E R S

AT NORTH CAMPUS

November 19, 2021

ENGINEERING RESEARCH SYMPOSIUM

SCHEDULE BOOK

Research.
Networking.
Professional Development.


#UMichERS
THE BIGGEST RESEARCH SHOWCASE IN THE COLLEGE OF ENGINEERING

16TH ANNUAL

Engineering Research Symposium

M ERS

Contents

OFFICE OF STUDENT AFFAIRS

Debby Covington	Director of Partnerships, Outreach and Retention
Tiffany Porties	Assistant Director of Partnerships, Outreach and Retention
Andria Rose	Coordinator of Graduate Programs
Shira Washington	Recruitment Coordinator
Leslie Cypert	Administrative Assistant

Fall 2021 ERS Co-Chairs

Joshua Sodicoff, Marisol Garrouste, Shreya Agrawal

Planning Committee

Towner Research
Daniela Tavarez
Mahnaz Vahdat
Niloufar Salehi
Sumit Asthana
Zhongzhu Chen

Advanced Poster
Chen Li
Jiaxin Mao
Jukai Zhou
Zaira Pagan

Emerging Poster
Daniela Tavarez
Kelly Crumley
Naihao Deng

Undergrad Poster
Amogh Angadi
Debbie Dong
Elif Sensoy
Jeanette Shen
John Yin
Kaelyn Whaley
Lucy Covello
Mackenzie Darling

Judging
Ankush Gadekar
Carson Denman
Max Toothman
Mira Chaplin
Niloufar Salehi
John Yin

Logistics
Dinesh Raj
Kaelyn Whaley
Rohit Kamath
Shanni Yu
Shuqing Zhang

Publicity
Anudeep Titti
Catalina Garza
Pritha Pal
Ragini Murthy

Additional Sessions
Amogh Angadi
Preeti Raj
Rohit Damodar
John Yin

Sponsors

MICHIGAN ENGINEERING
UNIVERSITY OF MICHIGAN

in2being LLC

MICHIGAN ENGINEERING
ASSOCIATE DEAN FOR RESEARCH

Sandia National Laboratories

COLLEGE OF ENGINEERING
CENTER FOR ENTREPRENEURSHIP

FedEx Office

MAKE AN IMPACT WITH YOUR RESEARCH

WHAT TO DO NEXT WITH YOUR RESEARCH?

ENHANCE YOUR DEGREE

The Center for Entrepreneurship offers a broad range of curricular and extracurricular programs.

From one-on-one mentoring in ideation to full de-risking and funding support, we have a nationally recognized staff of instructors, trainers, and mentors that make the transition from lab to market a smooth, efficient, and valuable process.

The CFE seeks to inspire and transform the Michigan community into entrepreneurial thinkers and doers. An innovation hub where the ideas, people, resources, and technology meet and create the future, we invite you to join us.

PATHWAYS TO IMPACT
WEBINAR SESSIONS OPEN TO ALL

Webinars covering topics like: roles in innovation and PhD career trajectories, Intellectual property basics, Innovation funding sources, networking to build a team, Identifying ideas worth pursuing.

cfe.umich.edu/icorps

PROFESSIONAL SKILLS
ENTR COURSES OPEN TO ALL

ENTR courses are open to students from all schools/colleges. Learn from U-M STEAM graduates, technical founders and experienced entrepreneurs.

cfe.umich.edu/courses

GRADUATE CERTIFICATE
COMPLEMENT YOUR DEGREE

A 12-credit certificate in Innovation & Entrepreneurship open to currently registered and degree-seeking Ann Arbor campus Masters, Ph.D. and professional students.

cfe.umich.edu/certificate

COMMERCIALIZATION
I-CORPS

World class training programs and NSF funding for identifying applications and broader impacts of research beyond your lab and forging industry partnerships

