

RESEARCH INTERESTS

Main topics: Robotics, Self-driving Car, Computer Vision, Machine Learning.

My research interests are robot perception and state estimation. I am particularly fascinated with dynamic simultaneous localization and mapping (SLAM). I am also interested in radar perception.

EDUCATION

National Yang Ming Chiao Tung University (NYCU)

(Original Name: National Chiao Tung University (NCTU))

Master of Science, Robotics

Advised by Prof. [Chieh-Chih \(Bob\) Wang](#)

Co-advised by Prof. [Wen-Chieh \(Steve\) Lin](#)

Overall GPA: 4.25/4.3

Hsinchu, Taiwan

Sep. 2019 – Sep. 2021

National Sun Yat-sen University (NSYSU)

Bachelor of Science, Electrical Engineering

Overall GPA: 3.97/4.3, Rank: 5/56

Kaohsiung, Taiwan

Sep. 2015 – Jul. 2019

PUBLICATIONS

Pou-Chun Kung, Chieh-Chih Wang, Wen-Chieh Lin, "Radar Occupancy Prediction with Lidar Supervision while Preserving Long-Range Sensing and Penetrating Capabilities", Under revision in RA-L 2022. [\[arXiv\]](#) [\[Video\]](#)

Chien-Cheng Fang, Pou-Chun Kung, Chieh-Chih Wang, Wen-Chieh Lin, "Target 3D Shape Estimation from a Low-Cost 4D Radar Module", Submitted to ICRA 2022. [\[Video\]](#)

Pou-Chun Kung, Chieh-Chih Wang, Wen-Chieh Lin, "A Normal Distribution Transform-Based Radar Odometry Designed For Scanning and Automotive Radars", ICRA 2021. [\[arXiv\]](#) [\[Video\]](#)

RESEARCH EXPERIENCE

Robot Perception and Learning Laboratory (NYCU)

Graduate Student

Advisor: Prof. Chieh-Chih Wang

Hsinchu, Taiwan

Sep. 2019 – Sep. 2021

Radar Occupancy Prediction with Lidar Supervision while Preserving Long-Range Sensing and Penetrating Capabilities

- Resolved the physical sensing discrepancies between radar and lidar in radar-to-lidar translation.
- Proposed sliding window inference to preserve radar penetrating capability in radar-to-lidar translation.
- Proposed that training in polar space has 4.2 times better IoU than in Cartesian space while extending a model trained with near-range data to long-range inference for polar-based sensors.

Target 3D Shape Estimation from a Low-Cost 4D Radar Module

- Extended our radar occupancy prediction work from 3D radar to 4D radar.
- Demonstrated the potential of converting low-cost 4D radar into 3D lidar-liked sensors.

A Normal Distribution Transform-Based Radar Odometry Designed For Scanning and Automotive Radars

- Developed a first radar odometry (RO) adapts to both automotive and scanning radars.
- Outperformed SOTA Automotive RO by reducing 51% Trans. and 17% Rot. error.
- Outperformed SOTA Scanning RO by reducing 30% Trans. and 29% Rot. error.

Existential Robotics Laboratory (UC San Diego)

Research Intern

Advisor: Prof. [Nikolay A. Atanasov](#)

San Diego, CA

Jul. 2019 – Sep. 2019

Project: Lidar Odometry with Pose Graph Optimization [\[Link\]](#) [\[Video\]](#) [\[Slide\]](#)

- Developed Lidar odometry using ICP and Factor Graphs (GTSAM).
- Deployed on real ground robot.

Advisor: Prof. Kao-Shing Hwang

Bachelor Project: ARDrone Indoor 3D Mapping and Navigation with LSD-SLAM [[Github](#)] [[Video](#)]

- Implemented LSD-SLAM with MultiSensor-Fusion EKF (fused with imu/sonar) on quadrotor to achieve autonomous indoor navigation.
- Won first place out of 26 teams in NSYSU College of Engineering Project Competition

Bachelor Project: ARDrone Face Recognition, Classification and Tracking

- Implemented face recognition (Haar Cascades), classification (InceptionV3), tracking (KLT tracker) and PID controller on quadrotor to achieve people tracking.

PROFESSIONAL EXPERIENCE

ADLINK Technology Inc.

Taipei, Taiwan

Case Job: Product Testing and User's Manual Writing

Mar. 2019 – Jun. 2019

- Tested SDK performance of Robot Operating System 2.0 (ROS2) Controller: [ROScube-X](#)
- Wrote [User's manual](#) and ROS2 introduction document. [[Slide](#)]

HyphaROS Workshop

Taipei, Taiwan

Developer & Teaching Assistant [[Website](#)]

Feb. 2018 – Mar. 2019

- Developed autonomous drone with Visual SLAM (LSD-SLAM, RTAB-Map) and VIO (VINS-Mono).
- Worked as teaching assistant in HyphaROS, which is the most famous advanced ROS training organization in Taiwan.

AI ROBOT@STSP

Tainan, Taiwan

Lecturer

Feb. 2018 – Aug. 2018

- Held ROS and mobile robot workshops in makerspaces and universities (9 workshops, 120 students).
- Taught lane following, traffic light detection, Lidar SLAM, and navigation using *KnightCar*.

INIKI ELECTRONICS CO. LTD.

Kaohsiung, Taiwan

Robotics Software Engineer

Jul. 2017 – Feb. 2019

- Developed a ROS autonomous platform: [KnightCar](#)
- Extended *Duckiebot* with 2D Lidar to achieve 2D SLAM and navigation. [[Github](#)] [[Video](#)]
- Implemented Lidar particle filter SLAM, EKF SLAM, AMCL localization, and A* path planning on the robot.
- Sold more than 200 KnightCars as the teaching material in 5 colleges in a year.

TEACHING EXPERIENCE

- **Teaching Assistant**, Human Centric Computing Spring 2021
- **Teaching Assistant**, Self-Driving Cars Fall 2020
- **Teaching Assistant**, Human Centric Computing Spring 2020

HONORS & AWARDS

- **Recipient of The Phi Tau Phi Scholastic Honor** - Award to 130 students every year (< 0.4%) Spring 2021
- **NYCU Academic Achievement Award** - Ranked 1st in a semester Fall 2020
- **NYCU Academic Achievement Award** - Ranked 1st in a semester Spring 2020
- **NYCU Academic Achievement Award** - Ranked 1st in a semester Fall 2019
- **NSYSU College of Engineering Project Champion** - First place out of 26 teams Fall 2018
- **NSYSU Excellent Student Award** - Top 3 students in a semester Fall 2018
- **NSYSU Excellent Student Award** - Top 3 students in a semester Spring 2017

SKILLS

Technical

- **Software** - C/C++, Python, ROS, ROS2/DDS, Linux, Tensorflow, Pytorch, MATLAB.
- **Embedded system** - PIC32 Series, Raspberrypi3, Nvidia TX2