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ME-EM eNewsBrief, October-December 2020

Department of Mechanical Engineering-Engineering Mechanics, Michigan Technological University

ME-EM
Michigan Tech eNewsBrief
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Greetings from Dr. William (Bill) Predebon, J.S. Endowed Department Chair and Professor, 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, MEEM.

Dr. Craig R. Friedrich to retire January 31, 2021

After 23 years with Michigan Tech, and 13-1/2 years serving as the ME-EM Associate Chair and Director of Graduate Studies, Dr. Friedrich is gleefully looking forward to his upcoming retirement at the end of the month.

Since joining the Department in 1997, Dr. Friedrich was selected as Director of Michigan Tech's Multi-Scale Technologies Institute (MuSTI), honored as the Robbins Chair in Sustainable Design and Manufacturing, and selected as Associate Chair and Director of Graduate Studies. His support, guidance and service to the department has led to the exponential growth and national ranking of our Graduate Program, and enviable reputation and placement status for our graduate students.

Chair Predebon says "Dr. Friedrich has played a key leadership role in support of our vision to grow the graduate program. His wisdom, dedication, and leadership has been invaluable during his tenure in this position. Dr. Jason R. Blough has been selected as the Graduate Director starting February 1, 2021.

Dr. Ye "Sarah" Sun (Assoc. Professor, ME-EM) appointed the Lou and Herbert Wacker Professorship in Mechanical Engineering

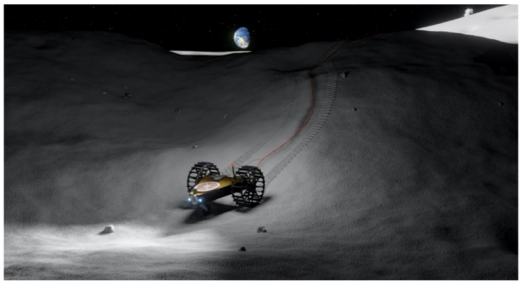
The professorship was created to retain and attract high-quality faculty who are at the top of their profession, can excite students to think beyond the classroom material, and know how to integrate their research into the classroom.

Dr. Sun was chosen for this position as she is recognized as an outstanding researcher in the area of wearable sensors, systems, and robotics and a respected member of the smart health community. You can learn more about Dr. Sun's research and outreach in this COE Blog article, check out her Human-Centered Monitoring Laboratory website, or read more about this rising star in Tech Today.

MTU Student Team wins NASA's BIG Idea Challenge!

Michigan Tech's BIG Idea Challenge student team, advised by ME-EM Assistant Professor Paul van Susante and led by PhD student Marcello Guadagno, took home NASA's First PlaceArtemis Award for their Tethered-permanently shadowed Region Explorer (T-REX) concept. The award was given to the team that demonstrated the best potential to contribute to and be integrated into an Artemis mission.

Watch the Michigan Tech BIG Idea Forum Presentation on YouTube. Explore the website of Dr. van Susante's Planetary Surface Technology Development Lab for a overview of their high tech facilities, a list of members, projects and publications.



Michigan Tech's tethered-permanently shadowed Region Explorer (T-REX). Providing power and data to rovers allowing exploration in PSRs of the moon in support of future Artemis missions.

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ME-EM Department - New Faculty & Staff

Dr. Kai Zhou joined the faculty of the ME-EM department this Spring semester as an Assistant Research Prof.

Dr. Zhou completed his post-doctoral research at the University of Connecticut with the Research of Advanced Manufacturing Processes Group. He also worked as a Quality Control Engineer at Keeney Manufacturing, and as a Research Engineer developing software prototypes with Bentley Systems, Inc.in Connecticut.

He earned his BS and MS degrees from Chongqing University in Automotive Engineering Mechanics, and his PhD in ME from the Univ of Connecticut.

Dr. Zhou's research expertise includes the fields of structural dynamics/solid mechanics and relevant structural health monitoring and design optimization applications using data-oriented methodologies.