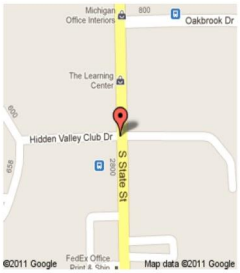
cfe.umich.edu/icorps

E+I MEETUPS
SEEK, DISCOVER, AND CONNECT

Bi-monthly meetups for all students to make connections, build teams, and receive advice on ideas. Expand your innovation network and meet peers in the E & I community.

cfe.umich.edu/ecosystem-convening

Ann Arbor Area FedEx Offices



24-Hour Location 2800 S State St, Ann Arbor, MI 48104

Phone: 734.665.2400 E-mail- usa0842@fedex.com

505 East Liberty Street, Ann Arbor, MI 48104

Phone: 734.761.4539 E-mail: usa0411@fedex.com

2609 Plymouth Rd, Ann Arbor, MI 48105

Phone: 734.996.0050 E-mail- usa0465@fedex.com

3354 Washtenaw Rd, Ann Arbor, MI48104

Phone: 734.975.0496 E-mail- usa1781@fedex.com

Schedule

Presenter Registration and General Information
8:00 am - 3:00 pm | Tishman Hall, Beyster Building

Judge Registration and Lounge
8:00 am - 3:00 pm | Chrysler Center Lobby

Welcome Remarks
9:00 am - 9:20 am | 1670 Beyster Building

Keynote Address - Dr. Tamas Gombosi
9:20 am - 10:00 am | 1670 Beyster Building

Coffee Break
10:00 am - 10:30 am | Tishman Hall, Beyster Building

Sponsor Booths
10:00 am - 2:00 pm | Duderstadt Center Atrium

Research Proposal Competition
10:30 am - 11:30 am | 1180 Duderstadt Center

Undergraduate Student Research Poster Session
10:30 am - 12: 30 pm | Duderstadt Center Atrium

Richard and Eleanor Towner Prize - Poster Session I
10:30 am - 11:15 am | Duderstadt Center Connector

Richard and Eleanor Towner Prize - Poster Session II
11:15 am - 12:30 am | Duderstadt Center Connector

Scientific Visualization Competition
11:30 am - 12:30 pm | 1180 Duderstadt Center

Schedule

Lunch
12:00 pm - 1:30 pm | Tishman Hall, Beyster Building

Emerging Graduate Student Research Poster Session
1:30 pm - 3:30 pm | Duderstadt Center Atrium

Advanced Graduate Student Research Poster Session
1:30 pm - 3:30 pm | Duderstadt Center Connector

Richard and Eleanor Towner Prize - Lightning Talks I
1:30 pm - 2:45 pm | Chesebrough Auditorium

Richard and Eleanor Towner Prize - Lightning Talks II
2:45 pm - 4:30 pm | Chesebrough Auditorium

Sandia National Laboratory Info Session
2:30 pm - 3:30 pm | 1180 Duderstadt Center

Center for Entrepreneurship Info Session
3:30 pm - 4:30 pm | 1180 Duderstadt Center

