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1-2022

ME-EM eNewsBrief, December 2021

Department of Mechanical Engineering-Engineering Mechanics, Michigan Technological University

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Greetings from William (Bill) Predebon, Chair, Department of Mechanical Engineering-Engineering Mechanics at Michigan Tech. For the latest news and info about our faculty, students and staff, please visit our website at www.mtu.edu/mechanical. Visit us on [Facebook](#), [Instagram](#) and [Twitter](#).

Upcoming Events

The ME-EM Scholarship Winter Carnival Alumni Hockey Skybox Social will be held on Saturday, February 12, 2022, during the Michigan Tech vs. Bowling Green hockey game in the Husky Suite South Skybox of the John MacInnes Student Ice Arena. The social begins at 5 p.m. Mechanical Engineering alumni and former professional hockey and football players John Scott (BSME '10) and Joe Berger (BSME '04) will attend the social and participate in a special ME-EM fundraising raffle.

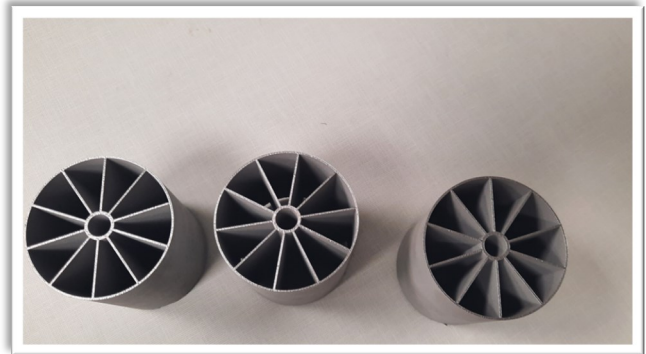
Tickets for the social are \$40/person, which includes a \$20 donation to the ME-EM Alumni Scholarship Fund. The ME-EM department will provide stadium food and refreshments. [Registration for skybox tickets](#) will soon be available on the Michigan Tech Ticket Office website. The deadline to purchase social tickets online is 8 a.m. on Wednesday, February 9, 2022.

Signed jersey raffle tickets are \$50 each. The online registration site will allow you to [purchase a raffle ticket](#) for a Michigan Tech hockey jersey signed by John Scott or for a Michigan Tech football jersey signed by Joe Berger. The winners will be announced during the intermission following the second period. If not present, the winners will be contacted. The deadline to purchase raffle tickets online is Noon on Friday, February 11. If attending the Social, raffle tickets can be purchased in person the night of the event with cash or check only.

ME-EM Department News & Accomplishments

Michigan Tech's 3D-printing capabilities have moved into metals with the acquisition of a 3D Systems DMP 350 metal printer.

Direct metal printing (DMP) allows manufacturers to create fine parts from metal powders through a process called additive manufacturing, where the printers add metal bit by bit. This is inverse from traditional manufacturing, which focuses on taking away metal to create a part.



Examples of a heat exchanger that was recently produced by Michigan Tech's new 3D metal printer

Obtaining the new 3D printer was made possible by the generosity of our Michigan Tech alumni. **Jim Scarlett** (AAS, Mechanical Design Eng Tech '00, and BS Industrial Business Mgt '01), owner of [Scarlett Inc](#), generously offered ME-EM department chair Bill Predebon a 20 percent discount on the \$875K system.

An anonymous ME alumni provided a very large donation, along with contributions from the following alumni: **Frank Agosti** (BSME '58), **John Drake** (BSME '64), [R.W. Fernstrum & Company, Inc.](#) - [**Paul Fernstrum** (BSME '65) and Sean Fernstrum (BS Sci & Tech Comm '90)], **Todd Fernstrum** (AAS EET '92), **Ron Starr** (BSME '67), and **Victor Swanson** (BSME '50).

For inquiries about the 3D Systems DMP 350 metal printer, contact **Jacob Lundin** (ME-EM Research Engineer, jdlundin@mtu.edu) or **Russell Stein** (MSE Research Engineer (BSME '87), restein@mtu.edu).

