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ME-EM eNewsBrief, March 2011

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Department of Mechanical Engineering—Engineering Mechanics

Greetings from William (Bill) W. Predebon, Chair, Department of Mechanical Engineering-Engineering Mechanics. For the latest news and information about our faculty, students, and staff please visit our web site at <http://www.me.mtu.edu/>.

Upcoming Events



The ME-EM Department, along with Michigan Tech's Corporate Development, will again co-host the **Annual Michigan Tech/ME-EM SAE Reception** at the SAE International Conference in Detroit, MI. The reception is Tuesday, April 12th from 5:00 p.m. to 8:30 p.m. in room M2-30 of Cobo Center. Refreshments will be served. We have an exiting agenda planned for this year. Students from the SAE Student Chapter at Michigan Tech will be there with competition vehicles. **Steve Williams** (BSME '86), Vice President, Vehicle Architecture and Advanced Engineering at Chrysler, will be the guest speaker. Door prizes will be given out. Come spend an evening with our students, hear about their competitions, see their vehicles, and hear what is happening on campus and at Chrysler. RSVP to Kathy at kagoulet@mtu.edu is appreciated.



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New Faculty

Dr. Ezra Bar-Ziv joined the Department as a professor on March 1, 2011. He earned his Ph.D. in Chemical Physics from the Weizmann Institute of Science, Rehovot, Israel. After completing his Ph.D., Dr. Bar-Ziv held several post doctoral



associate positions. He was the director and founder of the program for Projects in Industry, the Program for High-Tech Retraining, and the chair and founder of the Department of Biotechnology and Environmental Engineering at Ben-Gurion University. He was the Clyde Chair in Chemical Engineering during his sabbatical at University of Utah in 2005-2006 and a professor and Associate Dean for Academic Development and Research at the College of Engineering Sciences at Ben-Gurion University. His teaching and research interests are in the areas of advanced energy systems, including coal combustion, gasification, pollution reduction, biomass torrefaction, for the power industry and large stationary systems.

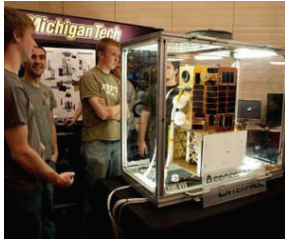
Dr. Nina Mahmoudian joined the Department as an assistant professor on January 1, 2011. She earned her Ph.D. degree at Virginia Polytechnic Institute and State University. After completing her Ph.D., she held the position of research associate at the University of Maryland for a year. Her teaching and research interests are in the areas of dynamics, stability and control of nonlinear systems, cooperative control of multi agent systems, and autonomous vehicles (AVs) with special interest in underwater gliders.



Dr. Mohammad Rastgaar Aagaah joined the Department as an assistant professor on January 1, 2011. He earned his Ph.D. at Virginia Polytechnic Institute and State University. After graduation he was a postdoctoral researcher at MIT for two years. His teaching and research interests are in the areas of dynamical systems, structural dynamics, active vibration cancellation, and human-robot interactions.



Student Competitions and Team Awards

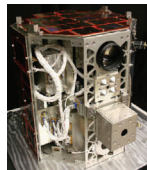


On January 17, 2011, Michigan Tech's **Aerospace Enterprise Team's** satellite

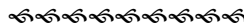
Oculus-ASR won first place in the Air Force Research Laboratory's University Nanosatellite flight competition review (FCR). A team of 24 judges from AFRL Space Vehicles Directorate, AFRL Propulsion Directorate, Air Force Office of Scientific Research, Department of Defense Space Test Program, Air Force Space and Missile Systems Center, Orbital Sciences Corporation, SpaceX, and Rockwell Collins reviewed design documents and hardware demonstrations from the eleven participating universities. Twenty-five undergraduates from MTU travelled to the FCR, which was held in Albuquerque, NM. Michigan Tech will now receive a two-year follow-on contract from AFOSR to perform final integration and testing of the spacecraft to prepare it for launch and also to construct a ground-control station on campus. The Department of Defense Space Test Program will launch the MTU satellite into low-Earth orbit in 2013. The spacecraft will complete a one-year nominal mission controlled from MTU. The satellite has been completely designed and built by Michigan Tech undergraduate students during a four-year program. Other schools in the competition were MIT, Cornell, Georgia Tech, University of Minnesota, Montana, Sate University, University of Central Florida, Missouri University of Science and Technology, University of Hawaii, St. Louis University, and Santa Clara University. The team is advised by **Dr. L. Brad King** (associate professor, ME-EM) and **Javier Fernandez** (Co-Director, EIT).



