Zi-Yan Liu

Hsinchu,Taiwan

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Education

National Tsing Hua University (NTHU) Hsinchu, Taiwan

Bachelor of Science, Interdisciplinary Program of Engineering(IPE)

Double Specialities: Power Mechanical Engineering , Physics Sep. 2016 - Jan. 2021

- Overall GPA: 3.48 (4.30 scale)
- Relevant Coursework: Deep Learning and Practice, Sensing and Intelligent Systems, Robotics, Self-Driving Cars, Introduction to Artificial Intelligence, The Introduction of Big Data, Control System, Linear System Theory

Work Experience

Artificial Intelligence and Multimedia Laboratory. (NYCU) Hsinchu, Taiwan

Research Assistant Mar. 2022 - Present

- Supervisors: Prof. Wen-Huang Cheng and Prof. Hong-Han Shuai
- Research Areas: Trajectory Prediction, Self-Supervised Learning, Prompt Tuning, Diffusion Models, Out-of-Distribution Detection
- Supported Project: **Assistive Integration System on Autonomous Vehicle**
  - Fused vision, Lidar, sound to predict pedestrians' movement and detect directions of specific vehicles
  - Constructed real-time data pipelines on Robot Operation System (ROS)
- Supported Project: **Improve Trajectory Prediction by Self-Supervised Mechanism and Visual Prompt Tuning**
  - Leveraged self-supervised learning methods in NLP to further improve trajectory prediction result
  - Introduced learnable visual prompts into vision-sequence model during downstream training
  - Preparing to submit to **ICCV 2023**

Assistive Robotics Group. (NYCU) Hsinchu, Taiwan

Research Assistant Mar. 2021 - Dec. 2021

- Supervisors: Prof. Hsueh-Cheng Wang
- Research Areas: Deep Reinforcement Learning, SLAM, Robotics, Communication, Localization, Planning, Navigation
- Supported Project: **Assistive Navigation System for Visual Impaired People**
  - Reformed indoor robots with add-on equipments to achieve semantic sound and haptic feedbacks for build navigation missions
  - Combined reinforcement learning for social environment navigation with ultra-wided bandwidth (UWB) localization system
- Supported Project: **Heterogeneous Unmanned Ground Vehicle and Blimp Robot Team for DARPA Subterranean Challenge**
  - Utilized SLAM, artifacts classification, control of robots with reinforcement learning to approach fully autonomous search and rescue system
  - Installed ultra-wided bandwidth (UWB) module to localize all vehicles to perform localizability-aware SLAM
- Published papers to **Field Robotics 2021** and **Frontier of Robotics and AI**

Industrial Technology Research Institute. (ITRI) Hsinchu, Taiwan

Software Engineer Intern Jul. 2020 - Dec. 2020

- Built fully automated pipelines to control unmanned ground vehicles for power plant cruising
- Integrated required hardware and communication interface

Publications

- C.-L. Lu, **Z.-Y. Liu**,J.-T. Huang,C.-I Huang, B.-H. Wang, Y. Chen, N.-H. Wu, H.-C. Wang, L. Giarré, P.-Y. Kuo. "Assistive Navigation using DeepReinforcement Learning Guiding Robot with UWB/Voice Beacons and Semantic Feedbacks for Blind and Visually Impaired People," In Frontier in Robotics and AI. 2021
- C.-L Lu*, J.-T. Huang*, C.-I Huang, **Z.-Y. Liu**, C.-C. Hsu, Y.-Y. Huang, S.-C. Huang, P.-K. Chang, Z. L. Ewe, P.-J. Huang, P.-L. Li, B.-H. Wang, L.-S. Yim, S.-W. Huang, M.-S Bai, H.-C. Wang. "A Heterogeneous Unmanned Ground Vehicle and Blimp Robot Team for Search and Rescue using Data-driven Autonomy and Communication-aware Navigation,"

In Field Robotics - Special Issue: Advancements and lessons learned during Phase I II of the DARPA Subterranean Challenge. 2021

Presentation

AutoTronics Taipei 2022 Taipei, Taiwan
Assistive Vision System for Autonomous Vehicle Jun. 2022

- Introduced background and challenges for autonomous driving in real world scenarios
- Presented utilized sensors, our software approach and innovation in the integrated system
- Demonstrated the system's real-time performance on participants in the audience

Hon Hai Research Institute Online
Learning Robust Representations from Simulation for Trajectory Prediction Apr. 2022

- Introduced prior works and bottlenecks in trajectory prediction discipline
- Presented an effective simulation environment for real traffic scenarios
- Explained background and theory of adversarial attack and its implementation in trajectory prediction

Other Academic Projects

Curriculum Reinforcement Learning for Navigation NYCU
Assistive Robotics Group 2021

- Implemented distributed distributional deterministic policy gradient for navigation among movable obstacles using TensorFlow
- Applied curriculum learning to stimulate deep reinforcement learning agent and achieve high reward space; dealt with complex tasks including passing narrow gates

3D Object Tracking and Localization NYCU
Self-Driving Cars Final Project 2021

- Used Iterative closest point algorithm to estimate self-driving car positions with a given point cloud map using C++ and PCL
- Participated in Argoverse 3D Tracking Competition detecting and giving location for every object in the scene using C++ and PCL

Brandname Detection NYCU
Deep Learning and Practice Final Project 2021

- Achieved by finetuning on a coco-pretrained R50-FPN Mask R-CNN model
- Obtained stable detection results for dozens of products in arbitrary angles at one time

Logistics in Simulation NYCU
Sensing and Intelligent Systems Final Project 2021

- Localized assigned products and estimated the proper pose for gripping
- Picked the product then delivered to assigned location

Cancer Analysis on Kidney Images NTHU
Drug Targeting Lab 2020

- Published one paper: Delivery of Sorafenib by Myofibroblast-targeted Nanoparticles for the Treatment of Renal Fibrosis. **Journal of Controlled Release 2022**
- Utilized CV methods to verify the cover rates of target therapy medicine on cancer distribution of kidney slices

Skills

- **Programming Languages:** C, C++, Python, MATLAB, Lua
- **Deep Learning Framework:** TensorFlow, PyTorch
- **Software, Middleware, and Libraries:** Git, ROS, Docker, OpenCV, Open3D, PCL
- **Hardware:** Raspberry Pi, Jetson TX2, Arduino, Digi XBee, Pozyx UWB Kit, Apriltags

Extracurricular Activity

IEEE INTERNATIONAL CONFERENCE ON MULTIMEDIA AND EXPO (ICME) 2022 Online
Organizing Staff Aug. 2022

- Arranged paper presentation sessions
- Coordinated with committee members on program details