Yuchen You

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Education

2024–Now **University of Michigan**, *Ann Arbor, MI, US*,
Computer Science, Bachelor of Engineering.
GPA 4.00/4.00 (update April 30, 2025)

2022–2024 **Shanghai Jiao Tong University**, *Shanghai, China*,
Mechanical Engineering, Bachelor of Engineering.
GPA 3.83/4.00

Research Experience

Sept. 2024–Ongoing **SoftRobot Electronic Control**, HDR Lab, Dept. of Robotics, Advisor: Xiaonan Huang (Sean), University of Michigan.

- Design the motion plan and state reconstruction and pose rendering for the modular robotic arm sections.
- Design the workflow and control algorithm for the soft robotic arm. Design the network communication between different mcu boards.
- Lead the stm32 and orangepi board's control algorithm design, including dynamics, PID control as well as can/i2c communication, use C++ and Rust for algorithms and also help with the hardware pcb design.
- **Working with General Motors**
- Demo and extended abstract accepted by **IEEE International Conference on Robotics and Automation (ICRA) 2025 Workshop, RoboSoft 2025 Workshop, Institute for Control, Optimization and Networks (ICON) 2025**
- Won *Best Poster Award* at ICRA 2025: Multi-Stable and Origami-based Soft Robotics.

Feb. 2024–Sept. 2024 **Control Developer**, UM-SJTU Joint Institute, Advisor: Yutong Ban.

- Objectives: Use the LLM and the Flexiv 7 DOF Robot Arm with ZED Depth Camera to handle natural language input and solve daily tasks like solve the jigsaw puzzles.
- Lead the robotic arm control part, basing on the Flexiv-RDK frame, use the reverse/forward kinematic solution to make fluent control of the 7 DOF manipulator to handle accurate motion.
- Combining simulation data and path planning into control flow

Projects

Jan. 2025 – Apr. 2025 **Simulated Basic Operating System**, *EECS482 Lecture Project Series*.

- **Concurrent Scheduler for Delivery System:**
  - Designed a high-throughput customer–delivery scheduler using Mesa monitors (mutexes and condition variables) to protect critical sections and minimize contention.
- **Thread Concurrency Library:**
  - Implemented a lightweight threading framework using `swapcontext`/`makecontext`, providing:
    - Thread lifecycle management (create, join, destroy)
    - Synchronization primitives (mutexes, condition variables, spin locks)
    - CPU interrupt handling and core-suspend mechanics
    - FIFO ready queues handling w/o preemtion
- **Pager & MMU Simulation:**
  - Simulated a minimalist Pager supporting SWAP-backed and FILE-backed pages.
  - Managed page tables, page metadata (dirty bit), and process-level resources.
  - Handled page faults with a clock-queue eviction algorithm, employing copy-on-write and "defer-and-avoid" principles for performance and consistency.
  - Utilize basic process operations (e.g., similar to unix `fork`, `mmap`).
- **Network File System:**
  - Built a Unix-style NFS with inode structures, ensuring strong consistency under concurrent client access.
  - Used Boost's upgrade/shared/unique locks to synchronize file create, delete, read, and write operations.
  - Implemented comprehensive error handling to guard against malformed requests.

Jan. 2025 – Apr. 2025 **Network Simulation with Mininet**, *EECS489 Lecture Project Series*.

- **Mininet Topology & Performance Measurement:**
  - Simulate the `iperf` insturction. Built custom Mininet networks and measured RTT/throughput with C++ socket library.
- **Video Proxy & Adaptive Streaming:**
  - Simulated a video-server proxy using `select/poll`.
  - Implemented round-robin load balancing for client request distribution.
  - Developed DASH support for adaptive bitrates based on client network conditions.
- **Transport-Layer Algorithm Emulation:**
  - Emulated TCP sliding window over UDP.
  - Implemented Go-Back-N and Selective Repeat strategy with both cumulative and selective acknowledgments.
- **L3 Router Simulation:**
  - Simulated a multi-interface Ethernet router with ARP cache.
  - Handled ICMP echo request/reply.
  - Implemented simple intra-domain routing logic.