Networking with Judges and Alumni
2:30 pm - 4:30 pm | Chrysler Center Lobby

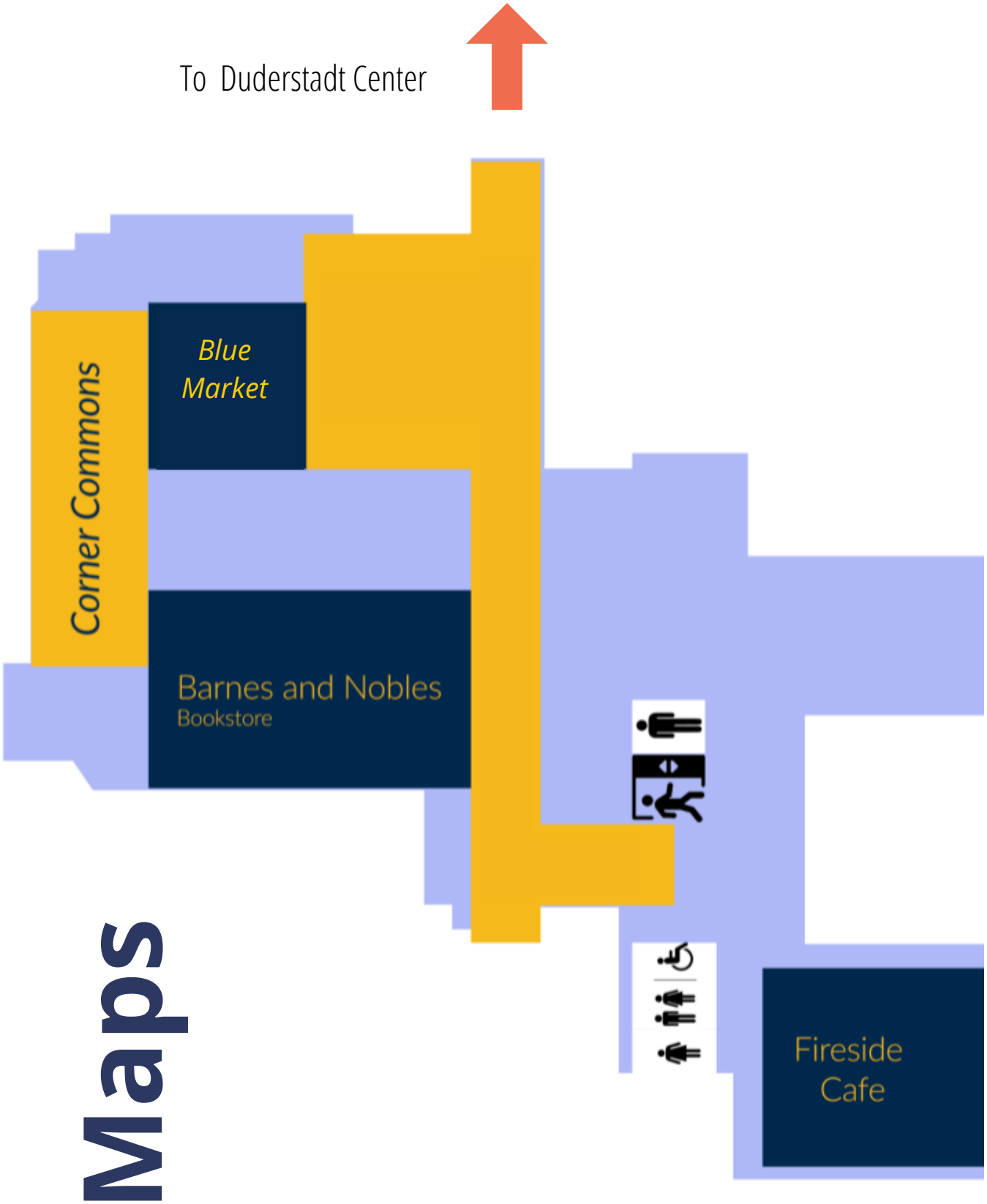
Award Ceremony
5:00 pm - 6:00 pm | 1670 Beyster Building