Megan Jarvi joined the office staff this Fall as an Administrative Aide.

Ms. Jarvi has held various positions at Michigan Tech and outside of the university. She holds an associates degree in business administration from Gogebic Community College, and is working to complete a BBA in Financial Planning at Davenport Univ.

William E. Hansley joined the staff at the Advanced Power Systems Research Center (APS LABS) as a Research Test Engineer.

Mr. Hansley received his BSME from Michigan Tech in May of 2020. While working on his undergraduate degree, he also worked for the APS LABS as an hourly student employee.

His previous positions include: Program Management at Nemak in Sheboygan, WI; Mechanic at Torch Lake Service in Lake Linden; and Machinist at Milwaukee Broach Corp in Norway, MI.

Jacob D. Lundin (BSMET '18) joined the department as a Research Engineer.

Mr. Lundin earned a BSMET from Michigan Tech in December of 2018, and an Associates degree from Northcentral Wisconsin Technical College in 2011.

Prior to earning his BSMET degree, Jacob worked with the ME-EM department as a Temporary Lab Assistant and as a Shop Attendant at Michigan Tech's Advance Technology Development Complex (ATDC).

Alumni and Friends News, Accomplishments & Awards

Kishan Bellur (MSME '16, PhD '19) has accepted an Assistant Professor appointment with Manhattan College. We wish him a successful career in academics.

Kevin Ballinger (BSME '95) has been appointed to the board of directors of Silk Road Medical. The story was reported in several trade publications including BioSpace, Yahoo Finance and WallStreetonline (Germany).

Venkata Rajesh Chundru (MSME'17, PhD '19 ME-EM), secured his first patent this summer. His time and effort invested in the research process, along with continuous interaction and technical discussions with advisors **Gordon Parker** and **John Johnson (Professors, ME-EM)** were the most essential components of his success. Learn about his patent, and enjoy some of his stellar photography on Michigan Tech Unscripted.

Jeremy Egger, '10 (ME-EM) was the focus of the story "Meet Photonak, the meant-to-be Anchorage band no calamity could stop," in the Olean Times Herald. Egger is the lead singer of the Anchorage, Alaska band Photonak, which released its debut album "Tempered."

David Hill ('65, BSME), was featured in the story "Profiling Greatness: David Hill," in CorvSport.com about his career with GM, which led to his induction into the Corvette Hall of Fame.

Marty Lagina (BSME '77) JD, CEO at Heritage Sustainable Energy, winemaker, and star of "Curse of Oak Island" reality TV series on the History Channel was the special guest for the November 23 COE Husky Bites. Lagina and co-host **Bill Predebon (JS Endowed Dept Chair & Prof, ME-EM)** talked with COE Dean, Janet Callahan. Read the COE blog article Marty Lagina: Say YES to the Quest: Reflections, Energy and Adventure!

Jeff Thompson (BSME '12) was featured in the story "Michigan Outdoor Industry Featured in Virtual Happy Hour," in RV Business. Thompson, along with his brother, founded Shaggy's Skis.

ME-EM Faculty/Staff Awards/ Accomplishments

Dr. Nancy Barr (Prof of Practice, ME-EM), has been appointed associate editor for STEM for Prompt: A Journal of Academic Writing Assignments. Prompt is a biannual refereed online journal that publishes academic writing assignments accompanied by reflective essays. It publishes assignments directed at both undergraduate and graduate students from all academic disciplines. Prompt is an open-access journal, with all articles freely available to all readers. For information about submission, contact Barr or click on this link.

Dr. Barr recently participated in an invited panel on "Strategies for Industry Success in the New Normal," for the Institute of Electrical and Electronics Engineers (IEEE). The event was hosted by IEEE's Professional Communication Society (PCS) and focused on reflecting on challenges, discussing new strategies and learning from the experiences of fellow industry members and academic professional communication specialists as they adapt to online, hybrid or physically constrained new working environments. Barr is a senior member of IEEE and serves as secretary to the PCS board of governors.