IN THIS ISSUE:

| | |
|---|---|
| • Upcoming Events | 1 |
| • ME-EM Department News & Accomplishments | 1 |
| • ME-EM Faculty & Staff Awards and Accomplishments | 2 |
| • New ME-EM Staff | 3 |
| • Student Accomplishments & Awards | 3 |
| • Student Competitions & Team Awards | 4 |
| • Alumni and Friends News, Accomplishments & Awards | 4 |
| • Current Contracts & Grants | 5 |
| • University News & Awards | 5 |
| • Past Events | 6 |

ME-EM Faculty & Staff

Awards and Accomplishments

Drs. Parisa Abadi and Susanta Ghosh (Asst. Profs., ME-EM) each received Michigan Tech Research Excellence Fund (REF) seed grants.



Dr. Andrew Barnard (ME-EM/GLRC) is the co-PI on a project that has received a \$217,527 R&D co-op/joint agreement from the U.S. Geological Survey. The project is titled "USGS Sensor Support System." Christopher Roussi (Senior Res Scientist/Engineer, MTRI/GLRC) is the principal investigator (PI).



Dr. Ana Dyreson, P.E. (Asst. Prof., ME-EM) was invited by the Environmental Engineering department's Graduate Seminar to present her research on October 25 in the GLRC. Her presentation was titled: "Energy-water-climate interactions in changing power systems: multi-sector modeling approaches leveraging interdisciplinary teams."

Dr. Dyreson was selected by the Tech Forward Initiative on Sustainability and Resilience (ISR) as a Sustainable and Resilient Communities Faculty Research Fellow! Dyreson works in the realm of energy systems transitions and the energy-water-climate nexus. She will be relieved of one course for the fall 2022 semester in order to focus on developing and submitting research funding proposals that will enhance Michigan Tech's leadership in impactful sustainability and resilience research. Dyreson will be working on proposal submissions for NSF programs, including the NSF CAREER award program, and for the Alfred P. Sloan Foundation. Read more about the [Faculty Research Fellow](#) program in Tech Today.

Dr. Susanta Ghosh (Asst. Prof., ME-EM) and **Dr. Trisha Sain** (Asst., Prof., ME-EM) were selected as recipients of university grants intended to mitigate financial losses to research, creative, and scholarly work as a result of the pandemic. A total of twelve individuals were selected for these grants. The grants come from a collaboration among the ADVANCE Initiative, Provost's Office, VP for Diversity and Inclusion, VP for Research Office, and University Marketing and Communications.



Dr. Kartik Iyer's (Asst. Prof., Physics/ME-EM) research—with collaborators Janet D. Scheel, Jörg Schumacher, and Katepalli R. Sreenivasan—was cited in the [scientific background document](#) for the [2021 Nobel Prize in Physics](#). The paper, titled "Classical 1/3 Scaling of Convection Holds Up to $Ra = 10^{15}$," was published in the [Proceedings of the National Academy of Sciences](#) in 2020.

Dr. Iyer's article "The Area Rule for Circulation in Three-Dimensional Turbulence" was recently published in the [Proceedings of the National Academy of Sciences](#). In the article, Iyer demonstrates that the Area Rule—which posits that the circulation around any closed loop uniquely depends on its minimal area—holds to a good approximation but has shortcomings: namely that the minimal area alone is insufficient to quantify the circulation statistics.



Jacob Lundin (Research Engineer, ME-EM) was nominated by the department for this year's Making a Difference Rookie Award. This award recognizes staff members who have been an employee at Michigan Tech for two years or less who have made an impact in a short amount of time and who quickly became valuable members of the team by demonstrating an understanding of the goals and mission of the department/area.

Dr. Guy Meadows (Research Professor, ME-EM and GLRC) was quoted in a [Wisconsin Watch](#) story about Wisconsin landowners battling shoreline erosion on Lake Michigan.



