Mumbi Whidby

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Research Interests

My Ph.D. research focuses on advancing **tactile sensing** and **perception** to enable more intelligent and intuitive **human-robot interaction**. I aim to understand how **tactile information** can be captured and interpreted across **multiple environments**, and how it can be effectively conveyed to users through **haptic feedback systems** and **teleoperation interfaces**. The goal is to support **robotic manipulation** and **biomechatronics** applications that **improve dexterity** and **robust manipulation** in both **autonomous** and **teleoperated robotic platforms**.

Education

University of California, Los Angeles
Ph.D. in Mechanical Engineering (Design, Robotics and Manufacturing) Sept. 2022 - Present
M.S. in Mechanical Engineering March 2024

Spelman College, Atlanta, GA May 2022
B.S. in Computer Science, Magna Cum Laude

Awards and Honors

Cota-Robles Fellowship – Full Ph.D. fellowship supporting exceptional underrepresented doctoral students at UCLA; awarded based on academic excellence and research potential.
Boeing Scholar – Competitive merit-based scholarship recognizing leadership, innovation, and academic achievement in engineering.
Upsilon Pi Epsilon – Member of the international honor society for excellence in computing and information sciences; awarded to the top 10% of students in computer science.

Technical Skills

Programming: Python, C++, MATLAB, PHP, Java, Scheme, JavaScript
Tools/Frameworks: ROS1, ROS2, SolidWorks, Onshape, Arduino, Pepakura, Git
Additional: Sensor integration, data acquisition, machine learning basics, teleoperation systems, microfluidics fabrication

Research Experience

University of California, Los Angeles Biomechatronics Lab Sept. 2022–Present
Research Assistant — Advisor: Dr. Veronica Santos

- Lead collaborative sensor development project with the University of Washington: design, manufacture, characterize, and deploy advanced tactile sensors in robotic testbeds.
- Conduct research on tactile sensor-based texture perception in solid and fluid environments, with a focus on enabling fine-grained robotic manipulation.
- Analyze multi-modal sensor data to improve haptic feedback and material classification algorithms.

- Mentor undergraduate researchers in sensor characterization and experimental protocols.

Human Fusions Institute, Case Western Reserve Oct. 2023–June 2024
Research Assistant — Office of Naval Research Project

- Developed and implemented real-time hand motion tracking systems for bimanual teleoperation of robotic platforms.
- Contributed to the design of user interfaces for immersive teleoperation, integrating visual and haptic feedback.
- Conducted user studies to evaluate the performance of the developed system under varied task conditions.

IC CAE Project, Virginia Tech Aug–Dec 2021
Research Assistant

- Designed and prototyped intelligent jamming strategies for wireless signals using software-defined radios (SDRs).
- Investigated methods for adaptive jamming and signal interception under dynamic RF environments.

NASA L'SPACE Mission Concept Academy Jan–May 2020
Researcher

- Collaborated on a multidisciplinary team to produce a design review for the NASA Lucy mission.
- Conducted systems engineering analysis of spacecraft components and mission architecture; assessed feasibility based on physical, risk, and budgetary constraints.

U.S. Army Drone Design Competition Apr 2019
Research Assistant

- Engineered and piloted a biologically-inspired drone chassis using additive manufacturing techniques.
- Integrated lightweight sensors and control systems to optimize drone performance in obstacle navigation tasks.
- Team placed 2nd in design category and 4th nationally in overall competition.

Industry Experience

Honeywell Enterprise May–Aug 2021
Intern

- Investigated opportunities for robotics integration within large-scale warehouse and logistics systems.
- Designed and implemented cloud-based solutions (AWS) for rapid deployment and system monitoring, reducing time-to-deployment and operational risk.
- Conducted cost-benefit analysis of robotic platforms for various fulfillment scenarios.

Publications

In Preparation

[1] Whidby, M., Kang, S.-M., Harber, E., Penaloza, J., Bender, A.T., Posner, J.D., and Santos, V.J. *"Towards Texture Perception in Diverse Medium: Leveraging Liquid Metal Strain Gauge*

Tactile Sensors. ”

[2] Harber, E., Johnson, C.P., Liebman, A., Psychoyos, A., Whidby, M., Kang, S.-M., Penaloza, J., Bender, A.T., Posner, J.D., Santos, V.J. *“OptiStrain: A Vision- and Microfluidics-based Tactile Sensor with High Spatial and Temporal Resolution.”*