

CHIH-HAO (ANDY) TSAI

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Github Portfolio: <https://github.com/andytsai104/my-portfolio>

Education

M.S. in Robotics and Autonomous Systems

Arizona State University, Tempe, Arizona, United States

Aug. 2024 – May 2026

GPA: 3.5/4.0

Study Abroad Program in Electrical Engineering

Aachen University of Applied Sciences, Aachen, Germany

Mar. 2023 – Aug. 2023

GPA: 3.3/4.0

B.S. in Mechanical Engineering

National Taipei University of Technology, Taipei, Taiwan

Sep. 2019 – Jun. 2023

GPA: 3.03/4.0

Technical Skills

- **Programming:** Python (Advanced – PyTorch, TensorFlow, OpenCV), MATLAB (Intermediate – robot design & kinematics, control systems), Bash Scripting (Intermediate - HPC task automation), C/C++ (Entry)
- **Robotics & Systems:** ROS 2 (Intermediate – RViz, Gazebo, MoveIt), Path Planning & Motion Control (Intermediate), PID Control (Entry), Arduino (Entry)
- **Tools & Simulation:** Linux (Intermediate), Git (Intermediate), Simulink (Intermediate), SolidWorks (Entry)
- **Machine Learning:** Deep Learning, Reinforcement Learning, General ML Techniques (Intermediate)

Professional Experience

BELIV Lab, Arizona State University

Research Assistant

Jun. 2025 – Present

Mesa, Arizona

- Designing a multi-agent pedestrian controller in CARLA using a pre-trained Social LSTM model and an RL-based model to simulate realistic and aggressive behaviors.
- Extracted BEV features with Vision Transformer and trained the RL model via a Twin Delayed Deep Deterministic Policy Gradient (TD3) pipeline.
- Integrating the pedestrian model into reinforcement learning (RL) pipelines to improve autonomous vehicle behavior and safety.

Test Research Inc.

Intern

Jul. 2022 – Sep. 2022

Taipei, Taiwan

- Assembled and performed troubleshooting of main AOI machines, ensuring compliance with operational standards.

Academic Projects

Vision-Based Maze Solving & Path Planning with MyCobot Pro 600

Team Project (Team Leader)

Mar. 2025 – Apr. 2025

Tempe, Arizona

- Developed a ROS 2-based pipeline to control a 6-DOF robotic arm using camera-captured paths.
- Built a digital twin (URDF) with SOLIDWORKS for simulation in RViz and Gazebo.
- Applied OpenCV in Python to process maze images, including path extraction and skeletonization.
- Executed joint trajectories on both simulation and physical robot via TCP/IP, optimizing motion smoothness.

Control Systems Design and Implementation

Coursework Project

Feb. 2025 – Apr. 2025

Tempe, Arizona

- Developing and implementing control systems (digital, cruise control, liquid level, and pendulum stabilization) using MATLAB, Simulink, and Arduino Due.
- Implementing and testing PID/PI controllers through hardware-in-the-loop (HIL) simulations.
- Modeling and linearizing dynamic systems, including vehicle and liquid flow, for controller design.
- Conducting system identification and optimizing control strategies for stability and performance.

Robot Forward/Kinematics (ROS2 & Gazebo & MATLAB)

Team Project (Team Leader)

Feb. 2025 – Mar. 2025

Tempe, Arizona

- Built a simulation model in ROS2, Gazebo and Solidworks for the Dobot Magician Lite robotic arm.
- Simulated a SCARA robot and performed motion control in Simulink.
- Validated forward and inverse kinematics using MATLAB and Python scripts.

Autonomous Mobile Vehicle and Robotic Arm

Bachelor Project (Team member)

Feb. 2022 – Nov. 2022

Taipei, Taiwan

- Designed and built an autonomous vehicle equipped with a robotic arm for object relocation using object detection within a team of 4.
- Led the development and implementation of object detection using TensorFlow and OpenCV on a WebCam.
- Created 3D models of the vehicle body and robotic arm using SolidWorks for 3D printing.
- Integrated motor control, robotic arm motion, and object detection functionality using Arduino.

Generative AI – Deep convolutional GAN (DCGAN)

Coursework Project

Oct. 2024 – Dec. 2024

Tempe, Arizona

- Developed a DCGAN model to generate human face images by training on CelebA dataset.
- Optimized the hyperparameters of DCGAN and implemented image augmentation to improve model performance.
- Trained the model on customized datasets and fine-tuned hyperparameters to generate other types of images, such as cat faces and noisy colored squares

Image Segmentation with Vision Transformer

Coursework Project

Oct. 2024 – Nov. 2024

Tempe, Arizona

- Fine-tuned a Vision Transformer model for object-background segmentation tasks.
- Create object-focused images by applying Gaussian blur to the processed image backgrounds.
- Utilized another depth estimation transformer to estimate image depth with different extend of normalization.