Jan. 2025 – Apr. 2025 **Digital Forensics**, *EECS 388 Lecture Project*.

- **Cryptanalysis & Password Cracking:**
  - Analyzed and exploited cryptographic flaws (length-extension, padding-oracle).
  - Employed John the Ripper to recover passwords from encrypted PDF/ODT files.
  - Used Hydra for SSH login brute-forcing.
- **Web Exploitation:**
  - Enumerated and extracted sensitive data from a cyber range search engine.
  - Bypassed authentication via XSS and SQL injection attacks.
- **Binary Exploitation:**
  - Identified buffer-overflow vulnerabilities.
  - Developed ROP chains and NOP-sled techniques to evade DEP and ASLR defenses.
- **Reverse Engineering:**
  - Used Ghidra to decompile binaries to C code.
  - Located and documented software weaknesses for further exploitation.
- **Steganography Analysis:**
  - Detected hidden data in images using Binwalk, Stegseek, and similar tools.
- **Network Security & Protocols:**
  - Studied TLS 1.3 handshake mechanics and security properties.
  - Implemented a Google-style TOTP generator for two-factor authentication.

Sept. 2024 – Ongoing **Origami Inspired Soft Robotic Arm: A Modular Design**, *HDR Lab, Dept. of Robotics*.

- Design Kresling origami and pneumatic-actuation workflow and control algorithms for a confined-space soft robotic arm.
- Led STM32 and Orange Pi firmware development (dynamics, PID, CAN/I^2C communication).
- Implemented core algorithms in C++ and Rust; collaborated on PCB hardware design.

2023–2024 **Auto Sentry Robot Control**, *Chinese Univ. National Robot Competition – Robomaster Championship*.

- Autonomous navigation and engagement with dual gimbals and 4-wheel chassis on STM32-F407.
- Lead circuit design; dual-gimbal stabilization; high-speed 4-wheel chassis response.
- Developed CAN/UART pipelines for CV and LiDAR data; implemented IMU-based absolute-pose control.

Skills

Languages	C++, Python, C, Rust, MATLAB, Elm, ShellScript, Visual Basic
Frameworks	C++ Boost Concurrency Library (boost::thread, boost::mutex, boost::regex), C++/Python Socket, Free-RTOS, Django, Flexive RDK Platform, PyTorch, spdlog
Scripting	JavaScript, HTML
Databases	sqlite3
Security Tools	John-the-Ripper, Hydra, sqlmap, wireshark, Ghidra, Autopsy, StegSeek
Linux Tools	Git, Docker, GDB(codelldb), Mininet, Neovim, LSP(Mason), CMake, MakeFile, clang-format

Honors & Awards

Jun. 2024 **Cheng–Family Scholarship**.

May 2024 **23rd National College Robot Competition, RMUC (RoboMaster University Champion) Eastern Region Champion**.

Apr. 2024 **23rd National College Robot Competition, RMUL Champion**.

Dec. 2023 **Shanghai Jiao Tong University Excellece Scholarship, Level B**.

Nov. 2023 **University Physics Competition, Silver Medal**.

Nov. 2023 **Wu Jiong Sun Jie Sunshine Scholarship**.

Aug. 2023 **22nd National College Robot Competition, RMUC National Champion**.

Aug. 2023 **SJTU Social Practice, Third Prize**.

Extra Curriculars

2025 Volunteer at IEEE International Conference on Robotics and Automation (ICRA), Georgia Tech, May 2025

2024 Teaching Assistant at Shanghai Jiao Tong University, ENGR 1000J (Introduction to Software Engineering)

2023 UM-SJTU Joint Institute Youth Volunteer Team member (Shanghai, China).

2023 Old Friends Youth Team, Shanghai, Facilitated intergenerational communication activities.

Personal Details

Language English (TOEFL 103/120), Chinese (Mandarin)

Hobbies Playing Rubics Cube, Badminton, Moba Games