

GUANYU XU

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Ann Arbor, MI - 48105, United States

EDUCATION

• University of Michigan

Anticipating Bachelor of Engineering in Computer Engineering in May 2026

08 2024 - present

Ann Arbor, US

- GPA: 3.96/4.00

- University Honors & Dean's List

• Shanghai Jiao Tong University

Anticipating Bachelor of Engineering in Mechanical Engineering in Aug. 2026

09 2022 - present

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.