Awards Reception
6:00 pm - 7:30 pm | Tishman Hall, Beyster Building

DUDERSTADT CENTER

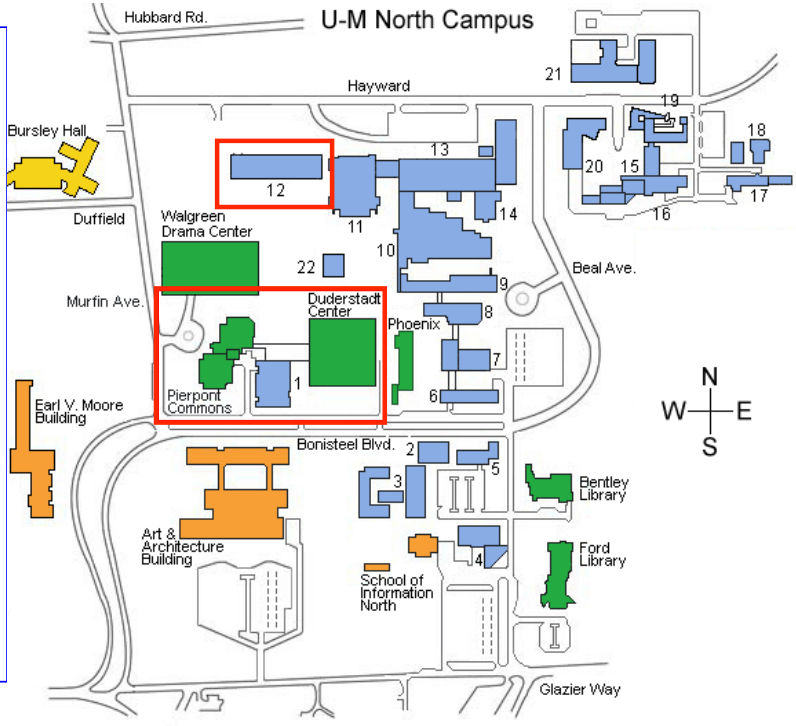
Maps

Pierpont Commons



Maps

1. Chrysler Center
2. Gerstacker Building
3. Engineering Research (ERB)
4. Lurie Biomedical Engineering
5. Interdisciplinary Research (IRB)
6. Cooley Building
7. Industrial Operations (IOE)
8. Lurie Center (LEC)
9. Lay Automotive Lab
10. Electrical Engineering and Computer Science (EECS)
11. HH DOW Building
12. Bob and Betty Beyster Building (BBB)
13. GG Brown Laboratory



14. Environmental & Water Research Engineering (EWRE)
15. Engineering Programs Building
16. Wilson Student Team Center
17. Naval Architecture & Marine Engineering (NAME)
18. Radiation Sciences Lab
19. Wind Tunnel
20. François-Xavier Bagnoud Building (FXB)
21. Space Research (SRB)
22. Ann and Robert H. Lurie Tower

M ERS

RICHARD AND ELEANOR TOWNER PRIZE

FOR OUTSTANDING Ph.D. RESEARCH

Poster Session 10:30 am - 12:30 pm
Presentations 1:30 pm - 4:30 pm

Share your ERS moments using #UMichERS

@ersuofm

@ErsuMich

Poster Session : Duderstadt Center Connector
Presentations : Chesebrough Auditorium

DEPARTMENTS	ADVISORS	PARTICIPANTS
ChE	Greg Thurber	Jaques Esterhuizen
NERS	Igor Jovanovic	Emily Vu
		Lauren Finney
MSE	Manos Kioupakis	Alex Kate Haley
		Sieun Chae
BME	Tim Bruns	Robert Graham
		Claire Tomaszewski
ECE	Heath Hoffman	Glen Chou
		Zhe(Ashley) Jian
ROB	Brent Gillespie	Michael Gonzales
IOE	Marina Epelman	Luze Xu
		Xian Yu
CEE	Yafeng Yin	Gaang Lee
		Yi Zhu
		Kathryn Langenfeld
		Cheng Yang
ME	Kazu Saitou	Sajedeh Nasr Esfahani
		Nazanin Farjam
ISD	Nigel Meville	Grace Burleson

Nominees

Machine-Learning Interpretable Chemisorption Models for Alloys (POSTER # 1001)
Jacques A. Esterhuizen, Bryan R. Goldsmith, Suljo Linic

A Condensed History Model for Electron Transport in Stochastic Media (POSTER # 1002)
Emily H. Vu, Brian C. Kiedrowski

