OKLAHOMA STATE UNIVERSITY

School of Mechanical and Aerospace Engineering

5TH ANNUAL MAE GRADUATE RESEARCH SYMPOSIUM

Friday, March 24, 2023

OSU Student Union

https://ceat.okstate.edu/mae/research/gsc/symposium/

7:45 – 7:50	Welcome Remarks by MAE Department Head, Prof. Sandip Harimkar
7:50 – 8:00	Opening Remarks by Chair of MAE Graduate Activities Committee (GAC), Prof. Arvind Santhanakrishnan
8:00 - 8:45	**Plenary Lecture** (room 265 – Ballroom) *Breaking boundaries: Why interdisciplinary research is key for tackling grand challenges* **Dr. Romit Maulik** Assistant Professor, Department of Information Science & Technology Pennsylvania State University
9:00 - 10:30	**Graduate Student Talks: Session 1** *Room: 270 – French Lounge*
9:00 - 9:15	**Md Asif Arefeen**, *Optimal Control of Powered Knee Exoskeleton to Assist Human Lifting*
9:15 - 9:30	**Md Arif Billah**, *Implicit Information Transfer via Streaker Bees in a Bio-Inspired Visual Feedback Swarm Framework*
9:30 - 9:45	**Mitchell Ford**, *Scalability of bio-propulsion using metachronal paddling*
9:45 - 10:00	**Sandra Vinnikova**, *Mechanics of nanomeshes for flexible and stretchable bio-sensors*
10:00 - 10:15	**Zach Yap**, *Solar balloons for Stratospheric observations*
10:15 - 10:30	**Asma Tabassum**, *Towards Wind Aware Navigation and Control for Safe Urban Operation of Small Unmanned Aircraft System: Autonomous and Human-Centric Approach*

9:00 - 10:30	**Graduate Student Talks: Session 2** *Room: 280 – Sequoyah Room*
9:00 - 9:15	**Ishriak Ahmed**, *High speed experimental and system identification tools for understanding swarming insect flight*
9:15 - 9:30	**Leila Rezaei**, *Modeling Nematic Liquid Crystal Elastomers in Compression*
9:30 - 9:45	**Kerrick Ray**, *Experimental Observations of the Boundary Layer and Movement in Varying Topography with Unmanned Systems*
9:45 - 10:00	**Muzaffar Qureshi**, *Fast Trajectory Optimization: A Comparative Study*
10:00 - 10:15	**Chris Scott**, *Holographic diagnostics for scramjet engine fuel injection*
10:15 - 10:30	**Joel Quarnstrom**, *Design of a Novel Bio-Inspired Inchworm Robot using Helical Actuators*
10:30-12:00	**Graduate Student Posters: Session 1 & Coffee Break** *Room 265 – Ballroom*
	Tanner Price, *Hybrid Rocket Test Stand Design and Evaluation of Nozzle Sizes on Hybrid Rocket Engine Performance*
	Nissrine Aziz, *Rheological and viscoelastic properties of liquid crystal elastomers during UV curing*
	Shahbaz P. Qadri Syed, *Parameterized input inference for approximate stochastic optimal control*
	Daniel Gassen, *This Sucks!: Advancement in Noninvasive Hormone Monitoring of Dolphins Using UAS Sample Collection Device*
	Ashraf Kassem, *Physics-Guided Multi-fidelity Learning for Characterization of Blunt-Body Dynamic Stability*
	Mehdi Yadipour, *Insect-inspired Visually-guided Decentralized Swarming*
	Soumya Mandal, *Fabrication of multimetallic NiCoCr nanoparticles via pulsed laser-induced dewetting of alloyed thin films*
	Kevin Bhar, *Asynchronous Local Computation in Decentralized Bayesian Learning*

Masoud S. Sakha, *Optimal Control of Multi-Mode Switched System*

Nicholas Nowak, *Yarn Pull-Out as a Mechanism of Ballistic Performance Enhancement in Silica Nanoparticle-Treated Kevlar (SNK) Fabric*

Zachary Morrison, *Dynamic Mode Decomposition of Discrete-time Dynamical Systems under Feedback Control using Discrete-time Control Liouville Operators*

Pouria Moghimi, *Modelling of Underground Thermal Energy Storage Tanks for HVAC Applications*

Abby Haddox, *A Smart Skin to Treat and Prevent Pressure Ulcers*

Erick Pepek, *Recyclable Polymers to improve Sustainability of Additive Manufacturing*

12:00 - 13:00	**Lunch** (*room 265 – Ballroom*)

13:00 - 14:30

Graduate Student Talks: Session 3
Room: 270 – French Lounge

13:00 - 13:15 | **Sanzida Hossain**, *Cooperative driving between human-driven and autonomous vehicles considering stochasticity in human driving behavior*

13:15 - 13:30 | **Furkan Oz**, *Quantum PDE Solver with Chebyshev Points*

13:30 - 13:45 | **Michael Sallaz**, *The Efficacy of Utilizing SolidWorks Finite Element Analysis for Design of Composite I-Beam Wing Spars in UAVs*