Dr. Sajjad Bigham (Assistant Professor, ME-EM) and his team have advanced to the second phase of the American-Made Challenges Solar Desalination Prize contest for his project, "Sorption-Based ZLD Technology." The contest is sponsored by the Solar Energy Technologies Office (SETO) at the U.S. Department of Energy (DOE). Read more about in MTU's ICC Blog, or on the Energy.gov website: American-Made Challenges: Solar Desalination Prize

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Dr. Sajjad Bigham, Dr. Ana Dyreson and Dr. Hassan Masoud (Assistant Professors, ME-EM) were selected by Michigan Tech's VP for Research Office as recipients of Fall 2020 Research Excellence Fund Awards.

Dr. Jason Blough (Professor, ME-EM) has been elected to the Society of Automotive Engineers (SAE) Fellow Grade. The highest grade of SAE membership, the Fellow Grade recognizes important engineering, scientific and leadership achievements that enhance the status of SAE's contributions to the profession and to society. He will be honored at the Fellow Reception and Dinner in conjunction with the SAE's WCX World Congress scheduled to be held in Detroit April 13-15.

Dr. Chang Kyoung Choi (Professor, ME-EM) was honored at an award ceremony held in December during the 2020 Korean Society of Mechanical Engineers Annual Conference as corresponding author of a paper published in the Journal of Mechanical Science and Technology that was selected for the 2019 JMST Best Paper Award. The paper, entitled "Quantitative measurements of nanoparticle layer thicknesses near the contact line region after droplet drying-out" was authored by: Dong Hwan Shin, Dae Yun Kim, Chang Kyoung Choi and Seong Hyuk Lee.

Dr. Hassan Masoud (Assistant Professor, ME-EM) and **Saeed Jafari Kang (ME-EM PhD student)** have applied the lessons of the water strider and the soapy toothpick to develop tiny surfing robots that propel themselves forward by chemically manipulating surface tension. Read about the insights these microrobots offer into chemical propulsion at fluid interfaces on mtu.edu/news.

Dr. Guy Meadows (Res. Prof., MEEM and Director, Marine Eng Lab - GLRC) is mentioned in the story "Group thinks it has found proof of 10,000-year-old, Ice Age culture in Straits of Mackinac," in the Detroit Free Press. **He was** also mentioned in the article "An Atlantis might wait beneath the Great Lakes. And a group of nonscientists might have the proof." The article first appeared in the Detroit Free Press, but has been picked up by media outlets throughout the country, including USA Today and Yahoo News.

Dr. Meadows was cited in the article "Rocky future? Lake Michigan neighbors battle over boulders on the beach," in MLive.

Dr. Darrell Robinette (Assistant Professor, ME-EM) was quoted in an article about the collaborative effort between Michigan Tech and Borg Warner on a connective vehicle project funded by the Department of Energy. The article has gotten coverage from several publications around the nation, including Automotive World, North American Clean Energy and Yahoo Finance.

Spring 2021 Husky Bites Schedule

Student Competitions & Team Awards

Michigan Tech's AutoDrive Enterprise student team was awarded 2nd place at the SAE/GM AutoDrive Year 3 Virtual Competition that was held in late September. Students competing in the challenge have been tasked with designing, building and testing a fully autonomous vehicle. They started with a Chevy Bolt and outfitted it with sensors, control systems and computer processors to successfully navigate an urban driving course in automated driving mode. Only eight universities from the U.S. and Canada were selected to compete in this four-year competition. Tech's team is advised by Dr. Jeremy Bos (Asst Prof, ECE) and **Dr. Darrell Robinette (Asst Prof, ME-EM).** Check out the results from Years 1-3: AutoDrive Challenge - Results - AutoDrive™ Challenge. A final year remains before the ultimate winners rise to the top. Good luck Huskies!