The Michigan Tech **Aerospace Enterprise Team's** Nanosat competition win was mentioned in the Feb. 15, 2001 USA Today.



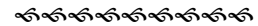
Michigan Tech again hosted the annual **Winter Baja** competition. Fifteen teams came to Houghton to compete in the informal competition held in Lake Linden. There were three events at the Winter Baja. Two two-hour endurance runs were scored by the number of laps. Twelve teams then participated in a short race where they negotiated part of the track backwards. See the results and a short video clip of the event at: <http://www.doe.mtu.edu/news/2011/winterbaja/index.html> or view the comments on Facebook: <http://www.facebook.com/pages/Winter-Baja-2011/173198251652?v=wall>. The team is advised by Dr. Brett Hamlin .



Seventeen teams competed in the 2011 SAE **Clean Snowmobile Challenge** held

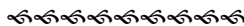
March 6-12th, held at Michigan Tech and co-hosted by the Department of Mechanical Engineering – Engineering Me-

chanics and the Keweenaw Research Center. The Michigan Tech team was 6th overall and was awarded the Caterpillar Corporation Award for Innovation. On their zero emissions sled, they moved the drive axle to the back, increasing efficiency. They were credited for "excellent critical thinking." This year's event was the greenest yet with 7 teams, including Michigan Tech, in the zero emissions category. The zero emissions category is sponsored by the National Science Foundation, which uses the electric sleds while conducting research in pristine arctic locations. This past year, the Keweenaw Research Center (KRC) personnel put a solar panel behind the KRC and the one solar panel banked enough energy to charge all the zero emissions sleds in the competition. See the complete list of results at: <http://www.mtukrc.org/snowmobile.htm>. Pictures of the event can be seen at: <http://www.mtu.edu/snowmobile/>. The Michigan Tech Clean Snowmobile Challenge was mentioned in the January 20th USA Today newspaper on page 8A under the News from every state. The article mentions that a record number of electric sleds will be competing. The team is advised by **Dr. Jason Blough** (associate professor, ME-EM)



The Detroit News quoted Tech senior Jason Socha in a feature on the **Eco-Car** challenge, a competition sponsored

by the US Department of Energy, General Motors and others. Michigan Tech is one of 16 university teams competing in the three-year challenge to make a GM-donated vehicle as fuel-efficient and emissions-friendly as possible. Michigan Tech's team has built a plug-in hybrid that uses a rear-drive electric motor and a V-6 engine from a 2009 Chevrolet Impala to get at least 40 miles per gallon. The winning team will be announced next summer. EcoCar is advised by **Dr. Adam Loukus** (instructor, ME-EM).



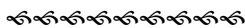
Student Accomplishments and Awards

The following ME-EM students will receive a Summer Undergraduate Research fellowship:

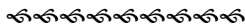
- **Hasti Asayesh Ardakani** (ME, sr.), project: "Self-powered Piezoelectric Nanostructures", advisor: **Reza Shahbazian-Yassar** (assistant professor, ME-EM),
- **Corson Cramer** (ME, sr.), project: "Potential Analyzer Diagnostic for Hall-effect Plasma Thruster Plumes", advisor: **L Brad King** (associated professor, ME-EM).



Mike Hojnacki (ME, sr.) was named to the All-Great Lakes Intercollegiate Athletic Conference team.



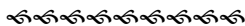
Corson Cramer (ME, sr.) was awarded the John MacInnes Slide Rule award for having the highest overall GPA (3.82) on the men's hockey team.