Dr. Aneet Narendranath's (Senior Lecturer, ME-EM) data science notebook, which he presented at the Wolfram Technology Virtual Conference in October, is being published online by Wolfram Research. The topic of his presentation was "Learning Analytics tools for a STEM curriculum," which was presented under the "Future of Education" conference track. Dr. Narendranath's work was chosen as a "Staff Pick" as an "exceptional post."



Bob Page (Director of Lab Facilities, ME-EM) was nominated for this year's Making a Difference Outstanding Leader Award. This award recognizes staff leaders who create a positive and motivating work environment by recognizing others for their contributions, supporting work-life balance, encouraging professional development, and responding well under pressure. Bob was nominated by his direct staff reports.



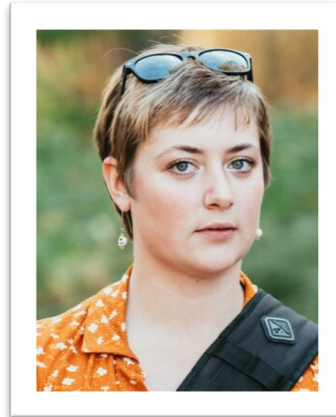
Mechanical Engineering Practice (MEP) session
- an MEP1 Reverse Engineering exercise



New ME-EM Staff



Jade Driscoll joined the ME-EM office staff in December as an Administrative Aide. Jade's most recent position was as an English Composition instructor at Alpena Community College. She holds an MA from Central Michigan University in English and Creative Writing, and she brings her writing, editing, and proofreading abilities to the position.



Meg Raasakka also joined the ME-EM office staff in December as an Administrative Aide. Meg previously worked at the Franklin Square Inn and as an assistant for Brockit Photography in Houghton. Meg brings to the position a dedicated work ethic, professional customer service, and an immense knowledge of the area.

Student Accomplishments/Awards

Lisa Downie (sr./ME) and **Eve Kaczowski** (sr./ME) were recognized as graduating seniors at Michigan Tech's chapter of Society of Women Engineers (SWE) end-of semester banquet. **Julia Westfall** (sr./ME) received a \$1,000 scholarship sponsored by Ruby & Associates Inc. and Developed Technologies, which recognizes students for their contributions to the SWE section and the University community.



Ayush Chutani (PhD student, ME-EM, MSME '17) and **Andrew Huston** (MS student, ME-EM) participated in the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow, Scotland as part of the Youth Environmental Alliance in Higher Education (YEAH), a multidisciplinary research and education network of students and faculty from 10 universities across four continents. Their graduate advisors are **Drs. Ana Dyreson** (Asst. Prof., ME-EM) and **Jason Blough** (Prof., ME-EM), respectively. Included in the event were six Michigan Tech students and three alumni who helped lead events and a press conference. Read the full story in the [Michigan Tech News](#) blog.



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Siddharth Gopujkar (PhD student, ME-EM), along with **Dr. Aneet Narandranath** (Sen. Lect., ME-EM), presented "Building a Suite of Learning Analytics tools for STEM education" at the Wolfram Technology Conference, October 13-16.



Hayden Huttula (sr./ME) was announced one of eight Michigan Tech football players that was named All-Conference by the GLIAC.



Hayden Huttula and **Michael Munderloh** (sr./ME) were recognized at the Michigan Tech football awards ceremony in December. Huttula received Offensive Lineman of the Year and Munderloh received the Daniel Dopp Memorial Special Teams Player of the Year.



Katy Pioch (sr./ME) was awarded a Women in Defense scholarship from the Women in Defense Michigan Chapter, recognizing her contribution to the field of defense and scholarship at Tech. Pioch is the current co-social chair and outreach director for SWE and current president of the SAE Clean Snowmobile Challenge Enterprise.



Prithvi Reddy, Ankith Ullal, Shabnam Konica, and **Chethan Reddy** (PhD students, ME-EM) were among

eleven recipients of the Grad School's Fall 2021 Finishing Fellowships. Their advisors are ME-EM professors **Darrell Robinette** (Asst. Prof.), **Youngchul Ra** (Assoc. Prof.), **Trisha Sain** (Asst. Prof.), and co-advisors **Rush Robinett** (Res. Prof.) and **Wayne Weaver** (Assoc. Prof.), respectively. Read more about each awardee in the [Grad School Newsblog](#).