Michigan Tech's student team won the NASA Breakthrough, Innovative and Game-changing (BIG) Idea Challenge! The challenge funded eight university teams to work on lunar payloads and study the Moon's darkest reaches. Michigan Tech's student team, led by **Marcello Guadagno (PhD student, ME-EM)** and guided by **Dr. Paul van Susante (Asst Prof, ME-EM)**, wants to take their rover technology into shadowy polar craters where the moon holds the closest source of extraterrestrial water. Getting to the frozen deposits and studying those polar craters are two aspects of NASA's Artemis program, which is aiming for a crewed moon landing in 2024. Check out the winning poster, presentation and technical paper, as well those of competing teams: 2020 Forum Results | Big Idea, a read the full story as it appears on the NASA.gov website.

Student Accomplishments & Awards

Masoud Ahmadi and **Sadaf Batool (PhD students, ME-EM)** both competed in the 2020 Three Minute Thesis (3MT) competition organized by Michigan Tech's Graduate Student Government (GSG). The event had record viewership with 174 people watching the event's live stream. You can watch all the presentations of the GSG's 3MT website, and read more about the competition in Tech Today. Masoud's advisor is **Dr. Sajjad Bigham (Asst Prof, ME-EM)**, and Sadaf is advised by **Dr. Mahdi Shahbakhti (Adj Prof, ME-EM).**

Nathan Ford (PhD student, ME-EM), current GSG President, was elected to serve a second term. His focus will be to expand support services to students who are not tuition-supported. Nathan is advised by **Dr. Brad King (Prof, ME-EM).**

Sunit Girdhar (PhD student, ME-EM) was quoted in the article "Missing Your Loved Ones Over The Holidays? International Students Offer A Few Lessons," on NPR and on public radio stations across the country. Sunit's advisor is **Dr. Andrew Barnard (Assoc Prof, ME-EM).**

Abby Hempy (MS student, ME-EM) and **Tucker Alsup (Asst Res Eng, ME-EM** and BSEE '17) worked together to turn a 1998 BMW 528i into a racing "art car". They drove to Gainesville, Florida to compete in the Grassroots Motorsports $2,000 Challenge in October. Read more about this Keweenaw gem in articles posted in: Automotive Women's Alliance (AWA) Foundation, MattStone-Cars.com, and The Wall Street Journal. Abby's advisor is **Dr. Jason R. Blough (Prof, ME-EM).**

George Ochieze, (PhD student, ME-EM and MS student in Mechatronics) was mentioned in a COE blog article about a new Career and Technical Education program for high schoolers in the area of Mechatronics. The program is offered through a partnership between Michigan Tech and the local school district. George is one of the interdisciplinary instructors of the program that currently has ten students from the local area enrolled.

Katie Pioch (jr. ME), section president of Michigan Tech's Society of Women Engineers (SWE) was quoted in a story in Tech Today about the chapter's mission to give back to the community and to spark youth interest in STEM-related fields. Read about our SWE chapter on the COE Blog.

The research of **Noah Skrzypczak (sr. ME)**, Nagendra Tanikella (PhD student, MSE) and Joshua Pearce (Prof, MSE) on a high-temperature low-cost open-source 3-D printer was covered widely by the technical additive manufacturing press including 3D Natives, 3D Printing Industry and Fabbaloo. Their open-source 3D printer research was also picked up internationally - most notably by Sohu in China the 6th most visited website globally.

Mitch Timm (PhD student, ME-EM) was nominated to represent Michigan Tech in the Midwestern Association of Graduate Schools (MAGS)/ProQuest Distinguished Thesis Award competition. His research consists of the study of complex fluids and transport phenomena; studing the interactions of fluids with solid objects and how certain materials are transported within fluids by utilizing the combined tools of theoretical (mathematical), computational (computer simulation), and experimental analysis. **Dr. Hassan Masoud (Asst Prof, ME-EM)** is his advisor. Read more in the Graduate School blog, or in Tech Today.