Corson Cramer (ME, sr.) was a recipient of one of the Western Collegiate Hockey Association Scholar-Athlete Awards. To earn recognition as a WCHA Scholar-Athlete, student-athletes must have completed at least one year of residency at their present institution prior to the current academic year and have earned a grade-point average of at least 3.50 on a 4.0 scale.



Michael Hojnacki (ME, sr.) was named to the Capital One Academic All-District IV College Division First Team in basketball with a 3.65 cumulative grade point average. He leads Tech in scoring at 15.9 points per game and has scored 20-plus points in a game seven times this season. The 6 ft. 7" forward ranks sixth in the GLIAC in scoring and is also among the league leaders in rebounding (5.5), field goal percentage (51.9), 3-point percentage (42.7) and free throw percentage (79.7).



John Moyer (ME, sr.) was awarded first place for his paper in the Solid Mechanics & Rehabilitation Engineering category at the ASME International Bioengineering Division competition. **Dr. Tammy Haut Donahue** (associate professor, ME-EM) is his advisor.

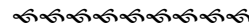
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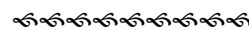
Thanks to all our corporate Capstone supporters, 19 design teams are putting final touches on their project work as this goes to press. Hertzian stress optimization, suspension design, process automation, delivery system design, and mechatronics represent just a few projects in this diverse group concluding in April.

If you are not able to make it to Tech for the design expo, keep an eye on our website for highlights of some of these projects and others. Sponsors of these projects are part of producing entry level engineers having skills and experience that far exceed their peers. Thank you for making it possible for Michigan Tech to do this.

Our next group of projects will begin this coming fall. If you haven't been part of Capstone yet, you may want to consider it!



Cody Rye, a senior from Ironwood, MI, will enroll at Michigan Tech in the fall of 2011 to study mechanical engineering. Cody was the first runner up in the 2010 High School football Rudy Awards which carries with it a \$5,000 scholarship. The High School Football Rudy Awards honor inspirational football players who best define what Rudy refers to as the "The Four C's": Character, Courage, Contribution and Commitment. The four scholarship winners were chosen by the online fans and the 2010 Selection Committee with distinguished members such as Drew Bledsoe, Jim Mora Sr., Andrea Kremer, Jenn Brown, Shaun Alexander and Leigh Anne Tuohy. The award is inspired by Daniel 'Rudy' Ruettiger, the iconic figure of the classic football film RUDY. See the video clip at <http://www.uppermichiganssource.com/news/story.aspx?id=563674> or the youtube video clip of Cody at: <http://www.youtube.com/watch?v=tcMFx9uSBBc>.

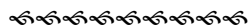


Lisa Staehlin (BSME '10) and MBA major was named to the All - GLIAC North Division Second Team along with All - Defensive Team honors in women's basketball.

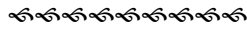
University News/ Awards



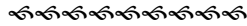
Michigan Tech's Hybrid Vehicle Engineering Certificate was mentioned in a SAE announcement. This is an interdisciplinary program involving faculty and staff from ME-EM, ECE, MSE, and Chem Eng and led by Carl Anderson (associate dean, College of Engineering) and Jeffrey Naber (associate professor, ME-EM). According to the announcement EMs and suppliers in the mobility industries are seeking engineers with vehicle electrification education. The Michigan Academy for Green Mobility Alliance (MAGMA), a Michigan Skills Alliance sponsored by the Department of Energy, Labor and Economic Growth (DELEG), ensures the automotive industry has the trained workers it needs to grow and prosper in the emerging green economy by identifying critical skills, approving relevant and high-quality training, and seeking available grant funding to assist individuals and companies in accessing this training. Michigan Tech is one of only three universities that is offering MAGMA-approved training.



The women's basketball head coach Kim Cameron was named GLIAC Coach of the Year.



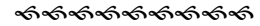
Over 300 students in grades 4-8 participated in the 13th Annual Western Upper Peninsula Science Fair on Monday, Feb. 28, in the Memorial Union Ballroom.



