

LIN JUNG PENG

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WORK EXPERIENCE AS RESEARCHER

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

- **Boston Dynamics Spot** Jun. 2024 - Present
TSMC Industry-Academia Research Project:
 - Aim: to implement Boston Dynamics' Spot robot for automated inspection tasks in industrial environments
 - Methods and Techniques Involved:
 - Utilized Spot's SDK and 3D-LiDAR localization based on ROS2 to enable precise remote control for the robot to navigate to designated locations
 - Developed a map switching system and utilize 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
 - Choreographed Spot's movements using Boston Dynamics' Spot Choreography software for dance performances at various events, including NTU's opening ceremony and ITRI's evening gala
- **Pangolin-Inspired Quadruped Bionic Robot** Jul. 2023 - Present
Pioneer Material Precision Technology Industry-Academia Research Project:
 - Methods and Techniques Involved:
 - 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, and eventually developed the robot's autonomous navigation capabilities through the integration of the Nav2 navigation system
- **EV π (Autonomous Vehicle)** Jul. 2023 - Dec. 2023
Foxconn Technology Industry-Academia Research Project:
 - Aim: To deploy HHEV.OS and test effective communication and functional compatibility with ROS2 system
 - Methods and Techniques Involved:
 - 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 (such as voltage divider circuits, buck modules, fuse design, and CAN bus communication modules) and PCB layout planning
- **Undergraduate Research Opportunities Program (UROP) Mentorship** Jul. 2023 - Present
 - Actively mentored the UROP, a crucial activity for our lab to recruit passionate undergraduates in robotics technology and provide them with opportunities for in-depth research and practical application
 - Taught theoretical knowledge related to robotics, ensured students have a solid academic foundation, and inspired them to apply theory to practice in lab projects, with the aim to promote knowledge exchange and innovative thinking
- **Professional Skills**

- **Software:** C/C++, Python, Matlab, ROS2, git, Zenoh, HHEV.OS,
- **Hardware:** PCB Design, Solidworks

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
 - **Phase One:** Implemented basic movement control for a hexapod robot, by employing ROS2 as middleware for joystick-controlled movement
 - **Phase Two:** Utilized Cartographer for SLAM algorithm to create 2D maps, by integrating Nav2 to develop autonomous navigation capabilities
 - **Phase Three:** Applied image processing techniques for camera-based AprilTag detection, to enable final movement correction after Lidar-based navigation to the target point
 - **Skills:** Python, ROS2, Cartographer, Nav2, AprilTag

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.
 - **System Development:** 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.
 - **Software Integration:** Utilized ROS as middleware, conducted simulation tests using Airsim, and covered functions like hovering, line following, traffic light detection, beanbag dropping, and landing
 - **Image Recognition:** Based on OpenCV for detecting lines, traffic lights, and material drop locations, to enable autonomous navigation and task execution
 - **Skills:** Python, ROS, MAVROS, PX4, Image Processing, Airsim, SolidWorks
- **Achievement:** advanced to the semi-finals in the TDK Competition and TSPE Paper Competition

COMPETITIONS AND ACHIVEMENTS/AWARDS

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

Feb. 2022 - Nov. 2022

- **Advanced the 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 the Semi-final;** accomplished autonomous line following, traffic light detection, hovering, 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)

Aug. 2018

■ **Top 4 in the Semi-final**

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

Jul. 2017

■ **Rank: 17/163**

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

Continued Internship after completing the undergraduate project

- 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