Ponkrshnan Thiagarajan (PhD student, ME-EM), **Pushkar Khairnar** (MSME '20), and **Dr. Susanta Ghosh** (Asst. Prof., ME-EM) published a paper in the journal IEEE Transactions on Medical Imaging. They developed a machine learning model for detecting breast cancer from histopathology images—tissues and cells examined under microscope. The model can classify benign and malignant tumors from these images—and it can also evaluate the uncertainty in its predictions. The paper outlines their novel probabilistic machine learning model, which outperforms similar models and reduces Uncertainty in Breast Cancer Diagnoses. Read the full story at mtu.edu/news.



Mitch Timm (PhD student, ME-EM) and **Dr. Hassan Masoud** (Asst. Prof., ME-EM) were featured guest bloggers on Michigan Tech's research blog, Unscripted. You can read their guest post, titled "Why We Built a Bug Robot That Can Surf," [here](#).

Student Competitions and Team Awards

Sunit Girdhar (PhD student, ME-EM) was a finalist in this year's Three Minute Thesis competition, organized by the Graduate Student Government (GSG) of Michigan Tech. 28 participants competed on Nov. 4. This year's finals were streamed live on GSG's Facebook page and can be [watched online](#), or read more in [Tech Today](#).



The faculty and student team of **Tyler Miller** (MSME '20, BSME '18), **Joel Duncan** (Asst. Res. Eng., APSRC/ME-EM), **William Hansley** (BSME '20, Res. Test Eng., APSRC/ME-EM), **Dr. John Beard** (ME-EM Res. & Emeritus Professor), **Dr. Jeremy Worm** (Assoc. Director APSRC/ME-EM), and **Dr. Jeff Naber** (Professor, ME-EM, Director APSRC) won an ASME award for Most Valuable Technical Paper in Engine Design and Mechanical Development. Their paper, which was published in December 2020, was recognized at the 2021 Internal Combustion Engines Fall Technical Conference in October 2021. The paper is titled "[Design Actuation, Experimental Setup and Testing of a 4-Cylinder Gasoline Spark Ignited Variable Compression Ratio Engine](#)."

Alumni and Friends News, Accomplishments & Awards

Ahammad Basha Dudekula (PhD, ME-EM '20) and his graduate advisor, **Dr. Jeff Naber** (Prof., ME-EM), received the 2020 Vincent Bendix Automotive Electronics Engineering Award in recognition of the paper they had published in the SAE International Journal of Connected and Automated Vehicles. This annual award recognizes the author(s) of the best paper on the subject of automotive electronics engineering. The paper is titled "[Algorithm Development for Avoiding Both Moving and Stationary Obstacles in an Unstructured High-Speed Autonomous Vehicular Application Using a Nonlinear Model Predictive Controller](#)."

Mark Rakoski (BSME '95), Vice President, Advanced Engineering, for Mitsubishi Electric Automotive America, Inc., was one of three Michigan Tech alumni featured at the first session of the Innovators in Industry series on 25 October. The session was titled "The Future of Autonomous Vehicles & Mobility."

Read more about the session on the [COE Newsblog](#).

Christine Roberts (BSME '91), Senior Vice President & General Manager of software and services solutions at Poly, was one of four Michigan Tech alumni featured at the second session of the Innovators in Industry series on 1 November. The session was titled "The Computing Revolution." Read more about the session on the [COE Newsblog](#).

Nelson Sommerfeldt (BSME '04) returned to Tech as a visiting scholar to find out if solar heat pumps are a viable winter heating method in colder U.S. climates. He teamed up with Tech's solar photovoltaic experts on the project—and the researchers have published two new studies that show how heating without gas or propane is good for the environment and the Upper Peninsula's wallet. Learn more about the research—and why you should save the propane for your grill—in the [Michigan Tech News](#).