Ultrashort-Pulse Laser Filament-Induced Fluorescence of Chlamydomonas reinhardtii for Identifying Uranium Stress (POSTER # 1003)
Lauren A. Finney, Nicholas Peskosky, Patrick J. Skrodzki, Milos Burger, John Nees, and Igor Jovanovic

Design and Applications of Surfaces for Solid Fouling Mitigation (POSTER # 1004)
Alex K. Halvey, Anish Tuteja

Theoretical discovery and experimental synthesis of ultra-wide-band-gap semiconductors with ambipolar doping for power electronic applications (POSTER # 1005)
Sieun Chae, Kelsey Mengle, Kyle Bushick, Nocona Sanders, Nguyen Vu, Jihang Lee, Pierre F. P. Poudeu, Hanjong Paik, John T. Heron, Emmanouil Kioupakis

Mechanisms of action of dorsal root ganglion stimulation for chronic pain (POSTER # 1006)
Robert D. Graham, Scott F. Lempka

Engineering the Ovarian Microenvironment and Deciphering Folliculogenesis in a Biomimetic Matrix (POSTER # 1007)
Claire Tomaszewski, Ariella Shikanov

Safely Learning Robotic Tasks from Human Demonstrations (POSTER # 1008)
Glen Chou, Necmiye Ozay, Dmitry Berenson

Improved Operational Reliability of AlSiO gate dielectric on β-Ga2O3 for High Power Switching Applications (POSTER # 1009)
Zhe (Ashley) Jian, Islam Sayed, Wenjian Liu, Subhajit Mohanty, Elaheh Ahmadi

Stimulation of Regenerative Peripheral Nerve Interfaces for Referred Sensation in the Phantom Limb (POSTER # 1010)
Michael Gonzalez, Cynthia Chestek, Deanna Gates

Gaining or Losing Perspective for Piecewise-Linear Under-Estimators of Convex Univariate Functions (POSTER #1011)
Jon Lee, Daphne Skipper, Emily Speakman, Luze Xu

Multistage Distributionally Robust Mixed-Integer Programming with Decision-Dependent Moment-Based Ambiguity Sets (POSTER # 1012)
Xian Yu, Siqian Shen

Wearable Biosensor-based Framework to Monitor Human Psychophysiological Responses to Construction and Built Environments (POSTER #1013)
Gaang Lee, SangHyun Lee

Analysis, Design, and Fabrication of Micro-Origami for Controllable Motions and Complex Functions (POSTER # 1014)
Yi Zhu, Mayur Birla, Joonyoung Yu, Kenn R. Oldham, Evgueni T. Filipov

Exploring viral community dynamics through wastewater treatment with a quantitative metagenomic method (POSTER # 1015)
Kathryn Langenfeld, Melissa Duhaime, Krista Wigginton

Driven Approaches to Improve Operations of Biological Processes in WRRFs: Analytics, Model and Control (POSTER # 1016)
Cheng Yang, Glen T. Daigger, Evangelia Belia, Branko Kerkez, Raj Rao Nadakuditi

A Simple Method for Human Primordial Germ Cell Development in a Synthetic Embryonic Niche (POSTER #1017)
Sajedeh Nasr Esfahani, Yi Zheng, Agnes Irizarry, Yue Shao, Jianping Fu

An additive nano-manufacturing platform combining electrohydrodynamic jet printing and area selective atomic layer deposition (POSTER # 1018)
Nazanin Farjam, Tae H. Cho, Christopher R. Allemang, Rebecca L. Peterson, Neil P. Dasgupta, Kira Barton

ncorporating Contextual Factors into Engineering Design Decisions (POSTER #1019)
Grace Burleson, Kentaro Toyama, Kathleen Sienko

UNDERGRADUATE STUDENT RESEARCH

POSTER SESSION

10:30 am - 12:30 pm

Share your ERS moments using #UMichERS

@ersuofm

@ErsuMich

Duderstadt Center Atrium

Accounting for Variations in Speech Emotion Recognition with Nonparametric Hierarchical Neural Network (#500)
Lance Ying, Amrit Romana, Emily Mower Provost

