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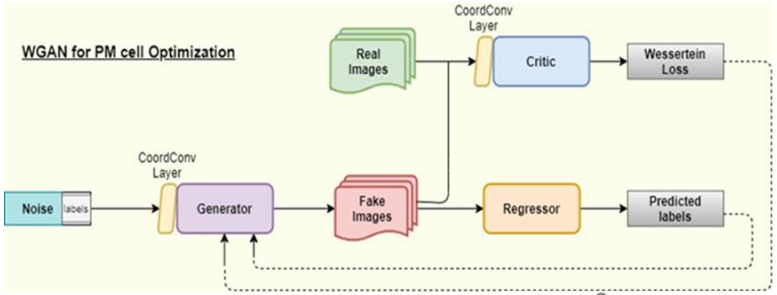

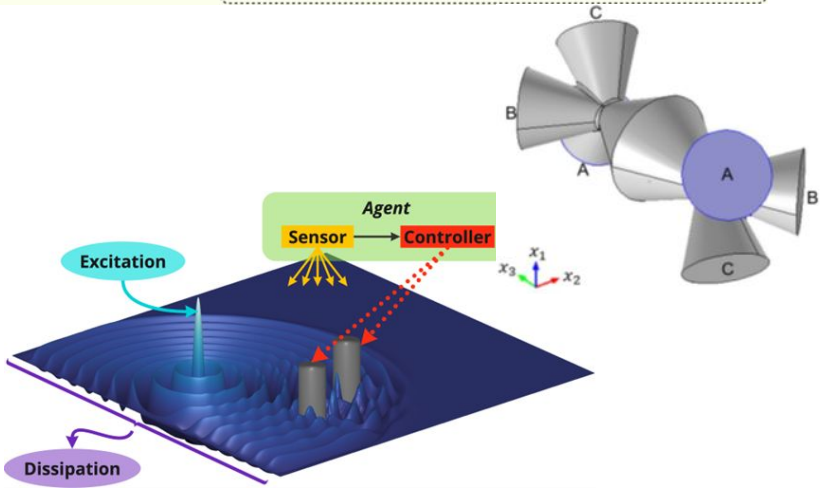

Research Interests and Keywords:
acoustic and elastic wave propagation/scattering, metamaterials, dynamic material, deep learning, reinforcement learning, optimal control, generative AI, optimization, high performance computing

Supervision Preference: ☑ faculty-led ☐ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Design of broadband Acoustic and Elastic Metamaterials using generative neural network, optimization, and reinforcement learning
- AI-Facilitated Knowledge Discovery of Complex Wave Dynamics for wave manipulation

Examples of Recent Projects and Publications:

- Pentamode metamaterial design via wave simulation and machine learning (Cheng Qiu, December 2024)
- Data-driven control of acoustic waves using movable and flexible scatterers (Noam Smilovich, December 2024, Outstanding Thesis Award)
- Acoustic wave manipulation through sparse robotic actuation. Paper # 3655 accepted for presentation at the IRCA 2025 conference **https://gladisor.github.io/waves/**

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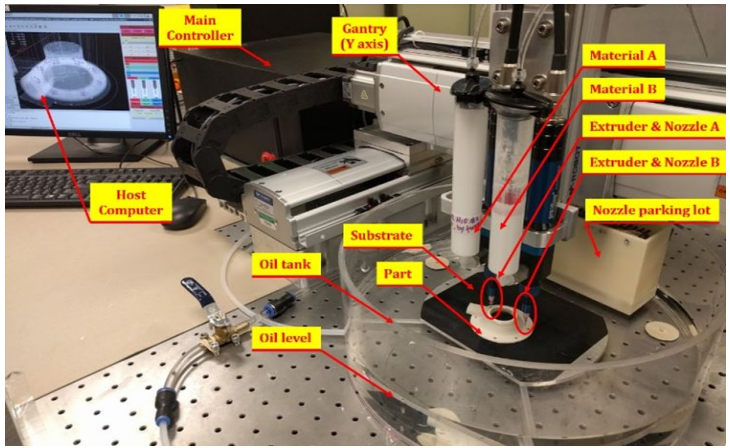