The Detroit Free Press published a guest editorial column by President Glenn Mroz, who is also chair of the statewide Presidents Council, State Universities of Michigan. In it he urged people to let their legislators know that the state and nation's priority needs to be educating more students in the STEM fields (science, technology, engineering and mathematics). The President's Council, State Universities of Michigan, chaired by President Glenn Mroz, met with newly elected Michigan Governor Rick Snyder On Wednesday January 12, 2011, to discuss higher education funding issues and the future of the state universities. After the meeting, PCSUM issued a news release that Michigan's 15 public university presidents are prepared to work collaboratively with Snyder, following the hour-long meeting. Read the article at:

http://www.admin.mtu.edu/urel/ttoday/previous.php?issue=20110114&utm_source=email&utm_content=20110114.

Michigan Tech's Winter Carnival was listed as one of America's Best Events in the January/February issue of Skywest magazine.



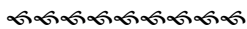
The Michigan Tech women's basketball team's run in the NCAA Tournament was stopped one step short of the ultimate prize Friday (March 25) as No. 2-ranked Clayton State defeated the No. 3 Huskies 69-50 in the NCAA Division II Women's Basketball National Championship game. The 35-1 Lakers, who were one win (and one point, for that matter) away from a perfect season, used a relentless press and forced 25 Tech turnovers to claim their school's first national title. The Huskies' run, which seemed improbable to start the season with no returning starters and a first-year head coach, ended with a 31-3 record. Tech advanced further into the NCAA Tournament than any other team in the program's history, coming within 40 minutes of earning the school's first national title since 1975, an NCAA Division I men's ice hockey crown.

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Current Contracts and Grants

Bo Chen (PI, ME-EM); **Jeffrey D. Naber** (co-PI, ME-EM); "REU Site: Research in Advanced Propulsion and Fuel Technology for Sustainable Transportation"; sponsor: National Science Foundation; total award amount: \$458,375.



Craig R. Friedrich (PI, ME-EM), **Chang-Kyoung Choi** (ME-EM), Paul Bergstrom (ECE), and Ravi Pandey (SPH), co-PIs; "Center for Diagnostic Nanosystems -

Phase 1"; sponsor: Marshall University Research Corporation; total award amount: \$538,000.

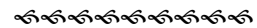


John Hill (PI, ME-EM); "Michigan Seatbelt Observation Studies"; sponsor: Michigan State Police; total award amount: \$118,621.



Seong-Young Lee (PI, ME-EM); "Urea Injector Spray Characterization Including Spray Pattern"; sponsor: ServoTech Engineering; total award amount: \$8,000.

Scott A. Miers (PI, ME-EM) and **Jeremy Worm** (co-PI, ME-EM); "Impact of E3 Spark Plugs on Emissions and Fuel Economy using Two-Stroke and Four-Stroke Snowmobiles"; sponsor: E3 spark Plugs; total award amount: \$18,000.



Jeffrey D. Naber (PI, ME-EM); **Seong-Young Lee**, **Jeremy Worm**, **Jaclyn Nesbitt** (co-PIs, ME-EM); "Diesel Spray Characterization including Soot Formation - Comparison of Injector Nozzles Found to Have Different PM Engine Emissions", sponsor: Ford Motor Company; total award amount: \$101,771.

Current Contracts and Grants Continued

Jeffrey Naber (co-PI, ME-EM); David Shonnard (PI, Chem Eng) and Bradley Baltensperger (co-PI, Cognitive & Learning Science); "RET Site: Wood to Wheels - Research Experience for High School Teachers in Sustainable Transportation Technologies"; sponsor: National Science Foundation; total award amount: \$358,492.

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**Jeffrey Naber** (PI, ME-EM), **Bo Chen**, **Scott Miers**, **Seong-Young Lee**, and **Jeremy Worm** (co-PIs, ME-EM); "Advanced

Gasoline Turbocharged Direct Inject Engine Development"; sponsor: Ford Motor Company; total award amount: \$1,394,204.

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Gordon G. Parker (PI, ME-EM); Wayne Weaver (co-PI, EECE); "Microgrid Modeling and Optimization for High Penetration Renewables Integration"; sponsor: Sandia National Laboratories; total award amount: \$450,000.