Student Accomplishments & Awards *(con't.)*

Upendra Yadav and **Revanth Mattey (ME-EM PhD students)** won the award for the most viewed video-presentation at the Society of Engineering Sciences (SES 2020) conference' 2020. Their work contains a novel formulation through which they can simulate large scale samples of graphene and CNTs under various loading conditions, "Mechanical Instability of Multilayer Graphene and the Effects of Substrate". **Dr. Susanta Ghosh (Assistant Professor, ME-EM)** is their advisor.

University News & Awards

Michigan Tech is one of the top two universities in Michigan and among the best in the country according to rankings by the website WalletHub released in October. WalletHub put 500 institutions on its "2021's College and University Rankings." Michigan Tech was ranked No. 138 on the overall list up eight spots from last year's ranking.

The College of Engineering rolled out 16 new online graduate certificate programs in CEE, ME-EM, GMES, and Biomed Eng. Students take three courses to earn a certificate - a deeper dive into the subject area. Students can also sign up for a single course without committing to a certificate. Working professionals are invited to join these online courses, many of them synchronously offered, with regularly scheduled class meeting times.

The new 9-credit ME-EM certificates are in: 1) Aerodynamics; 2) Computational Fluid Mechanics; 3) Dynamic Systems; 4) Vehicle Dynamics; 5) Quality Engineering. The list of currently available online courses is located at: https://www.mtu.edu/online/courses-registration/. Read the full story on the COE Blog.

Michigan Tech's Great Lakes Research Center and the Keweenaw Research Center (KRC) were mentioned in the article "Mobility Startups Get State Funding," in MITECH News.

Michigan Tech's celebration of midyear graduates was covered by the Daily Mining Gazette.

President Rick Koubek was interviewed in the story "Michigan Tech honors midyear graduates with online celebration," on WLUC TV6.

Michigan Tech was mentioned in the story "Pulp Market 2020 : Size, Share & Trend | Industry Analysis Report," in Murphy's Hockey Law.

A study at Michigan Tech was cited in the story "Distributed energy plays a critical role in Michigan's carbon-neutral goal," in Energy News.

U.S. News and World Report's annual rankings of colleges and universities has been released, and once again, Michigan Tech appears on lists of several categories including: National Universities, Best Colleges for Veterans, Best Value Schools, Top Performers on Social Mobility, and Top Public Schools. Information on the U.S.News rankings of Colleges and Universities can be found here.

The Fall 2020 Virtual Career Fair - Forged by Nucor, was a success. In excess of 250 companies met with more than 2,000 Michigan Tech Students via our Career Fair Plus Platform. There were more than 11,000 individual appointments that occurred over the 18 hours of the career fair.

The Great Lakes Research Center (GLRC) at Michigan Tech is the newest PlanetM testing facility partner as a resource available for companies from across the globe to test and deploy connected and automated vehicle technologies on Michigan's state-of-the-art proving grounds, in the National Airspace System (NAS) or in a freshwater ecosystem. Read the full press release at mtu.edu/news.

The Great Lakes Research Center was featured in the story "Michigan sponsors unmanned boat research," in State Scoop. The story was also featured in mitechnews.com

COVID-19 testing at the Michigan Tech Gates Tennis Center covered by WLUC TV6 in Marquette was picked up by other media outlets, including newsjatt.com. The testing was also covered by the Daily Mining Gazette.

Michigan Tech was ranked as having the best return on investment (ROI) of any public college in Michigan by Stacker. Michigan Tech came out on top of the 15 public colleges or universities in Michigan considered for the ranking. The article's author John Harrington said of MTU, "Students at the school develop printable 3D prosthetic hands created from recycled plastic to help kids in Nicaragua, create quieter snowmobiles and launch orbiting nanosatellites."

