspective into the Mechanics of Cellulose Nanocrystals	PI: Reza Shahbazian-Yassar, Co-PI: Gregory M. Odegard	National Science Foundation	\$277,650
New Insights on High-Performance Anodes for Lithium-Ion Batteries	PI: Reza Shahbazian-Yassar	American Chemical Society- Petroleum Research Fund	\$154,000

NOISE, VIBRATION, AND HARSHNESS

\$231,682

TITLE	NAME	SPONSOR	AWARD
Buzz-Squeak-Rattle Material Study	PI: Charles Van Karsen	Bayer MaterialScience	\$3,912
Acoustic Boom Modeling	PI: Charles Van Karsen, Co-PIs: Gregory M. Odegard, Jim DeClerck	General Motors	\$184,401
Vibration Based Flow Detection in Fiber Reinforced Polymer Wraps	PI: Mohan Rao	Neptune Research Inc.	\$43,369

Patents & Publications

* Please note: Bold text indicates ME-EM faculty members and *italicized text* indicates ME-EM students.

PATENTS

Douglas J. Woodruff, Gary W. Pennala, **William J. Endres**, Nicole Barna, Quincy Schultz, David Thomasini, and Matthew Zblewski: Micro-jet Cooling of Cutting Tools, Patent Number 8439609 B2, May 2013

William J. Endres: Cutting Tool Insert Having Internal Microduct for Coolant, Patent Number 8047748 B2, November 2011

Lyon B. King: Self-regenerating Nanotips for Indestructible Low-power EP Cathodes, Patent Number 8080930 B2, December 2011

John H. Johnson, Gordon G. Parker, and Maruthi Devarakonda: NA Control Strategy for NO_x and NH_3 Reduction Urea-SCR Aftertreatment Systems, Patent Number 8230677 B2, July 2012

Yarom Polsky, Mark C. Grubelich, **and Mark R. Vaughn:** Reduced-Impact Sliding Pressure Control Valve for Pneumatic Hammer Drill, Patent Number 8176995 B1, May 2012

BOOK CHAPTERS

Abdelkhalik, Ossama O., 2011, "Implementation of Kalman Filter For Localization," <u>Theory, Practice and Advances: A</u> <u>Handbook for Engineers and Academics</u>, Wiley, Hoboken, New Jersey

Choi, Chang K., Park, G., and Sparer, T., 2012, "Microimpedance Measurement for Cellular Transformation and Cancer Treatment," <u>Biosensors and Molecular Technologies</u> <u>for Cancer Diagnostics</u>, Taylor & Francis, pp. 609-628, ISBN 978-1439841655

Plunger, B., Sparer, T., and **Choi, Chang K.,** 2012, "Electrical Cell-Substrate Impedance Sensing for Measuring Cellular Transformation, Invasion, Migration, and Anticancer Compound Screening," <u>Cancer Metastasis-Biology and</u> <u>Treatment</u>, Springer, pp. 55-69, ISBN 978-9400749269

Wallner, T., and **Miers, Scott A.,** 2012, "Alternative Fuels for Internal Combustion Engines," <u>Encyclopedia</u> <u>of Sustainability Science and Technology</u>, Springer Science+Business Media, New York, New York, ISBN 978-0387894690

Odegard, Gregory M., McNally, T., and Potschke, P., 2011, "Multi-Scale Modeling of Polymer CNT Composites," Polymer Carbon Nanotube Composites: Preparation, Properties and Applications, Woodhead Publishing, Philadelphia, Pennsylvania, ISBN 978-1845697617

Johnson, Jaclyn, Worm, Jeremy J., Miers, Scott A., and Naber, Jeffrey D., 2011, "Biofuel Use from Bioenergy Crops: Internal Combustion Engines in Transportation," <u>Handbook</u> of Bioenergy Crop Plants, CRC Press, Boca Raton, Florida, ISBN 978-1439816844

PUBLICATIONS

Goh, Shu T., Abdelkhalik, Ossama O., and Zekavat, Seyed A., 2012, "Implementation of Differential Geometric Filter for Spacecraft Formation Orbit Estimation," <u>International</u> <u>Journal of Aerospace Engineering</u>, Vol. 2012, Article ID 910496, 13 pages

Abdelkhalik, Ossama O., Gad, Ahmed, 2012, "Shape Based Approximation of Constrained Low-Thrust Space Trajectories using Fourier Series," <u>AIAA Journal of</u> <u>Spacecraft and Rockets</u>, Vol. 49, No. 3, pp. 535-546

Abdelkhalik, Ossama O., and *Gad, Ahmed,* 2011, "Hidden Genes Genetic Algorithm for Multi-Gravity-Assist Trajectories Optimization," <u>AIAA Journal of Spacecraft and</u> <u>Rockets</u>, Vol. 48, No. 4, pp. 629-641

Abdelkhalik, Ossama O., and *Gad, Ahmed*, 2012, "Dynamic-Size Multi-Population Genetic Optimization for Multi-Gravity-Assist Trajectories," <u>AIAA Journal of Guidance,</u> <u>Control, and Dynamics</u>, Vol. 35, No. 2, pp. 520–529

Goh, Shuting, **Abdelkhalik, Ossama O.,** Zekavat, Seyed A., 2011, "Constraint Estimation of Spacecraft Formations Orbits using Relative Positions Measurements," <u>AIAA</u> <u>Journal of Guidance, Control, and Dynamics</u>, Vol. 35, No. 2, pp. 387–397