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**Sheryl A. Sorby** (PI, ME-EM); AJ Hamlin and Norma Veurink (co-PIs, EEF); "GSE/RES Collaborative Research: Addressing STEM Gender Gap: Does Spatial Training Enhance Middle-School Girl's STEM-Relevant Skills, Attitudes, Beliefs, and Interests?"; sponsor: National Science Foundation; total award amount: \$227,227.

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Jeremy Worm (PI, ME-EM); **Scott A. Miers** (co-PI, ME-EM); "Characterization of the Effects of Ethanol as a Fuel in a High Performance Spark Ignited Engine"; sponsor: UChicago Argonne, LLC; total award amount: \$30,000.

Alumni and Friends News, Accomplishments, & Awards

It is my intent to highlight alumni accomplishments on a regular basis. I would like to hear from you about your accomplishments and those of other Michigan Tech ME-EM alumni who have achieved recognition. Please email me this information at wwpredeb@mtu.edu or Kathy at kagoulet@mtu.edu.

Diana Brehob (BSME '78) has accepted a new position as Chief IP Counsel of EcoMotors.

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**Vijay Sazawal** (MEEM PhD '75) has been appointed to the Civil Nuclear Trade Advisory Committee (CINTAC) to advise the US commerce department on trade issues facing the industry. Mr. Sazawal is currently director of the government programs at USEC Inc, a leading supplier of enriched uranium fuel for commercial nuclear power plants worldwide.

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Col. Andy Dobrot (BSME '85), Lt. Col. Jason Meyers (BSEE '93), and Maj. Jack Hedenberg (BSEE '91), all Air Force ROTC alumni, were instrumental in the in the successful test launch of the Airborne Laser Test Bed (ALTB), part of the Missile Defense Agency's Ballistic Missile Defense System that uses incredibly complex engineering and science, including lasers. The laser is fired from the nose of an airplane tens of miles from the target and its photons have to hit a missile exceeding 2,000 mph. Read the whole article at: <http://>

www.admin.mtu.edu/urel/ttoday/previous.php?issue=20110110&utm_source=email&utm_content=20110110.

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**Alex Webster** (BSME '86) has been named president of Classic Turning Inc. in Jackson. He was at Eaton Aerospace Group since 1983, serving in engineering and management positions, most recently as director of division product management.

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Dr. Terry J. Woychowski (BSME '78) has been selected as the first recipient of a new award established by the Michigan Tech Alumni Association. The Humanitarian Award, presented to those alumni who, through their outstanding involvement and dedication, have made a significant contribution of volunteer leadership or service which has improved or enriched the lives of others and the welfare of humanity, and whose accomplishments reflect admirably on or bring honor to their Alma Mater. The award will be presented to Terry at the dinner on Friday, August 5 in the MUB ballroom, during the annual Alumni Reunion.

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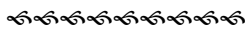
**Terry Woychowski** (BSME '78), Vice President for Global Vehicle Program Management at General Motors, has been appointed to the Michigan Tech Board of Control by Governor Rick Snyder. The appointment is effective immediately.

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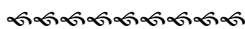
The ME-EM Department at Michigan Tech has an alumnus that is one of the top executives in each of the three major US car industries. They are Dr. **Terry Woychowski**, Vice President, Global Vehicle Program Management at General Motors, new Governor appointee to the Michigan Tech Board of Control, ME&EM Academy member, and College of Engineering External Advisory Committee member. **Dan Kapp**, Director, Powertrain Research and Advanced Engineering at Ford, just voted for induction into the ME&EM Academy, College of Engineering External Advisory Committee chair, and former ME-EM External Advisory Board member. **Steve Williams**, Vice President, Vehicle Architecture and Advanced Engineering at Chrysler.

Faculty/Staff Awards Accomplishments

Karen Bess, office assistant (ME-EM), received the Michigan Tech Making a Difference Rookie Award. This award is given annually to a staff member who has been at Michigan Tech for two years or less and has made a significant contribution and/or exceeded all expectations in meeting the challenges of their job in this short time. Karen received the award for her ability to step in and keep the process flowing smoothly without a significant learning curve and her support to the Department's Safety Committee that included helping implement the lockout program and her revision of the entire safety manual.