Jake Soter (EE/CPE '19, MBA '20) was on [Husky Innovate](#) for a virtual talk on Oct. 8th to discuss the founding of the "SwimSmart Warning Systems," which was co-founded with **Dr. Andrew Barnard** (Assoc. Prof., ME-EM). Read more about this Husky-built Beach Warning System in the [Michigan Tech News](#).

Ryan Thompson (BSME '19) came to campus on 25 October to showcase the old school bus he converted into a tiny mobile home. The bus is 40 feet long and has approximately 225 square feet of living space, and it is designed to be fully off-grid: it is equipped with solar power, 100 gallons of fresh water, a composting toilet, and propane appliances. Thompson purchased the bus in December 2020 and documents his experiences on social media. You can find him @seekingdiscovery on TikTok, Facebook, and YouTube, and @seeking_discovery on Instagram. Read the article in the [Michigan Tech Sustainability Blog](#).

Rebecca Ufkes (BSME '87), President of Ufkes Holdings, was one of four Michigan Tech alumni featured at the final session in the Innovators in Industry series held on 8 November. The session was titled "Entrepreneurship, Startups, and Venture Capital." Read more about the session on the [COE Newsblog](#).



Current Contracts and Grants

Bar-Ziv, Ezra (PI, ME-EM/APSRC): “Commercialization of Waste Torrefaction Technology Stage - 1”; sponsor: Zi Technologies; total award: \$101,384.



Blough, Jason (PI, ME-EM/AIM), and **Jim De Clerck** (co-PI, ME-EM): “Full Field Dynamic Response for Simulation”; sponsor: Honeywell Federal Manufacturing & Technologies, LLC; total award: \$94,312.



Dyreson, Ana (PI, ME-EM/GLRC), **Andrew Barnard** and **Jeremy Worm** (Co-PI's, ME-EM/APSRC), and **Xinyu Ye** (Co-PI, CEGE): “Mackinac Marine EV Solutions”; sponsor: Mackinac Economic Alliance; total award: \$100,000.



Ra, Youngchul (PI, ME-EM/APSRC): “Investigation on the North American Synthetic Fuels and Analysis of Their Chemical Reaction Characteristics”; sponsor: Hyundai America Technical Center Inc.; total award: \$135,000.



Wang, Zequn (Co-PI, ME-EM), **Paul Sanders** (PI, MSE/IMP), **Joseph Licavoli**, (Co-PI, MSE): “Hybrid Structured Nickle Superalloys to Address Price Volatility and Weld/ Weld Repair Based Supply Chain Issues”; sponsor: US Department of Energy; total award: \$400,000.



Blizzard catches big air above Michigan Tech’s Mont Ripley Ski Area.

University News & Awards

The Oct. 4 official opening of the Michigan Tech Grand Traverse Area research workspace was the focus of a [Traverse City Record-Eagle](#) news story, which was also picked up by [Yahoo! News](#).



The latest session of the [Health Research Institute’s COVID-19 Town Hall Series](#) was covered by [ABC 10](#).



Michigan Tech’s women’s volleyball team was the number 20 seed for the GLIAC Tournament and is No. 1 in the Midwest.



Michigan Tech came in at No. 3 on the Best Colleges in Michigan 2021 list in Canada’s [University Magazine](#).

The dedication of a new skate rental center at the John MacInnes Student Ice Arena in honor of [Charlotte Jenkins](#) and alumna [Cheryl DePuydt](#) was covered by [WJMN Local 3](#).



Michigan Tech’s football team won its 11th consecutive Miner’s Cup after defeating rival Northern Michigan University at the Superior Dome on 16 October.



Michigan Tech’s men’s cross country finished second at the Great Lakes Intercollegiate Athletic Conference Championships on 23 October, and the women’s cross country team finished fourth. **Sam Lange** (jr./ME) finished 13th for the men’s team.



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Students get hands-on experience participating in a reverse engineering exercise in an Mechanical Engineering Practice session.