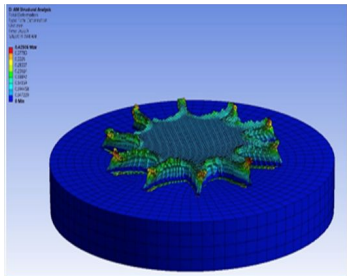

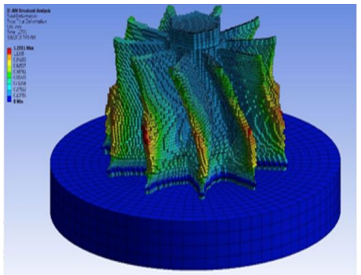

Research Interests and Keywords:
additive manufacturing, design optimization, structural ceramics, and functionally graded materials

Supervision Preference: ☑️ faculty-led ☑️ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Finite element simulation of superalloy 3D printing
- Additive manufacturing and mechanical characterization of advanced ceramics
- Tool-path planning for extrusion-based 3D printing

Examples of Projects or Theses in Progress or Completed:

- Improving the quality of additively manufactured parts using machine learning algorithms
- Optimal design of functionally graded materials for 3D printing

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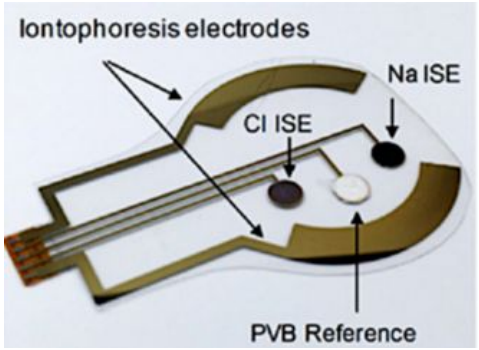

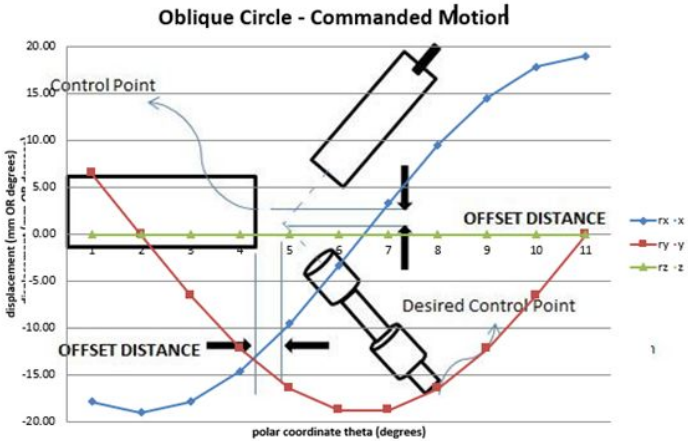

Research Interests and Keywords:
AI-driven robots, pattern recognition, sensors, signal conditioning

Supervision Preference: ☑ faculty-led ☐ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Hyper-local Low-cost Sensor Nodes and AI Forecasting (Sponsored by NIH grant)
- Wearable Sensor Systems for Monitoring Cognitive Function During Physical Exercise Using EEG, fNIRS
- Brain-Heart Interaction: Dual-Sensor Systems to Evaluate Cognitive Load and Physical Stress
- AI-Powered Sweat and Saliva Biosensors for Non-Invasive Metabolite Detection

Examples of Projects or Theses in Progress or Completed:

- Migraine detection and characterization via EEG signal acquisition and conditioning circuit analysis
- Kinematic characterization and remote control of a six-axis denso robotic arm for Massage Therapy

Crystal Han

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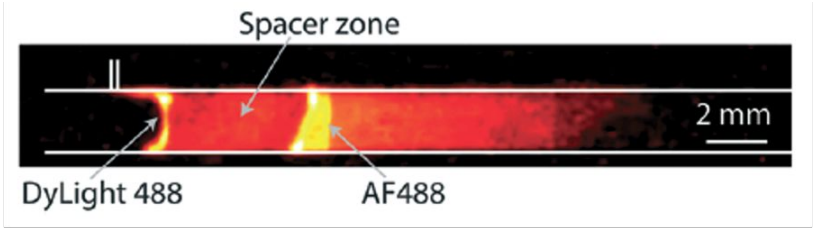
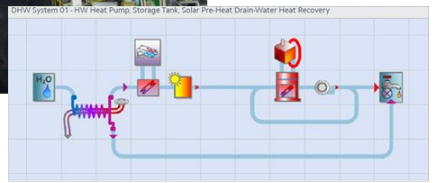


Size based DNA separation in a microfluidic channel visualized using fluorescent dyes, *DOI: 10.1039/c9lc00311h*

Industrial assessment



Energy modeling for industrial processes from https://www.iesve.com/software/loads