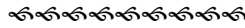


Dr. Thomas Grimm (associate professor, ME-EM) was one of two professors that alumnus Andy Dobrot (BSME '85) credits in part with his success in the Air Force, stating "They told us 'We are here to teach you how to think, because in the real world there are no answers in the back of the book.'" He also "felt that Tech gave me a leg up over the rest of the engineers that I worked with." Read the article at: <http://www.admin.mtu.edu/urel/ttoday/previous.php?issue=20110110&id=11734&nav=1#2>.



Dr. Mahesh Gupta (professor, ME-EM) had his paper "Three Dimensional Simulation of Coextrusion in a Complex Profile Die" selected as paper of the month for February by Extruder

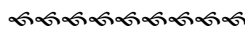
Tech and was highlighted on their web site.



Dr. John Johnson (research professor and professor emeritus, ME-EM) was selected as the recipient of the 2011 Franz F. Pischinger Powertrain Innovation Award, in recognition of his extensive research effort and exceptional work in the diesel emissions area. The award recognizes exceptional innovation and competence in powertrain design and development through the annual recognition of an engineer who has demonstrated outstanding innovation in the field. He will receive the award at the 2011 SAE World Congress during Awards Ceremony on Tuesday, April 12th, at Cobo Hall in Detroit, MI.

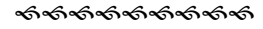


Dr. Lyon Brad King (Ronald and Elaine Starr Associate Professor, ME-EM) has been selected to replace Dr. Gordon Parker (John and Cathi Drake Professor, ME-EM) as ME-EM Director of Research. Dr. Parker is stepping aside to lead the development of a multi-disciplinary initiative in Sustainable Integrated Transportation and Electric Grid.



Dr. Scott A. Miers (assistant professor, ME-EM) is a finalist for the Michigan Tech 2011 Distinguished Teaching Award (DTA) in the Assistant Professor/Lecturer/Professor of Practice Cate-

gory. As a finalist for the 2011 DTA Dr. Miers will become a member of the Academy of Teaching Excellence at a banquet on April 25, 2011.



Jeremy Worm (research engineer/grant writer, ME-EM), received the Michigan Tech Making a Difference, Creating Community Connections Award. This award is given annually to a staff member who serves the community (inside and outside the University), initiates and maintains, sustainable, collaborative partnerships within Michigan Tech or with community organizations, incorporates the ideals and interests of Michigan Tech and our neighbors, in Houghton or around the world, into their daily work, serves as mentors and/or model citizens to Michigan Tech students, faculty, staff, or community members inside and outside the University making Michigan Tech a great place to work, demonstrates dedication by enhancing one or more aspects of work/life (e.g. diversity, opportunities for professional development, work/life balance), and supports and/or organizes activities that encourage community-building and foster a sense of joy in the workplace. Jeremy was chosen for his work with the Hybrid Electric Vehicle (HEV) course and its associated laboratories and for his willingness "to assist and go the extra mile for students, staff and faculty in support of their projects--solving issues for them and clearing roadblocks that have enabled all to be that much more effective and productive." The HEV course has been delivered to over 300 students, over 230 of which were distance-learning students.



Department Accomplishments

The 2012 US News and World Report Best Graduate School Rankings were released on March 16th. The Department of Mechanical Engineering - Engineering Mechanics continued to be ranked at 48 among the doctoral granting universities. The College of Engineering has moved up one position to 85th in the same rankings.

Faculty and Student Invention Disclosures

An invention disclosure, "Fixation system design for a leadless pacemaker", was submitted by Beatrix Burgess (EBE, sr.), **Brian Czech** (EME, sr.), Daniel Dubiel (EBE, sr.), Natalie Hartman (EBE, sr.), John Kinzinger (EMSE, sr.), and Amberlee Lifer (EMSE, sr.). Their advisors are: Steve Hackney (professor, MSE) and Rupak Rajacher (assistant professor, BME).