Gaussian Process Constraint Learning for Safe Planning from Demonstrations (#800)
Hao Wang, Glen Chou, Dmitry Berenson

Assessing the Effect of a Powered Ankle Exoskeleton on Human Agility (#110)
Katelyn King, Sarah Gonzalez, Dr. Leia Stirling

Microfluidic Isolation and Quantification of Tumor-Derived Extracellular Vesicles (#310)
Henry McEacheron, Nna-Emeka Onukwugha

Surface plasmon polariton excitation from a transient ultrafast laser-excited dielectric function (#510)
Rishabh Kothari, Ben Torralva, Alex Sarracino, Steven Yalisove

Implementation of data conversion and evaluation programs to analyze neural network results (#610)
Daphne Tsai

Optimizing Plant Operations by Using Particle Counters to Detect Cryptosporidium-sized Particles (#710)
Tarrik Quneibi, Rebecca Lahr

Removal of DBPs via Plasma-Based Water Purification (#910)
Jordon Horton, Joseph Groele, Roxanne Pinsky, John Foster, Alex Szczuka

Generalizable Design of Microwell Hydrogels for Epithelial Cell Organoid Culture (#120)
Vikram Bala, Samantha Lukpat, Claudia Loebel

Topologically-Informed Atlas Learning (#220)
Thomas Cohn, Nikhil Devraj, Odest Chadwicke Jenkins

Investigating Unsupervised Learning Methods to Select Fair Samples of Large Unlabelled Image Datasets (#320)
Kevin Wang, Yuqing Qiu, Ruiyu Li, Sophia Johnecheck, Carol Flannagan

Depletion of Neutrophils Prevents Tumor Recurrence in Murine Lung Cancer Model (#420)
Jason Manassa, Jennifer M. Lee, Kristena Y. Abdelmalak, Carlos Espinoza, Marina Pasca di Magliano, Stefanie Galban

Identifying the V2+/V3+ Reaction Intermediate on Metals by Surface Enhanced Raman Spectroscopy (#330)
Daniel Pert, Harsh Agarwal, Bryan Goldsmith, Nirala Singh

Scenario Generation for Simulation-based Testing and Validation of Autonomous Vehicles (#730)
Nikhil Punshi, Dr. Arpan Kusari

Myofibroblast activation in cardiomyocyte-cardiac fibroblast bilayer tissues on tunable synthetic fibrous matrices (#830)
Darcy D. Huang, Samuel J. DePalma, Austin E. Stis, Brendon M. Baker

Exploring the 3D coral-like microstructure of fine eutectic colonies in laser surface remelted Al-Si alloy (#240)
Xinyi Zhou, Paul Chao, Ashwin J. Shahani

Stretchable Emission Layer for Wearable Blood Oxygen Monitoring Device (#740)
Arianna Q. Wu, Hazel Mohamedali, Tony Zheng, Xiwen Gong

Ground Contact Sensing for Contact Gaits Mechapod (#840)
Sandilya Sai Garimella, Dr. Shai Revzen

M ERS

EMERGING GRADUATE STUDENT RESEARCH

POSTER SESSION

1:30 pm - 3:30 pm

Share your ERS moments using #UMichERS

@ersuofm

@ErsuMich

Duderstadt Center Atrium

Heterogeneous human-robot task allocation based on bi-directional trust (#600)
Arsha Ali, Hebert Azevedo-Sa, Dawn M. Tilbury, Lionel P. Robert Jr.

