Jing-Yuan **Huang**

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Research Objective

My research interest lies in the hardware development, control, and human-robot interaction design for autonomous robots. My future goal is to become an industrial researcher and contribute to the development next-generation robots.

Education

National Taiwan University

Taipei, Taiwan

B.S. in Electrical Engineering — *Sep. 2019 - Jun. 2023*

- **Overall GPA** : 4.15 / 4.3 (3.94 / 4)
- **Last 60 credits** : 4.25 / 4.3 (3.98 / 4)
- **Selected Courses** : Robotics, Precise Motion Control, Control system, Mechanical Design, Machine Learning, Algorithm, Data Structure

Research Experience

Design and Evaluation of the infant Cardiac Robotic Surgical System (iCROSS)

2022 IEEE/RSJ IROS International Conference — *Mar. 2021 - May. 2022*

- Devised and implemented prototypes of cable roller tool drivers for various surgical instruments, such as clip appliers and forceps.
- Fabricated the system utilizing a combination of FDM, SLA 3D printing, and laser cutting techniques, achieving 1-millimeter precision.

Attitude Control Calibration and Experiment Testbed to Characterize Attitude Determination and Control System Performance

2022 Small satellite conference — *Feb. 2022 - Aug. 2022*

- Designed and evaluated a triaxial Helmholtz cage for a Nano-satellite testing system, achieving $< 5\%$ deviation within a $100\ mm^3$ volume.
- Conducted magnetic field measurements, analyzed the results with MATLAB simulations for homogeneity, linearity, and coupling.

Chandelier

2023 UIST[Manuscript submitted for publication] — *May. 2022 - Oct. 2022*

- Developed motor control boards employing TB6612 drivers and microcontrollers to effectively control 120 DC motors.
- Created ESP32 code to enable touch sensing and TCP communication for four user applications, enhancing human-computer interaction.

Project Experience

Sand-Art Robot

A sand-painting robot arm

- Contructed an open-source robot arm and created two novel end-effectors of sprinkling and scraping to perform sand painting.
- Modeled and fomulated a sand-painting path planning algorithm, resulting in processing input images into robot commands within 1 minute.

Ratrig V-CORE 3

An open-source 3D printer

- Revamped an open-source 3D printer, enhancing print quality through the addition of fans and adaptable enclosures.
- Fine-tuned the machine for a wide range of materials, including PLA, ABS, TPE, PETG, and carbon fiber nylon.

Sushirobot

An itamae sushi-making robot system

- Engineered a four-plated folding mechanism and a soft gripper by combining PLA and TPE materials in 3D printing.
- Developed ROS2 software to facilitate host synchronization with the robot arm and subsystems via serial, promoting seamless collaboration.

Magic Glove

A FPGA-based sign language recognition system

- Devised and crafted a glove featuring an IMU and bending sensors for real-time sign language recognition.
- Enhanced recognition accuracy by implementing Dynamic Warping, Viterbi algorithm on an FPGA.

Self-Tracing Robot Car

An automated car equipped with a fire detection and extinguishing system and remote control capability

- Fabricated a mechanical Crank rocker system for the extinguisher aiming mechanism, providing 20cm of vertical adjustment.
- Developed object detection code on a Raspberry Pi using OpenCV and established a remote control connection interface with a PC via Wi-Fi.

Work Experience

Digital Archive of Lin-Shan Lee
Taipei, Taiwan

Graphic Designer — *Sep. 2021 - now*

- Created key visual elements for the website, including graphic images, artistic animations, and logos, using Photoshop and Illustrator.
- Took charge of guiding website design and promoting communication and collaboration within the coding team during weekly meetings.

Cornerstone EECS Design and Implementation Course
Taipei, Taiwan

Teaching Assistant — *Feb. 2023 - June. 2023*

- Provided hands-on assistance to students in soldering, circuitry, and Arduino projects within the class.
- Delivered lectures on the usage of 3D printers and laser cutting, and conducted regular TA office hours in the Maker Space.

Zebra Tech.
Taipei, Taiwan

Mechanical Engineer Intern — *Jul. 2022 - Sep. 2022*

- Integrated an IMU and stretch sensors to perform sensor fusion for gesture recognition, enhancing user comfort during scanner operation.
- Designed PCBs for Ultra-wide band (UWB) tags and an ESP32 controller, enabling indoor positioning capabilities for warehouse scanner devices.

Tensor Tech.
Taipei, Taiwan

Hardware Engineer Intern — *Feb. 2022 - Jun. 2022*

- Simulated magnetic fields and designed 3 Helmholtz Coil devices using stacked phenol-formaldehyde resin plates to ensure structural strength.
- Engineered a 2-Axis platform for automated sun sensor calibration, significantly reducing manual operation time.

Skills

TOEFL score	102/120 (Reading: 29, Listening: 29, Speaking: 23, Writing: 21)
GRE score	323/340 (Verbal: 153, Quantitative: 170, Analytical Writing: 3.5)
Programming	MATLAB, C/C++, Python, HTML/Javascript/CSS, System Verilog, Labview
Hardware	Arduino series, STM32 series, ESP32 series, Respberry Pi, Jetson-Nano, MyRIO
Implementation	PCB design, 3D printing (FDM & SLA), Laser cutting

Honors & Awards

2023	**Grand award: Best application, ST Corp. Award 3rd Place**, MakeNTU	*Taipei, Taiwan*
2022	**Grand award: Best maker, NXP Corp. Award 3rd Place**, MakeNTU	*Taipei, Taiwan*
2021	**Grand award: 3rd Place**, National College Innovation and Cross-domain Integration Competition	*Taoyuan, Taiwan*
2019	**The High Distinction Award**, NTU general physics lab creative design contest	*Taipei, Taiwan*

Leadership and Extracurricular Activities

NTU Electrical Engineering Maker Space

Administrator — *Sep. 2020 - Jul. 2023*

- Managed the public space and provided guidance to users in 3D printing, laser cutting, coding, and hardware development.
- Delivered public presentations in academic salons, sharing experiences related to hardware development.

NTU Electrical Engineering Light Dance

Prop Group Project Leader — *Sep. 2020 - Jun. 2022*

- Led a team of 10 students in the design and implementation of props for characters, utilizing WS2812 LEDs, STM32 Bluepill, and Raspberry Pi.
- Developed testing code using C++ on a Raspberry Pi 4B to control WS2812 LED strips and LEDs with optical fibers.

NTU Electrical Engineering Student Association

Marketing Department President — *Sep. 2021 - Jun. 2022*

- Guided a student team in shaping the key vision for electrical engineering student events.
- Delivered lectures on visual and graphic design using Photoshop and Illustrator, reaching an audience of over 15 students.

Chaiyi and Yunlin Student Association Social Service Team

Curriculum and Instruction Section Chief — *Sep. 2019 - Feb. 2020*

- Devised the syllabus and multi-level experiments for instructing elementary school students in basic science and mathematics.
- Conducted a lecture explaining the principles of Arduino and its application in lighting up LEDs.