Research Interests and Keywords:
microfluidics, biological sample purification, micro total analysis system, industrial energy management and efficiency, industrial energy assessment

Supervision Preference: ☑ faculty-led ☐ student-proposed

Potential Topics for Upcoming Projects or Theses:

- TBA (due to potential sabbatical leave AY25-26)

Examples of Projects or Theses in Progress or Completed:

- Quantifying energy efficiency and performance of floating head pressure controls on industrial chiller systems in different climates
- Development of a lab-on-a-chip for simultaneous DNA extraction and amplification using isotachophoresis

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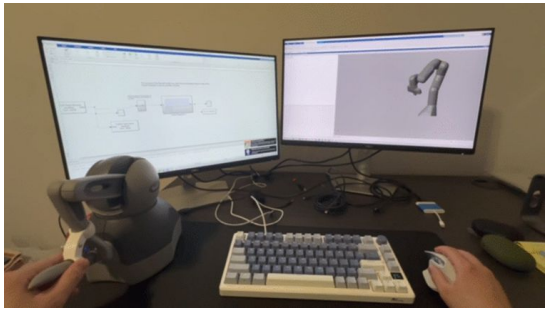

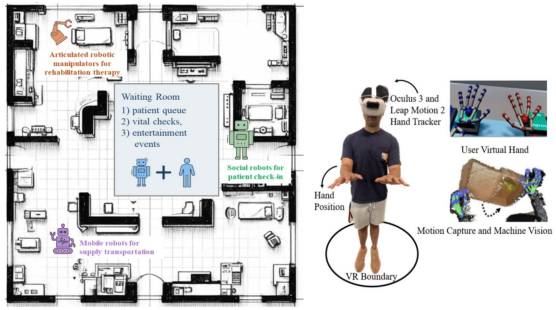

Figure a) Human Robot Interaction Digital Twin Platform, b) Mixed reality human-robot co-adaptation and co-existing between human-physical environment and human AI-driven Digital Twin pair

Research Interests and Keywords:
human-robot interactions, human-AI co-adaptation, haptic technology, human biomechanics, and medical devices

Supervision Preference: ☑️ faculty-led ☑️ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Mixed-reality-based platform for AI-driven, collaborative HRI environments
- Design a robotic oral feeding bottle with bioanalytical sensors for effective milk delivery

Examples of Related Publications:

- Integrating motion intention and impedance control in teleoperated robotic rehabilitation for upper extremity disorders [publication]
- SmartLact8: A bio-inspired robotic breast pump for customized and comfort milk expression [publication]

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From https://grist.org/article/2009-08-31-california-students-take-refract-house-to-solar-decathlon/

Research Interests and Keywords:
thermal system optimization, energy system in grid interactive buildings, fair and equitable power distribution for smart grid, solid state thermal energy conversion

Supervision Preference: ☑️ faculty-led ☑️ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Sustainable energy generation and management
- Grid interactive buildings
- Equitable power distribution

Example of Recent Project in Progress:

- HVAC control modification to improve energy fairness for low income households (V. Flores Casarrubias)

Last updated 20250131

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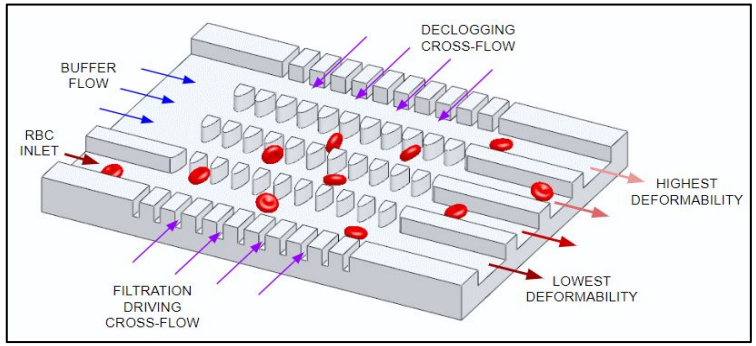
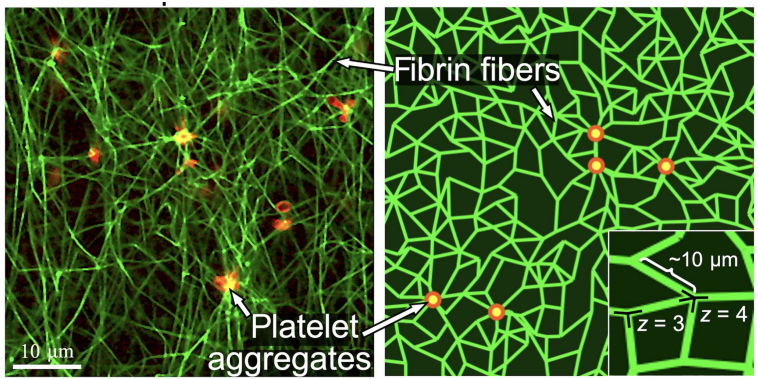


