Yuchen Song

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Education

University of California, San Diego   *Sept. 2023 - Jun. 2025*
MS in Electrical and Computer Engineering   **GPA:** 4.0/4.0 [Trans.]

- **Coursework:** Introduction to Robotics, Sensing and Estimation in Robotics, Robot Manipulation and Control, Machine Learning for Robotics, Planning and Learning in Robotics.

South China University of Technology   *Sept. 2018 - Jun. 2023*
BEng in Robotics Engineering & BEcon   **GPA:** 3.83/4.0 [Trans.]

- **Coursework:** Machine Vision and Sensing System, Embedded System and Design, Classical/Modern Control Theory, Theory and Technology of Robotics, Industrial Robots and Applications.

University of California, Berkeley   *Jun. 2020 - Aug. 2020*
Visiting student

- **Coursework:** CS61BL: Data Structures and Programming Methodology.

Publications

* indicates equal contribution

3D-Spatial Multimodal Memory   *Under Review*

Xueyan Zou, **_Yuchen Song_**, Ri-zhao Qiu, Xuanbin Peng, Jianglong Ye, Sifei Liu, Xiaolong Wang

WildLMa: Long Horizon Loco-Manipulation in the Wild   *Under Review*

Ri-zhao Qiu*, **_Yuchen Song*_**, Xuanbin Peng*, Sai Aneesh Suryadevara, Ge Yang, Minghuan Liu, Mazeyu Ji, Chengzhe Jia, Ruihan Yang, Xueyan Zou, Xiaolong Wang

Learning Generalizable Feature Fields for Mobile Manipulation *Under Review*

Ri-zhao Qiu*, Yafei Hu*, **_Yuchen Song*_**, Ge Yang, Yang Fu, Jianglong Ye, Jiteng Mu, Ruihan Yang, Nikolay Atanasov, Sebastian Scherer, Xiaolong Wang

Experience

Depth Supervised Multi-View Stereo Neural Radiance Fields   *Jul. 2022 - Aug. 2022*
Research project with professor Huazhe Xu, THU

- Performed Structure from Motion with COLMAP on collected images to extract depth from point cloud
- Applied depth supervision on Multi-View Stereo (MVS) NeRF pretrained on DTU dataset
- For a new scene with only a few images as sparse input, DS-MVSNeRF can achieve better results with fewer artificial floaters and higher rendering results (PSNR 1.2 ↑) with less training effort (7h → 20min)

Reinforcement Learning in Traffic Merging Scenario   *Sept. 2021 - Mar. 2022*
Research project with professor Yuan Lin, SCUT

- Used Simulation of Urban MObility (SUMO) software to build the parallel-typed merging scenario, and registered it as a customized environment in gym
- Applied Traffic Control Interface (TraCI) to control intelligent agent (ego vehicle) with SUMO predefined driver models and deployed reinforcement learning algorithms
- Conducted experiments and the RL policy was shown to work well (93% success merge, 73% ↓ on jerk)

Lymph Node Sections for Cancer Detection Based on Deep CNNs   *Jul. 2021 - Aug. 2021*
Kaggle prediction competition

- Applied various kinds of CNNs on the dataset from Kaggle and achieved 85% accuracy in image classification
- Made comparisons among the most famous architectures like VGG16, ResNet-18, and EfficientNet
- Conducted experiments to emphasize the importance of pre-trained weights for these networks
- Designed a user-interface based on PyQt5 and made a chatbot based on NLTK

Projects

LiDAR-Based SLAM and Visual-Inertial SLAM   *Jan. 2024 - Mar. 2024*
ECE276A course project

- Synchronized data from encoder, IMU, LiDAR scans and camera with closest time steps
- Performed encoder and IMU odometry with differential drive model
- Matched consecutive LiDAR scans with iterative closest point (ICP) and Kabsch algorithm
- Built occupancy map with Bresenham's algorithm, projected camera images to ground
- Conducted pose graph optimization with factor graph SLAM using loop closure technique
- Initialized trajectory with pose kinematics motion model and initialized landmark location with triangulation
- Mapped landmarks via EKF update with stereo camera observation model on the predicted trajectory
- Corrected localization with EKF prediction and update steps on mapped landmarks
- Combined the previous two steps for simultaneous localization and mapping with Extended Kalman Filter

Robotic System Design with Robot Operating System (ROS)   *Oct. 2023 - Dec. 2023*
CSE276A course project

- Modeled the robot with a bicycle model, employing PID control to drive the robot to the desired waypoints
- Conducted calibration of the onboard camera, utilized Apriltag detection method for landmark identification, and performed coordinate transformations with TF module in ROS to achieve robot localization
- Defined a trajectory for the robot car, leveraging Kalman Filter to do SLAM
- Applied A* and RRT planner algorithms to build a roomba-like robot

Design & Manufacturing of Robot Cars   *Sept. 2019 - Jun. 2022*
Undergraduate course projects

- Designed four versions of cars and accomplished the goals: **the first one** could achieve line tracking and cargo delivering; **the second one** could be controlled via Bluetooth and shoot balls (ping-pong ball, pickle ball, and tennis ball) to a specific area; **the third one** was able to conduct wireless charging and electricity storage during the cruise; and **the fourth one** was designed comprehensively to implement obstacles avoidance, line tracking, object detection, grasping and unloading
- Tools Used: C, Arduino, STM32, OpenMV, Solidworks, Cura

Skills

Programming: Python, Java, C++, C, MATLAB, and R

Tools: PyTorch, ROS, PyBullet, Simulink, and Solidworks, Git, LaTeX, Photoshop, Premiere Pro

Languages: Chinese (Native), TOEFL 106 [Cer.], GRE 327+3.5 [Cer.]