

LIN JUNG PENG

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WORK EXPERIENCE

City Science Lab @ Taipei Tech, a cooperation with MIT Media Lab (Taipei, Taiwan)

Researcher (Full-time) – Robotics Team

- **NVIDIA Isaac Sim City Science Lab Digital Twin** Dec. 2024 - Present
 - Integrated multi-task scheduling system with Boston Dynamics Spot simulation in the City Science Lab digital twin environment.
 - Implemented robot control in Isaac Sim by combining ROS2 Navigation Stack (Nav2) for path planning with reinforcement learning for motion control.
- **Boston Dynamics Spot** Jun. 2024 - Present

TSMC Industry-Academia Research Project:

 - Utilized Spot's SDK and 3D-LiDAR localization based on ROS2 to enable precise remote control for the robot to navigate to designated locations for automated inspection tasks in industrial environments
 - Developed a map switching system and utilized AprilTag as Spot's initial position in maps to resolve the issue of being unable to load the entire map in a large factory environment
- **Bio-Inspired Quadruped Bionic Robot (Pangolin, Triceratops)** Jul. 2023 - Present

Pioneer Material Precision Technology Industry-Academia Research Project:

 - Focused on the circuit and control system development using Nvidia Orin Nano as the control computer and multiple Dynamixel servomotors to replicate the pangolin's unique curling ability
 - Enhanced the robot's perception by installing a Realsense D435 depth camera, integrated Nvidia Isaac ROS VSLAM and AprilTag SLAM for precise indoor localization
- **EV π (Autonomous Vehicle)** Jul. 2023 - Dec. 2023

Foxconn Technology Industry-Academia Research Project:

 - Aimed at deploying HHEV.OS and test effective communication and functional compatibility with ROS2 system
 - Integrated Foxconn's automotive middleware software HHEV.OS into the EV π control system
 - Ensured smooth assimilation into the current ROS2 system architecture while maintaining original functionality and improving overall system performance and reliability through enhanced security

Hardware Circuit Board Production:

 - Redesigned the EV π circuit system architecture to create a layered power supply system driven by a 36V battery
 - Produced various circuit boards needed for the task, including initial schematic design and PCB layout planning
- **Undergraduate Research Opportunities Program (UROP) Mentorship** Jul. 2023 - Present
 - Recruited and mentored undergraduates, taught them application skills and theories of robotics
- **Professional Skills Developed**
 - **Software:** C/C++, Python, Matlab, ROS2, git, Zenoh, HHEV.OS
 - **Hardware:** PCB Design, KiCad, Solidworks

Teaching Assistant (TA) at Application of AI and Advanced Robot Control Systems class Sep. 2024 - Present

Teaching Assistant (TA) at Urban Robotics & AI class Sep. 2024 - Present

EDUCATION

National Taipei University of Technology (Taipei Tech) (Taipei, Taiwan)

Bachelor of Science, Mechanical Engineering Sep. 2019 - Jun. 2023

Cum. GPA: 3.63/4.0 Last 60 GPA: 4.0/4.0 Class Rank: 2/51 Total Credits: 163

Academic Excellence Award: awarded for 4 times, respectively in 2/2022, 6/2022, 2/2023, and 6/2023

San-Yu Excellence Award: in recognition for top grades in academics, conduct, and physical education, with no disciplinary actions or absences; awarded for 6 times, respectively in 6/2020, 6/2021, 2/2022, 6/2022, 2/2023, and 6/2023

UNDERGRADUATE RESEARCH

Development of LiDAR-Based SLAM and Navigation System for Hexapod Robots

Feb. 2023 - Jun. 2023

MIT-Taipei Tech Collaboration City Science Lab UROP

- **Project Goal:** To develop a system using 2D-LiDAR for SLAM and navigation by integrating camera and AprilTag for precise final target localization and correction
 - Implemented movement control for a hexapod robot using ROS2 as middleware for joystick-controlled movement
 - Utilized Cartographer for SLAM algorithm to create 2D maps to develop autonomous navigation capabilities
 - Applied image processing techniques for camera-based AprilTag detection, to enable final movement correction after Lidar-based navigation to the target point

The Application of The Drone Combined with Image Processing

Feb. 2022 - Nov. 2022

In Collaboration with Aeroprobing Inc.

- **Project Goal:** To develop an autonomous drone system for line-following and material transportation.
 - Designed the drone using SolidWorks, constructed the frame with 3D printing and carbon fiber materials, and equipped it with a Pixhawk 4 Mini flight controller and Jetson Xavier NX as the main computer.
 - Utilized ROS as middleware, conducted simulation tests using Airsim, and covered functions like hovering, line following, traffic light detection, beanbag dropping and landing to enable autonomous navigation and task execution

COMPETITIONS AND ACHIEVEMENTS/AWARDS

2022 TSPE Research Project and Paper Competition (Taichung, Taiwan)

Feb. 2022 - Nov. 2022

- **Advanced to Semi-final;** authored the sections on flight control system and planning algorithms.

2022 Taiwan TDK Robocon (Aerial Robotics Group) (Tainan, Taiwan)

Feb. 2022 - Nov. 2022

- **Advanced to Semi-final;** realized auto line following, traffic light detection, beanbag dropping, and precision landing

2022 International PBL Competition Program @ Taipei Tech (Taipei, Taiwan)

Aug. 2022

- **Best Team Award;** a one-week International Collaborative Robotics Competition
 - Utilized an Arduino Mega board combined with a Pixy camera for image processing, two DC motors for movement control, a servo motor for operating a ping pong ball collector, and an ultrasonic sensor for detecting walls and four obstacle zones (sand, grass, white stones, and water) and collecting as many red balls as possible.

RoboCupJunior CoSpace Rescue Challenge (Montreal, Canada)

Top 4 in the Semi-final

Aug. 2018

FIRST Global Challenge Robotics Competition (Washington D.C., USA)

Rank: 17/163

Jul. 2017

INTERNSHIP

HIWIN Technologies Corporation (Taichung, Taiwan)

Jul. 2021 - Aug. 2021

- Completed a project titled "*Improvement of Automated Robotic Arm Utilization Rate*", aimed at optimizing the operational processes of production line robotic arms and increasing engineers' willingness and efficiency to use robotic arms for material handling; operated CNC machines, interpreted design blueprints, and learned CNC languages

Aeroprobing Inc. (New Taipei, Taiwan)

Nov. 2022 - Jan. 2023

- Integrated ROS and Yolov5 to control drones in Airsim for object detection and tracking to simulate drone inspection tasks in factory environments; utilized the Xilinx KV260 FPGA control board as the drone's control computer, and leveraged the Vitis AI system on FPGA to accelerate image processing and AI image recognition

CLUB & LEADERSHIP

Hip-Hop Dance Club @ Taipei Tech

Vice President

Jul. 2020 - Jun. 2021

Member

Sep. 2019 - Jun. 2023

CERTIFICATE

SOLIDWORKS CAD Design Associate (CSWA)

Feb. 2021