Gad, Ahmed, Taheri, Ehsan, and **Abdelkhalik, Ossama O.**, 2011, "Solution to the GTOC5 using Hidden Genes Genetic Algorithms," <u>International Review of Aerospace</u> <u>Engineering</u>, Vol. 4, No. 4, pp. 218-227

Goh, Shu T., **Abdelkhalik, Ossama O.,** and Zekavat, Seyed A., 2011, "Spacecraft Formation Orbit Estimation using WLPS-Based Localization," <u>International Journal of Navigation and</u> <u>Observation</u>, Vol. 2011, Article ID 654057, 12 pages

Abdelkhalik, Ossama O., and *Taheri, Ehsan,* 2012, "Approximate On-Off Low-Thrust Space Trajectories using Fourier Series," <u>AIAA Journal of Spacecraft and Rockets,</u> Vol. 49, No. 5, pp. 962-965

Goh, Shuting, **Abdelkhalik, Ossama O.,** and Zekavat, Seyed A., 2012, "A Weighted Measurement Fusion Kalman Filter Implementation for UAV Navigation," <u>Aerospace Science</u> and Technology, Vol. 28, No. 1, pp. 315-323

Mastricola, Nicholas, and **Abdelkhalik, Ossama O.,** 2013, "Comparison of Relativistic Perturbations on Spacecraft Earth Orbits," <u>IIUM Engineering Journal</u>, Vol. 14, No. 1, 14 pages

Abdelkhalik, Ossama O., 2013, "Hidden Genes Genetic Optimization for Variable-Size Design Space Problems," Journal of Optimization Theory and Applications, Vol. 156, No. 2, pp. 450-468

Publications (cont'd)

Goh, Shu T., **Abdelkhalik, Ossama O.,** and Zekavat, Seyed A., 2012, "Implementation of Differential Geometric Filter for Spacecraft Formation Orbit Estimation," <u>Journal of Aerospace Engineering</u>, Vol. 2011, Article ID 910496, 13 pages

Medici, E.F., and **Allen, Jeffrey S.,** 2011, "Modeling and Diagnostics of Fuel Cell Porous Media for Improving Water Transport," <u>ECS Transactions</u>, Vol. 41, No. 1, pp. 165-178

Medici, E.F., and **Allen, Jeffrey S.,** 2011, "Incorporation of Evaporation and Vapor Transport in Pore Level Models of Fuel Cell Porous Media," <u>ECS Transactions</u>, Vol. 41, No. 1, pp. 141-152

Medici, E.F., and **Allen, Jeffrey S.,** 2011, "Improved Water Removal from Fuel Cell Flow Channels via Natural Frequency Excitation of Free Surfaces," <u>ECS Transactions</u>, Vol. 41, No. 1, pp. 1887-1896

Medici, E.F., and **Allen, Jeffrey S.,** 2011, "Scaling Percolation in Thin Porous Layers," <u>Physics of Fluids</u>, Vol. 23, No. 12, Article ID 122107, 9 pages

Parikh, Nishith, Allen, Jeffrey S., and Shahbazian-Yassar, Reza, 2012, "Microstructure of Gas Diffusion Layers for PEM Fuel Cells," <u>Fuel Cells</u>, Vol. 12, No. 3, pp. 382-390

Herescu, Alexandru, and **Allen, Jeffrey S.,** 2012, "The Influence of Channel Wettability and Geometry on Water Plug Formation and Drop Location in a Proton Exchange Membrane Fuel Cell Flow Field," <u>Journal of Power Sources</u>, Vol. 216, pp. 337-344

Liu, Wenjia, and **Chen, Bo,** 2011, "Optimal Control of Mobile Monitoring Agents in Immune-Inspired Wireless Monitoring Networks," <u>Journal of Network and Computer</u> <u>Applications</u>, Vol. 34, No. 6, pp. 1818-1826

Chen, Bo, and Liu, Wenjia, 2012, "A High Computational Power Wireless Sensor Network for Distributed Structural Health Monitoring," <u>International Journal of Sensor</u> <u>Networks</u>, Vol. 11, No. 3, pp. 137-147

Chen, Cheng, Li Shuang, Shuang, **Chen, Bo**, Wen, Ding, 2011, "Agent Recommendation for Agent-Based Urban-Transportation Systems," <u>IEEE Intelligent Systems</u>, Vol. 26, No. 6, pp. 77-81

Chen, Bo, and Zang, Chuanzhi, 2011, "Emergent Damage Pattern Recognition using Immune Network Theory," <u>Smart</u> <u>Structures and Systems</u>, Vol. 8, No. 1, pp. 69-92

Chen, Bo, and Liu, Wenjia, 2012, "A Web-Based Structural Health Monitoring Sensor Network," <u>International Journal</u> <u>of Computer Applications in Technology</u>, Vol. 44, No. 3, pp. 188-197 *Feng, Lei,* Liu, Wenjia, **Chen, Bo,** 2012, "Driving Pattern Recognition for Adaptive Hybrid Vehicle Control," <u>SAE</u> <u>International Journal of Alternative Powertrains</u>, Vol. 1, No. 1, pp. 169-179

Siuti, Piro, Retterer, Scott, **Choi, Chang K.**, and Doktycz, Mitchel, 2011, "Enzyme Reactions in Nanoporous, Picoliter Volume Containers," <u>Analytical Chemistry</u>, Vol. 84, No. 2, pp. 1092-1097

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