Darren Dong

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EDUCATION

University of Michigan, Ann Arbor, MI **August 2022 - May 2026**
Bachelor of Science in Engineering in Computer Science with a Minor in Electrical Engineering
GPA: 3.85/4.0
Courses: Data Structure and Algorithms, Computer Vision, Artificial Intelligence, Machine Learning, Advanced Operating System, Natural Language Processing, Logic Design, Computer Security, Embedded System Design, Signal and Systems

EXPERIENCES

University of Michigan School of Information, Ann Arbor, MI **May 2023 - August 2023**
Research Assistant

- Assembled mechanical, electrical, and software components to create a professional, real-time greenhouse ventilation system. Achieved sub-2-second responsiveness to temperature changes and push-button interactions, with full shutter motion completed within 10 seconds of receiving a signal.
- Researched and selected affordable and sustainable hardware and software components, successfully developing a durable greenhouse ventilation system under $100. Ensured ease of assembly and accessibility for the general public, capable of withstanding various weather conditions such as heat and storms.
- Maintained effective communication with the supervising professor by providing regular status updates and sharing ideas. Fostered both independent and collaborative work environments to ensure efficient project progression. Outlined future goals for next phases, including integration of wireless networking via ESP32.

PROJECTS

University of Michigan

Soft Robotic Sensor with Embedded Light Control **April 2024**

- Conducted research on developing a lightweight, accessible soft robotics light sensor, focusing on cost-effective materials (~$30) with the proper refractive index for optimal light transmission. Aimed to design a sensor capable of controlling various systems.
- Constructed an electrical system for the custom soft robotic sensor, using a red LED for light emission, Stretch Magic tubing for light guiding, a photodiode, and a low-pass filter. Achieved accurate and denoised light signal detection by preventing interference from tubing compression and bending.
- Programmed a Raspberry Pi Pico to control the motor speed proportionally to the light detected by the photodiode. Implemented PID control to adjust the motor's setpoint speed based on initial light readings, resulting in a fully operational system activated by the custom sensor.

SLAM and Navigation of a Two-Wheeled Robot **January 2024 - April 2024**

- Developed an action model, sensor model, and particle filter utilizing LIDAR sensing and odometry to autonomously navigate a two-wheeled robot through a maze. Employed the A* path planning algorithm for efficient exploration and obstacle avoidance, enabling safe and effective traversal of unknown areas.
- Implemented a bang-bang feedback controller for basic movements—forward, backward, left, and right. Tuned the robot's motors using PID controls to ensure accurate odometry values and mitigate nonsystematic errors, achieving a pose error within 10cm and 30°.
- Visualized odometry, particle filter, and robot pathing in real-time using RViz. Integrated LIDAR rays and the wave planner algorithm to generate and update a detailed map, highlighting unexplored frontiers. This provided a clear and dynamic representation of the robot’s position, movements, and sensing capabilities.

Hovercraft Prototype **February 2023 - April 2023**

- Generated and presented design concepts and mechanisms for a hovercraft prototype to an audience, addressing challenges to ensure successful flight. Focused on lifting 50g payloads, selecting appropriate materials for the hovercraft shell, and operating within the constraint of two running motors.
- Built, simulated, and tested the hovercraft prototype using cardboard and CATIA software to analyze internal and external airflow. Achieved a mass of 797g, within the 800g budget, delivering 15W of power and 8N of lift.
- Enabled the hovercraft to navigate and lift payloads through various challenges. Successfully completed a straight line in 50 seconds and a figure-eight in 6 seconds during time trials.

SKILLS

Programming Languages: C++, Java, Python, JavaScript, SQL
Frameworks/Libraries: Git, Github, PyTorch, Numpy, Matplotlib, OpenCV, Pandas, PyTorch, Flutter, Jinjia, Flask, React