Stacker considered public colleges that primarily issue bachelor's degrees. "The college with the highest 40-year ROI in every state was included. The study incorporated net present value, that calculates future earnings based on income ten and forty years, respectively, after starting college."

ME-EM Department News

We are excited to see Michigan Tech's Mobile Lab (developed and operated by the ME-EM department) featured on one of our industry partner's websites! In a new addition to their public website, Dana highlights Global Technology Centers, which includes a picture of the Mobile Lab, and an article entitled "Why Dana is Forging Long-term Academic Partnerships".

The article focuses on academic partnerships and how they are beneficial in providing career opportunities to students and talent to industry. In the article there is a brief description of how Michigan Tech's Mobile Lab benefits Dana by providing their employees with on-site, targeted professional development short-courses related to electric vehicles.

Class is in session - inside Michigan Tech's Mobile Lab, training engineers at their corporate location.

Current Contracts & Grants

Blough, Jason (PI, ME-EM / APSRC); Jim De Clerck, Chuck van Karsen (co-PIs, ME-EM); "Full Field Response for Simulation and Prediction"; sponsor: Honeywell Federal Manufacturing & Technologies, LLC; award: $70,000.

Blough, Jason (PI, ME-EM / APSRC); Jim De Clerck, Chuck van Karsen (co-PIs, ME-EM); "Time-Domain & Multi-Axis Resonant Plate Shock Test"; sponsor: Honeywell Federal Manufacturing & Technologies, LLC; award: $148,000.

Naber, Jeffrey (PI, ME-EM / APSRC); Brian Eggart (co-PI, ME-EM); "Integration and Test of a Condenbine System with ISB Engine"; sponsor: Nostrum Energy, LLC; award: $19,815.

Robinette, Darrell (PI, ME-EM / APSRC); Jeff Naber, Bo Chen, Jung Yun Bae (co-PIs, ME-EM); Chris Morgan (co-PI, Pavlis Honors College); "Energy Optimization of Light and Heavy-Duty Vehicle Cohorts of Mixed Connectivity, Automation and Propulsion System Capabilities Via Meshed V2V-V2I and Expanded Data Sharing"; sponsor: Department of Energy; award: $1,999,951.

Sain, Trisha (PI, ME-EM / MuSTI); "A Multiscale Multiphysics Computational Modeling and Experimental Study for Thermo-Oxidation in Polymers"; sponsor: US Dept of Defense - Air Force Office of Scientific Research; award: $401,530.

Worm, Jeremy (PI, ME-EM / APSRC); Jeff Naber, Joel Duncan, Tucker Alsup, William Hansley (co-PIs, ME-EM); "Direct Injection of Water as an Enabler for High Brake Mean Effective Pressure"; sponsor: Nostrum Energy, LLC; award: $45,423.

Yang, Yongchao (co-PI, ME-EM), Lui, Zhen (PI, CEE), Tim Colling, (co-PI, CEE) Michael Billmire (co-PI, MTRI); "Autonomous Winter Road Maintenance Decision Making Enabled by Boosting Existing Transportation Data Infrastructure with Deep and Reinforcement Learning"; sponsor: US Department of Transportation, Federal Highway Administration; award: $689,239.

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opportunities abound…!

We continue to be amazed at what some of our Senior Capstone Design teams are accomplishing through this unique period. Quite efficiently combining both off-campus and on-campus students on individual projects, these teams have come through with novel and productive solutions through uniquely productive workflows. Ranging from field service tools for locomotives, to saw blade test rigs, to COVID-19-killing UV lights, to increasing design efficiency for rack-and-pinion steering gear mechanisms, these teams continue to impress.

Twenty projects are at their halfway point right now, in very good shape for concluding in April. And, this group has tough but equally rewarding challenges in front of them.

We are already at capacity for January-2021 projects, but please get in touch if you're interested in learning more or getting involved in what is likely the most dynamic senior design program in America. Another group of projects will be getting underway in September *!!!*

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