Inspired by https://doi.org/10.1039/C2LC21045B



Results from https://doi.org/10.1101/2023.03.24.534185

Research Interests and Keywords:
microfluidics, soft and biological tissue mechanics, microfabrication, microelectromechanical systems (MEMS)

Supervision Preference: ☑ faculty-led ☐ student-proposed

Potential Topics for Upcoming Theses:

- Microfluidic interrogation of red blood cell deformability
- Localized mechanics of active biopolymer networks
- Nanoscale stiffness mapping of solid polymer electrolytes

Examples of Theses in Progress:

- Effects of microgravity on the dynamic response of a closed-loop perfusion system (A. Schweizer)
- Multiphysics simulation of polymer-ceramic composite electrolytes under compression (M. Suski)

Last updated 20250130

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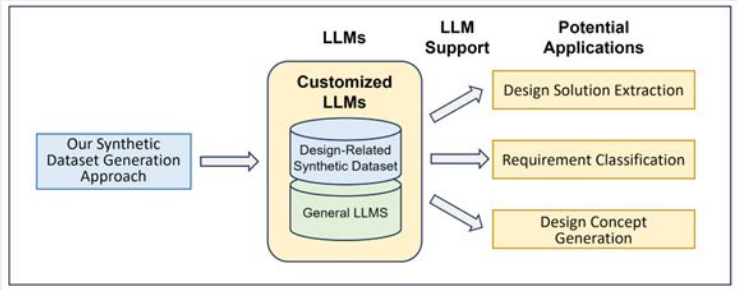

Figure a) Collaboration between AI and designers, b) Integration of computational tools through design process

Research Interests and Keywords:
AI for engineering design support, design solution exploration for human-centered design, design theory and methodology

Supervision Preference: ☑️ faculty-led ☑️ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Investigating cognitive aspects of human–AI collaboration during engineering design.
- Exploring potential bias in AI-generated design outcomes within human–AI interaction contexts.
- Designing modular robotic systems with adaptability across VR/AR environments.
- Autonomous experimentation enabled by knowledge capture and reuse.

Example of Related Publication:

- A method for synthesizing ontology-based textual design datasets: evaluating the potential of large language model in domain-specific dataset generation [publication]

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(a) (b)

(a) Smart walker and (b) lower limb exoskeleton (Exo-H3) designed and controlled for assisting people with disabilities with different sensors, actuators and components

Research Interests and Keywords:
medical and assistive robotics, human-robot interaction, biomedical engineering, mechatronic systems, intelligent control, machine learning

Supervision Preference: ☑ faculty-led ☐ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Design and development of an assistive robotic system for people with dementia (funded by CSU grant)
- Intelligent control of lower-limb exoskeleton with machine learning tools (funded by NSF grant)

Examples of Projects or Theses in Progress or Completed:

- Structural design, analysis and manufacturing of an intelligent robotic walker [publication]
- Adaptive gait planning with learning-based torque estimation and control for exoskeletons [publication]

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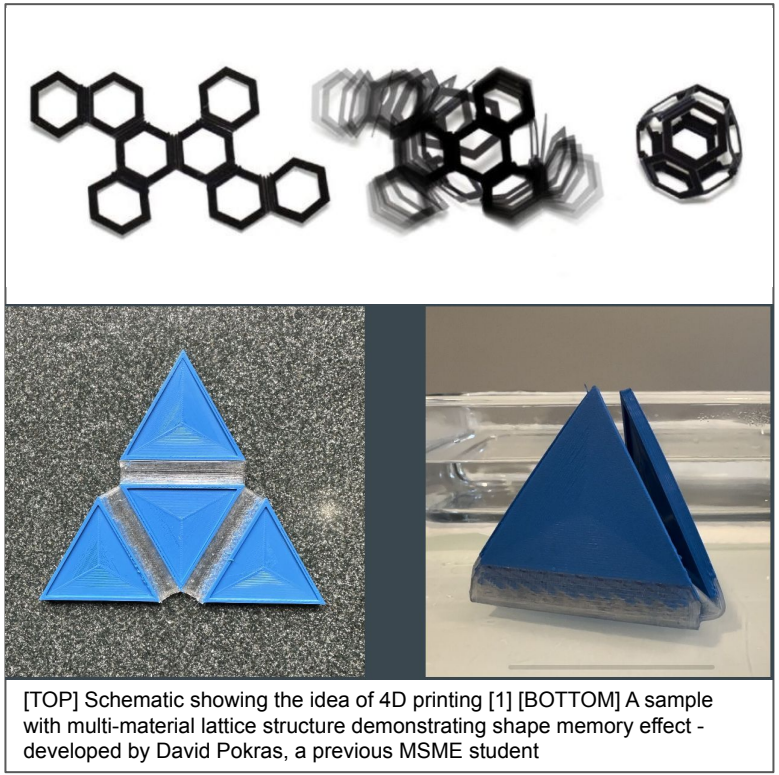