Past Events

The **ME-EM Senior Recognition Banquet - Order of the Engineer Ceremony** was held on December 7 in the Memorial Union Ballroom. 68 seniors attended the ceremony. **Ms. Leah Lemanski** (BSME '95), Nexteer Automotive, Executive Director – NA EPS Applications, gave the keynote address.

The Order of the Engineer is a solemn obligation to oneself “to uphold devotion to the standards and the dignity of [the engineering] profession.” It is an obligation to turn to “practical use, the principles of science and the means of technology... to serve humanity by making the best use of earth’s precious wealth.”



"Your reputation is precious. It's hard to repair, and you must protect it at all costs."
Colleen L. Jones-Cervantes (BSME '83)

Husky Bites (ME-EM guests featured Oct to Dec, 2021)

Oct 18 - [Tiny House Design - Weather, Watts & Materials](#)

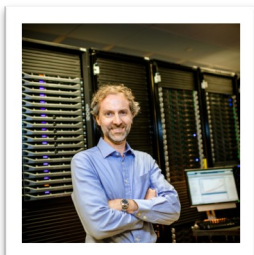
We learned how to build a Tiny House fit for the UP. Last spring, the students in Michigan Tech's Green Campus Enterprise had a Tiny House team, and MSE Prof. Paul Sanders was their client. The resulting Tiny House in Bete Gris is now mostly done. It is affordable, beautiful, sustainable, carbon-neutral/net zero, and cozy and warm for year round use, too. The team's consultant, green building design specialist and former instructor (and ME-EM alum), was **Dave Bach** (BSME '69). Read more: [COE blog post](#).



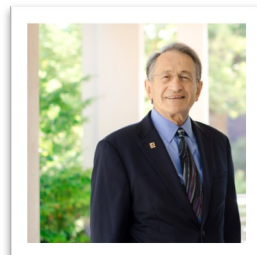
Dave Bach (BSME '69)
Owner, Dave Bach Designs,
Houghton, MI



Artist rendering of the Tiny House.
Credit: Sierra Braun



Dr. Greg Odegard, John O. Hallquist
Endowed Chair in Computational
Mechanics, ME-EM



Dr. Bill Predebon, J.S. Endowed
Professor and Dept. Chair, ME-EM

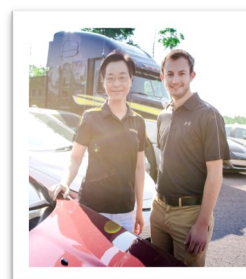
Nov 8 - [Manned Mars Missions: New Materials](#)

Dr. Greg Odegard (Prof., ME-EM) shared how his team of researchers at Michigan Tech go about developing new ultra-light weight structural materials to significantly cut fuel costs for sending humans to Mars—and beyond.

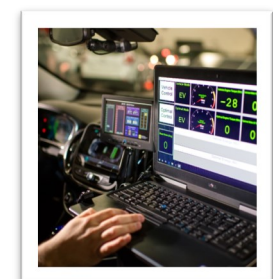
Dr. Bill Predebon (Prof. and ME-EM Dept Chair) joined the conversation. He has been at Michigan Tech since 1975 (46 years, and 24 years as department chair). Bill plans to retire this summer.

Nov 15 - [What's next, NEXTCAR?](#)

Dr. Bo Chen (Prof., ME-EM) and her former student **Dr. Joe Oncken** (PhD, ME-EM '20) talk about how engineers go about designing and creating the crucial elements of an all-electric vehicle ecosystem. Chen and her research team at Michigan Tech envision an all-electric future. They develop advanced control algorithms to build the nation's electric vehicle charging infrastructure and highly efficient hybrid electric vehicles, integrating with advanced sensing technologies that allow for predictive control in real time. These technologies enable the kind of vehicle-to-vehicle and vehicle-to-infrastructure communication that will reduce our nation's energy consumption.



Dr. Bo Chen and Dr. Joe Oncken
among the fleet, outside at the APSRC.



Michigan Tech's NEXTCAR research
delivers direct implementation of
engineering solutions, tested within
the realities of on-road conditions.