ROGER HO

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EDUCATION

UNIVERSITY OF MICHIGAN **Aug 2019 - May 2023**
BSE Mechanical Engineering; Minor in Computer Science **Ann Arbor, MI**
Overall GPA: 3.92/4.00, summa cum laude | **Major GPA:** 4.00/4.00

ACADEMIC EXPERIENCE

PRECISION SYSTEMS DESIGN LABORATORY May 2022 - May 2023

Research Assistant | University of Michigan **Ann Arbor, MI**

- Devised and conducted experiments to characterize a novel flexure mechanism to verify the performance of a theoretical structural augmentation, resulting in a publication in preparation.
- Collaborated with a team to design a flexure-based XY nanopositioning system with a focus on manufacturability, and carried the project through design, manufacturing, assembly, and open-loop testing, resulting in a patent and publication in preparation.
- Carried out thorough static and dynamic finite element analysis (FEA) to optimize flexure parameters for actuation stiffnesses, bearing stiffnesses, and resonant frequencies.
- Developed a framework with a graduate student to simulate and subsequently select the appropriate precision actuators and sensors based on flexure parameters and motion profile.

U-M BATTERY LAB Sep 2021 - Jan 2022

Research Assistant | University of Michigan **Ann Arbor, MI**

- Investigated the effect of fast formation on battery lifetime and electrochemistry by interpreting data from tests such as hybrid pulse power characterization (HPPC) and constant discharge.
- Analyzed diagnostic data from end-of-life lithium-ion pouch cells in Python to elucidate the effects of discharge temperature and presented the results in a digestible format.

MICROFLUIDICS AND SOFT MATTER GROUP May 2018 - Sep 2018

Research Assistant | The University of Hong Kong **Hong Kong**

- Conducted individual investigation on the structural strength of Aqueous Two Phase System (ATPS) capsules created with microfluidics for the application of timed medication release, triggered by capsule rupture from high voltage electric fields and Couette flow.
- Collaborated with graduate students on investigating the application of microfluidics in ATPS.

WORK EXPERIENCE

STEALTH-MODE ROBOTICS STARTUP Jul 2023 - Present

Design Engineer **Ann Arbor, MI**

- Led the development of a robust mechatronic system for a robotic device, successfully demonstrating the function and novelty of our product to prospective users.

- Leading the development of miniature manipulators for a robotic device, meeting crucial company milestones in a fast-paced environment with stringent deadlines.
- Managed projects for multiple initiatives, entailing responsibilities such as risk management, mechanical design, mechanism analysis, testing and validation, design for manufacturing, and coordination of manufacturing logistics, while ensuring adherence to industry standards.

PHOENIX CAPITAL **Jun 2021 - Aug 2021**

Quantitative Analyst Intern **Hong Kong**

- Investigated and implemented experimental trading algorithms based on buy-and-sell-point prediction from the perspective of survival statistical analysis.
- Devised profitable trading algorithms and technical indicators based on momentum trading.
- Wrote multiple internal tools and scripts in Excel VBA to streamline workflow in the office..

PUBLICATIONS

1. Radgolchin M., Radkte D., Rath S., **Ho R.**, Awtar, S., 2024, "Experimental Characterization of a Sandwich Double Parallelogram Flexure Mechanism", planned for Dec. 2024 submission to *Precision Engineering*
2. Radgolchin M., Rath S., **Ho R.**, Ridings C., Awtar, S., 2025, "A New XY Flexure Mechanism Architecture with In-Plane and Out-of-Plane Interconnects: Part 1 - Design" planned for Jan. 2025 submission to *Precision Engineering*

INVENTIONS

1. Shorya Awtar, Siddharth Rath, **Roger Ho**. 2024. Method of Manufacture and Assembly of XY Flexure Mechanism Assembly. U.S. Patent Application 18/605,411, filed March 14, 2024. Patent pending.

HONORS

JAMES B. ANGELL SCHOLAR **Mar 2021 - Apr 2023**

Awarded to students who achieve all A's (A+, A, A-) for two or more consecutive terms.

UNIVERSITY HONORS/DEAN'S LIST **Dec 2019 - Dec 2022**

Awarded to students who earn a GPA of 3.5 or above during a term.

GRADING & TEACHING

GRADER **Aug 2021 - May 2022**

Graded assignments and quizzes for engineering courses such as "Introduction to Dynamics and Vibrations" and "Mechanical Behavior of Materials".

IB MATHEMATICS TUTOR **May 2019 - Aug 2019**

Tutored IB students in mathematics SL on topics such as calculus, trigonometry and statistics.

INDIVIDUAL PROJECTS

LASER SCANNING CONFOCAL MICROSCOPE **2023-2024**

- Designed, simulated, and built a 3D printed XYZ flexure motion system capable of submicron (<200 nm) motion resolution over +/- 2.5mm motion range in all axes.
- Designed a confocal laser optical system with micron-scale optical resolution along with a gain-adjustable amplifier circuit to scan objects of varying albedos without saturation.
- Modified off-the-shelf open-loop stepper motors for closed-loop control to enable high-speed (>5 mm/s) motion with minimal error (estimated <1 um).
- Developed a library in C++ to operate the microscope and process data from scans.

ULTRASONIC ACOUSTIC TWEEZERS **2022-2023**

- Designed and built an enclosure that enables fine adjustment to the spacing between two opposing ultrasonic transducer arrays.
- Wrote custom Verilog HDL code for Altera Cyclone II FPGA to command phases of 50 ultrasonic transducers independently at π/64 resolution while concurrently receiving phase command input from microcontroller over SPI.
- Designed custom dual-layer PCB in KiCAD and hand-soldered SMD components.
- Developed a C++ library to compute the individual phases of 50 ultrasonic transducers for levitation, successfully suspending a small styrofoam ball at the focal point.

SOFTWARE EXPERIENCE

- **Programming:** MATLAB (Simulink, Simscape), LabView, Python, Java, Javascript, SQL, C++, C#, C, Verilog, Quartus II (ModelSim)
- **Mechanical:** Solidworks (CSWA Certified), ANSYS (Mechanical, Discovery), MSC Adams
- **Electronics:** LTSpice, KiCAD

SKILLS

- **Fabrication:** 3D Printing (SLA/FDM), Machining (Mill, Lathe), Metrology
- **Electronics:** Microcontroller and FPGA programming, Circuit design
- **Instrumentation:** LabVIEW (myRIO), Capacitance probes (Lion Precision), Optical linear encoders (Heidenhain, Renishaw), dSpace, Stereo/compound microscopy