[TOP] Schematic showing the idea of 4D printing [1] [BOTTOM] A sample with multi-material lattice structure demonstrating shape memory effect - developed by David Pokras, a previous MSME student

[1] "4D Printing," Self-Assembly Lab [Online]. Available: https://selfassemblylab.mit.edu/4d-printing.

Research Interests and Keywords:
engineering & mechanical design, new product development, 3D and 4D printing, sustainable manufacturing

Supervision Preference: ☑️ faculty-led ☑️ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Comparison of mechanical properties of 3D/4D printed polymers with uni and multi-directional fibers
- Use of ML/AI for automation of product design and development

Examples of Related Publications:

- Shape memory polymers in 4D printing: investigating multi-material lattice structures [publication]
- Enhancing product design through AI-driven sentiment analysis of Amazon reviews using BERT [publication]

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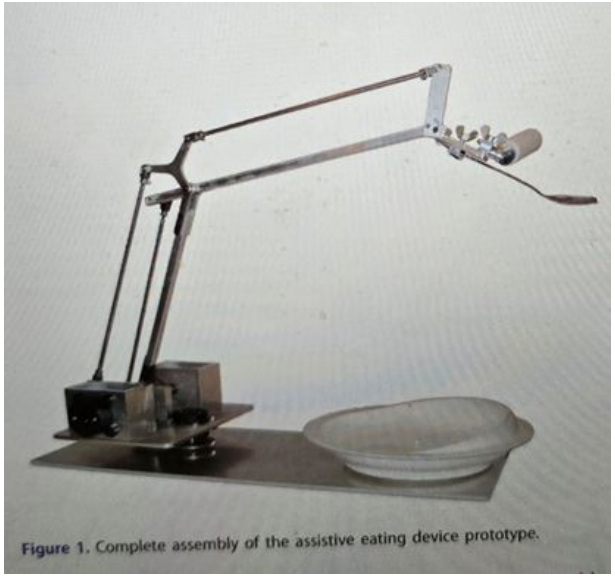

Figure 1. Complete assembly of the assistive eating device prototype.

ASSISTIVE TECHNOLOGY 2022, VOL. 34, NO. 2, 170–177 https://doi.org/10.1080/10400435.2020.1734111
Article: Mechanical design of a new device to assist eating in people with movement disorders

Research Interests and Keywords:
mechanical design, materials behavior, fracture mechanics, finite element analysis, biomechanics devices

Supervision Preference: ☑ faculty-led ☐ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Assistive Eating/Feeding Device for Aging/Rehab Population with Facial Positioning Detection Capability.

  To design and develop a mechatronic kinematic device to detect a person's mouth while sitting at the table, scope up the food (solid or liquid) from a plate/bowl, and successfully feed a targeted person.

  This device will help enhancing self-feeding, maintaining an acceptable level of life quality, The envisioned project is suitable for mechanical design and mechatronics students.

Buff Furman

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https://transweb.sjsu.edu/research/1948-Automated-Transit-Network

Research Interests and Keywords:
Solar-powered automated transportation, precision machine design, mechatronic systems, dynamics

Supervision Preference: ☑️ faculty-led ☑️ student-proposed

Potential Topics for Upcoming Projects or Theses:

- Modeling the dynamics of a suspended ATN vehicle
- Design of full-scale test facility for the Spartan Superway automated transportation system

Examples of Projects or Theses in Progress or Completed:

- Spartan Superway Modular Guideway Support Design and Analysis
- Spartan Superway SolidWorks Motion and ANSYS Motion curriculum and case study

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