Yining (Nick) Guo

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Education

University of Pennsylvania - **Master of Science in Bioengineering** Aug 2022 - Dec 2023

Core courses: Biomedical image analysis, Rehab engineering and design, Brain-computer interfaces, Applied medical innovation, Machine learning, Internet of Things, Nanoscale systems biology, Embedded software, Design of mechatronic systems, etc.

Overall GPA: 3.64/4.00

Boston University - **Bachelor of Science in Biomedical Engineering** Aug 2018 - May 2022

Core courses: Programming for engineering, Microfluidics, Electrical circuits, Linear algebra, Principle of molecular cell biology, Systems physiology, Signals & controls, Engineering mechanics, Biomedical Measurement, Biomedical instrumentation, Intro to machine learning, etc.

Overall GPA: 3.52/4.00

Research & Project Experience

Auto-Navigation of Magnetically Controlled Microrobot in Fallopian Tube (Working Paper) - **Research Assistant** Aug 2024 - Present

- **Microrobot manufacturing**: Designed and fabricated the microrobot utilizing elastic material and magnetic particles, ensuring magnetization to achieve desired moving pattern under magnetic field.
- **System Development**: Complied and employed object detection and microrobot auto-navigation algorithms in both Python and C++. Designed GUI to enable integrated control of robotic arm, NIR laser, magnetic field generator (MFG) and DAQ.
- **Model Construction**: Developed a 3D uterus-fallopian tube model and established the navigation channel for the microrobot.

Robot for Competition in Game Setting - **Project Team Leader** Nov 2023 - Dec 2023

- **Program Development**: Developed C/Arduino programs for robot powering, Wi-Fi connection, UDP signal handling, I2C communication, and ESPnow messaging.
- **Robot Propulsion and Signal Processing**: Implemented unique robot propulsion with two continuous servo motors and self-designed auxilliary wheels. Achieved precise signal tracking and processing functionalities, including "vive" IR sensor-based object coordinate tracking, and IR pulse signal frequency tracking.
- **Navigation and Remote Control**: Established wall-following using ultrasonic sensors, enabling the robot to navigate without manual control. Developed a JavaScript-based web GUI for remote control, enabling steering and autonomous mode switching through sliders.
- Achieved second place in the class competition out of 17 teams.

Wi-Fi-Controlled Vehicle Project for Competition - **Project Team Leader** Sep 2023 - Oct 2023

- **Project Development**: Led the team to develop a Wi-Fi-controlled vehicle, designing a mobile base with an Ackerman steering mechanism.
- **Control System**: Designed an integrated proportional feedback control system, improving steering precision and stability.
- **Program Development and GUI Design**: Designed and implemented Arduino code for the car's mobile base and ESP32 microcontroller. Designed Arduino code for the web interface, motor actuation, and proportional feedback control.
- Achieved first place in the class competition, surpassing 34 groups.

Social Robot R&D for Elderly with Disability - **Project Team Leader** Sep 2022 - Dec 2022

- **Algorithm Development and 3D Modeling**: Compiled algorithms to enable robot to avoid obstacles and move autonomously in elder's household setting. Constructed 3D model for device packaging using CAD software.

- **Circuit Design**: Designed circuits to interact with the embedded system. Tested sensor modules, ensuring robot functionality.
- **Project Support**: Assisted team members with project proposals and presentations.

Multispectral 2-D Imaging Device for Superficial Tumor Detection - **Student Researcher** Sep 2021 - May 2022

- **Literature Review and Project Design**: Reviewed previous literature and designed methods and material improvements to optimize the imaging device's performance based on experimental conditions.
- **Algorithm Development**: Developed MATLAB algorithms to calculate pixel-level intensity of tissue images under red/near-infrared light, achieving high-precision imaging analysis.
- **Circuit Construction and Device Manufacturing**: Designed and built MOSFET transistor circuits to interact with the embedded system of the imaging device, ensuring stable signal transmission. Used CAD software and 3D printing technology to design and manufacture the device housing, enhancing practicality and durability.
- **Validation and Testing**: Designed and implemented a liquid optical phantom for validating the device in tumor detection senario.

Work Experience

Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences - **Research Assistant** Jun 2024 - Present

- **System Development**: Engaged in the construction and application-related development of magnetically controlled micro/milirobot and their control systems.
- **Project Management**: Assisted in the application, initiation, reimbursement, and conclusion of scientific research projects, and help resolve other engineering issues during project progress.

Extracurricular Activities

Intrauterine Device (IUD) Anchoring System - **Prototype Engineer** Jan 2023 - Dec 2023

- **Prototype Design**: Designed and manufactured initial prototype of an IUD anchoring system using CAD software, ensuring design meets functional requirements. Adjusted designs based on PI's feedback, optimizing the solution.
- **Analysis and Reporting**: Conducted market, reimbursement, and FDA regulatory analyses. Drafted project reports, ensuring compliance.
- **Activity Participation**: Participated in the activities of Penn Health Tech/I-Corp MedTech startup programs with PIs.

Skills

- **Programming languages**: Python (image&data analysis, ROS2, YOLOv5), C++/C (MFG control, Arduino IDE, ARM Keil for MCU development) , MATLAB (image &data analysis)
- **Embedded MCU development**: Arduino UNO, Raspberry Pi, Arduino Nano Sense, ESP32, ESP8266, STM32
- **Software usage**: Onshape, SolidWorks, Qt Designer (for GUI design), COMSOL, Adobe Illustrator
- **Engineering techniques**: 3D printer (Both SLA and FDM) and laser cut machine operation

Publication

Patent Application 1

- **Title**: "Microelectronic Cell Dynamics Detection Module, Cross-Range In Situ Cell Dynamics Monitoring System and Method"
- **Application Number**: CN202411157177.2
- **Status**: Under Preliminary Examination (China)

Patent Application 2

- **Title**: "Micron-level Magnetic-Controlled Cell Micro-Gripper System for Medical Detection and Diagnosis"
- **Application Number**: Currently not available
- **Status**: Under Preliminary Examination (China)