The effect of aspect ratio on the mechanical behavior of Li metal in solid-state cells (#700)
Catherine G. Haslam, Jeffery B. Wolfenstine, Jeff Sakamoto

Safety-Critical Control with Sector-Bounded Uncertainties using Robust Control Barrier Function (#900)
Shih-Chi Liao, Jyot Buch, Peter Seiler

Internal reinforcement adaptive dynamic programming for optimal contain-ment control of unknown continuous-time multi-agent systems (#210)
Jiefu Zhang, Zhinan Peng, Jiangping Hu, Rui Luo, Bijoy K. Ghosh

Compressible Multifluid Navier-Stokes Equations via the Discontinuous Galerkin Method (#520)
William White, Eric Johnsen

3D In-situ Intragranular Grain Mapping in NiTi Shape Memory Alloy Using High-Energy Diffraction Microscopy High-Energy Diffraction Microscopy (#620)
Wenxi Li, Sangwon Lee, Myles Mckenna, Ashley Bucsek

Quantifying Variability in Li-ion Battery Materials using Single Particle Electrochemistry (#820)
Lindsay Gubow, Diana Kim, Yiyang Li

Design of Ni-based Superalloys for Fusion Energy through Life Cycle Analysis (#920)
Mackenzie Warwick, Dr. Kevin G. Field, Dr. Paul W. Humrickhouse

Applying Machine Learning to High-Energy Diffraction Microscopy Experiments and Data Processing (#130)
Yuefeng Jin, Ashley T. Lenau, Reeju Pokharel, Steve Niezgoda, Ashley Bucsek

In-situ multiscale investigation of recovery, recrystallization and grain growth using 3D X-ray diffraction microscopy (#230)
Sangwon Lee, Tracy Berman, Can Yildirim, Carsten Detlefs, John Allison, and Ashley Bucsek

Oxygen Barrier Properties of Polyisobutylene-Grafted Graphene Oxide in a Styrene-Butadiene-Styrene Matrix (#430)
Carlos A. Figueroa Morales , Dana M. Pinson, Moustafa Zagho, BeiBei Chen, Luke Galuska, Xiaodan Gu, Sergei Nazarenko, Robson Storey, Derek Patton

Experimental data collection for validation of progressive damage model of laminated composites (#630)
JJ. Fernando Rojas Sanchez, Anthony M. Waas

Optimizing Connected Vehicle Technology using WSN, ML, and Trajectory Planning (#930)
Bhavya Sekhani, Arihant Jain

Improving Tolerogenic Outcomes in Food Allergy using Biodegradable, Allergen-loaded Nanoparticles (#640)
Michael Saunders, Laila Rad, Kate Griffin, Jessica O'Konek, Lonnie Shea

Non-bleaching Nanoscopic Labeling of Cellular Actin (#150)
Di Zu, Somin Eunice Lee

Growth and characterization of First-Epitaxial Thin Film of low-Bandgap MnV_2O_4 (#250)
Kamal Rudra, Pramod Ravindra, Shwetha Bhat, Sushobhan Avasthi

An Integrated Vibro-Acoustic Modulation Technique For Bolt Loosening Monitoring (#350)
Minghao Chen, Yanfeng Shen

ADVANCED GRADUATE STUDENT RESEARCH

POSTER SESSION

1:30 pm - 3:30 pm

Share your ERS moments using #UMichERS

@ersuofm

@ErsuMich

Duderstadt Center Connector

Image-Based Air Quality Forecasting through Multi-Level Attention (#100)
Tony Zhang, Robert P. Dick

Design and Optimization of Periodic Porous structure of Electromagnetic Metamaterial Absorbers (#200)
Kanat Anurakparadorn, Alan Taub, Eric Michielssen

A Nonaqueous Redox-Matched Flow Battery with Charge Storage in Insoluble Polymer Beads (#400)
Dukhan Kim, Melanie S. Sanford, Thomas P. Vaid, Anne J. McNeil

The effects of aluminum composition on the microstructural and electrochemical properties of lithium lanthanum zirconium oxide (#410)
Alexandra Moy, Grit Haeuschen, Martin Finsterbusch, Jeff Sakamoto