13:45 - 14:00 | **Jared Town**, *Nonuniqueness and Convergence to Equivalent Solutions in Observer-based Inverse Reinforcement Learning*

14:00 - 14:15 | **Jacqueline Esimike**, *Interaction of cough-generated exhalation flow with gasper jets in airliner cabins*

14:15 - 14:30 | **Ujjval Patel**, *PLUS - PowerLine Unmanned Surfer: Dynamic and Tracking*

13:00 - 14:30

Graduate Student Talks: Session 4
Room: 280 – Sequoyah Room

13:00 - 13:15 | **Joshua Melvin**, *Integration of a Turboprop Replacement for a Piston Engine Driven General-Aviation Aircraft for Ground Turboelectric Research*

13:15 - 13:30	**Achyuth Thumbalam Guthai**, *Use of Full-Field Strain Measurements to Determine Mechanical Properties of Shale Under Repeated Cyclic Loading*
13:30 - 13:45	**Moad Abudia**, *System Identification Using Operator Theory With Eigenfunction Validation*
13:45 - 14:00	**Nastaran Arzamani**, *Stories that Have Not Been Heard: Using Text Mining to Analyze Aviation Accident Reports*
14:00 - 14:15	**Emalee Hough**, *High altitude observations with solar balloons*

14:30-16:00

Graduate Student Posters: Session 1 & Coffee Break
Room 265 – Ballroom

Khaled I. Alghamdi, *Feasibility Study for a Residential A/C System Integrating Thermal Energy Storage for Load Shifting Using a Novel Three-Fluid Heat Exchange*

Braydon Revard, *Experimentation and Validation of UAS Based Wind Sensors for Urban Applications*

Md Raqibul Hasan Prince, *Binary Variables based Weight Minimization of Lightweight Manufacturable Composite Laminated Structures*

Bipin Kafle, *Gravitational effects on the wettability of microporous hydrophobic tubular surfaces*

Nahid Uzzaman, *Predicting dynamic covariances of the label even when the inputs are uncertain using variational Wishart processes*

Tochukwu Elijah Ogri, *Joint State-Parameter Estimation for Adaptive Optimal Trajectory Tracking in Nonlinear Systems*

Bryce Randall, *Stability and control analysis using CFD for low aspect ratio low Reynolds number aircraft*

Abhishek Tikar, *Spark Plasma Sintering of Al0.5CoCrFeNi2 High Entropy Super Alloy and Composite*

Shafi Al Salman Romeo, *Machine Learning Applications on Predicting Turbulence Closure Term*

Peter Ramsdale, *The Development of Testing Criteria and Methods for the Evaluation of a Counter Unmanned Aerial System Platform as a Viable System*

Patrick Williams, *Orbital Debris Encounters Analysis about ISS Orbit*

Mohammed Abir Mahdi, *Experimental and numerical analysis of lattice structures using homogenization approaches*

Rohit K. S. S. Vuppala, *Machine Learning based Reduced Order Modeling for wind-field prediction in urban spaces for Unmanned Aerial Systems*

16:00 - 16:45	**Undergraduate Student Posters**

Room 265 – Ballroom

Sam Glenn, *Morphological characterization of wing shapes of tiny insects*

Tuyen Nguyen, *Dynamic Stability Analysis of the Orion Capsule at Transonic Speed*

Austin Rouser, *An experimental evaluation of leading-edge surface roughness effects on propeller performance*

Mason Biliske, *Aluminum-Infused PLA for Hybrid Rocket Fuel*

Peyton Pierson, *Blunt re-entry vehicle Reinforcement Learning Model with adaptive mesh refinement to reduce computational load*

Dr. Romit Maulik

Assistant Professor, Department of Information Science & Technology Pennsylvania State University
Breaking boundaries: Why interdisciplinary research is key for tackling grand challenges

Student Union Ballroom, 8 AM – 8:45 AM

Abstract: In today's hyper-connected research landscape, a regular exchange of technical expertise across domains is crucial for rapid development of solutions to grand challenges. This talk will expand on this philosophy by recapping the speaker's journey as an apprentice through different departments (Aerospace Engineering, Leadership Computing, Mathematics and Computer Science), ultimately culminating in how this approach was instrumental in constructing an independent research program. We will also discuss the importance of "grand challenge" questions as compasses to direct the long-term efforts of a research program and how asking the right question is frequently the most difficult, and valuable part, of a new project.

Biography: Dr. Romit Maulik is an incoming Assistant Professor in the Department of Information Science and Technology at Pennsylvania State University. In addition, he is, and will continue to remain, a Staff Scientist at Argonne National Laboratory in the Mathematics and Computer Science Division. He was previously the Margaret Butler Postdoctoral Fellow at Argonne, after obtaining a PhD in Mechanical and Aerospace Engineering at Oklahoma State University with Dr. Omer San. His research interests lie at the intersection of data science, applied mathematics, and high-performance computing. Learn more at: https://romit-maulik.github.io/.