

GUANYU XU


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Ann Arbor, MI - 48105, United States


EDUCATION

- **University of Michigan** 08 2024 - present
Anticipating Bachelor of Engineering in Computer Engineering in May 2026
Ann Arbor, US
 - GPA: 3.96/4.00
 - University Honors & Dean's List
- **Shanghai Jiao Tong University** 09 2022 - present
Anticipating Bachelor of Engineering in Mechanical Engineering in Aug. 2026
Shanghai, China
 - GPA: 3.63/4.00
 - Undergraduate Excellent Scholarship recipient

RESEARCH EXPERIENCE

- **Project A: Stretchable Optical Waveguide Sensor for Shape Reconstruction** 05 2025 - present
Summer Research Project of Hybrid Dynamics Robotics Lab at University of Michigan 
 - **Summary:** In this project, we proposed and implemented a soft optical waveguide sensor that infers its 3D geometry using multiplexed LED-Photodiodes (PD) measurements. We provide a creative solution for soft robot state estimation.
 - **Contributions:**
 - * Implemented a PointNet-based autoencoder model using PyTorch and completed model training.
 - * Built a data collection pipeline for collecting high accuracy ground truth data using depth camera.
 - * Wrote STM32 firmware to scan LEDs and sample photodiodes via an analog-to-digital converter.
 - * Designed and fabricated a multilayer optical waveguide with an embedded stretchable PCB.
- **Project B: Active Steering Control of Soft Growing Robot** 09 2024 - 03 2025
Research Project of Hybrid Dynamics Robotics Lab at University of Michigan
 - **Summary:** In this project, we built a novel steering joint for soft growing robots, and tried to achieve accurate closed-loop control of omnidirectional steering.
 - **Contributions:**
 - * Adapted the design of electrostatic clutch-based steering joint and applied it to the entire robot.
 - * Built geometrical model characterizing the relationship between the steering angle and the clutch actuation pattern.
 - * Designed a custom PCB for the electrostatic clutch control circuit.

COURSE PROJECT

- **Project A: Lumen Grid: Multi-Robot Competitive Parking Game** 02 2025 - 04 2025
Course project for Introduction to Embedded System Design (EECS 373) at the University of Michigan. 
 - **Introduction:** In this project, we used STM32 microcontroller to implement three interconnected subsystems. The game involves four Zumo robots competing to occupy as many of the 10 dynamically lit spots as possible.
 - **Contributions:**
 - * Program in C++ to manage robot control logic and communication.
 - * Design an IMU-based remote controller for the Zumo robot with vibration feedback.
 - * Interface with a camera for position tracking of each robot based on color code.
 - * Develop the main control algorithm for the game setting.
 - **Outcome:**
 - * Proficiency in serial communication protocols including UART, I2C, SPI, etc.
 - * Experience with wireless communication protocols including Bluetooth and Zigbee.

* Experience with logic analyzer and gdb debugger.

• Project B: Transformable wheel for Lunar Rover

02 2023 - 08 2024

Project of the undergraduate research program (PRP) at Shanghai Jiao Tong University.

- **Introduction:** In this project, we design and build a lunar rover model with transformable wheel. Real-time sensing is implemented for self-adaptive wheel transformation actuation on a Raspberry Pi platform.
- **Contributions:**
 - * Implemented a PID controller with an IMU for path stabilization.
 - * Interface with ultrasonic sensor and LiDAR for wheel transformation control.
- **Outcome:**
 - * Experience with CAD design software including SolidWorks.
 - * Enhanced skills to understand hardware specifications and datasheets.

PUBLICATION

[P.1] Guanyu Xu, Longquan Liu, et al. (2024). **A Variable Radius Wheel**. National Intellectual Property Office, Patent No. ZL 2024 2 0506534.0. Registration Date: 2024.03.15, Grant & Publication Date: 2024.09.13.

SKILLS

- **Specialized Area:** Embedded System Design, Machine Learning, and Control Theory
- **Interested Area:** Vision-Language Model, Computer Architecture.
- **Programming:** C/C++, Python, MATLAB, Verilog, ARM assembly
- **CAD/Hardware Experiences:** SolidWorks, Abaqus, AutoCAD, Raspberry Pi, STM, and Arduino.

HONORS AND AWARDS

- **Third prize in the 13th SJTU Liming Cup Mechanical Innovation Competition for Freshmen** 05 2023
Shanghai Jiao Tong University
 - Designed a mechanical vehicle that could grab and raise objects, catch little balls, and climb up obstacles.
 - The competition is graded based on the vehicle's performance by measuring the points it gets at the competition venue.
- **Outstanding Project of PRP in 2023** 10 2023
Shanghai Jiao Tong University
 - Award for the transformable wheel project.
 - Our project was considered as highly creative and accomplished well.