A Fully Automated Single-Board Computer Generator Using Neural Networks (#810)
Morteza Fayazi, Ronald G. Dreslinski

A Simulation-based Uncertainty Quantification Scheme for Reliability Assessment of Structures Subjected to Extreme Winds (#720)
Srinivasan Arunachalam, Seymour M.J. Spence

Pseudo-4D characterization of growth and form of Al-Al2Cu eutectic colonies (#530)
Paul Chao, George R. Lindemann, Ashwin J. Shahani

Scalable architectures for high frequency and very high frequency wireless power transfer (#140)
Xin Zan, Al-Thaddeus Avestruz

Identifying the mechanism of the Ce3+/Ce4+ redox reaction through kinetic and spectroscopy measurements (#340)
Cailin A. Buchanan, Dylan Herrera, Bryan R. Goldsmith, Nirala Singh

Human Prediction of Robot's Intention in Object Handling Tasks (#440)
Teerachart Soratana, Xi Jessie Yang, Yili Liu

Slimming Neural Networks using Adaptive Connectivity Scores (#540)
Madan Ravi Ganesh, Dawson Blanchard, Jason J. Corso, Salimeh Yasaei Sekeh

Elucidating Electronic Charge Transport in Solid Electrolyte Materials for Battery Applications (#940)
Everardo Olide, Donald Siegel

RESEARCH PROPOSAL COMPETITION

10:30 am - 11:30 am

Share your ERS moments using #UMichERS

@ersuofm

@ErsuMich

1180 Duderstadt Center

Investigating the Effect of Task-Specific Programming on CS Learning and Interest in K12 Students
Tamara Nelson-Fromm

Examining the Influence of Chirality on Protein Adsorption and Stem Cell Differentiation
Jessica Ma, Nicholas A. Kotov

Defining and Predicting Protein Loop Ligandability
Chloe E. Markey, Brittany S. Morgan, and Anna K. Mapp

Nonlinear Coherent Pulse Stacking for Achieving Ultrashort, High-Energy Pulses from Laser Systems
Mohammed Azzouz, Almantas Galvanauskas

Trust-Based Task Allocation for Optimizing Heterogenous Human-Robot Team Performance
Arsha Ali, Dawn M. Tilbury, Lionel P. Robert Jr.

Fine-Grained Image-Based Air Quality Inference
Tony Zhang, Robert P. Dick

A Robotics Programming Language with Compile-Time Formal Verification
Jiawei Chen1, Shayan Jalili, Jose Luiz Vargas De Mendonca, Jean-Baptiste Jeannin

In Vitro Platform for the Creation of Pancreatic Tumor-Mimetic Microenvironments and Cancer Therapy Screening
Malini Mukherji, Joerg Lahann

Sampling Performative and Bias-Avoidant Subsets of Large Unlabeled Image Datasets
Kevin Wang

Two-photon polymerization-based fabrication of Photonic Devices for Industrial Organic Liquid Sensing
Kamal Rudra

Scalable methods for ensuring safety and stability of future networked energy systems
Sijia Geng, Ian Hiskens

SCIENTIFIC VISUALIZATION COMPETITION

11:30 am - 12:30 pm

1180 Duderstadt Center

Share your ERS moments using #UMichERS

@ersuofm

@ErsuMich

Quantifying Coral Snake Anti-Predator Thrashing Displays
Shannon M. Danforth, Talia Y. Moore

in-situ X-ray characterization of lamella orientations in locked Al-Al2Cu eutectic colonies
Paul Chao, Ashwin J. Shahani

Visualizing censorship measurement data
Ramakrishnan Sundara Raman

Exploring the 3D coral-like microstructure of fine Al-Si eutectic colonies in laser surface remelted alloy
Xinyi Zhou, Paul Chao, Ashwin Shahani

Presentations

SCIENTIFIC VISUALIZATION COMPETITION