GUOLIANG YOU

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EDUCATION

University of Science and Technology of China (USTC), Hefei, China *Sept.2019 - Jun.2025*
Ph.D. Candidate in Computer Technology
Graduate Fellow in Lab for Intelligent Networking and Knowledge Engineering
Advisor: Prof. Yanyong Zhang, *Fellow, IEEE*, and Assoc. Prof. Jianmin Ji
Thesis: End-to-End Perception and Planning Algorithms for Autonomous Driving
Committee: Prof. Guoliang Chen, Prof. P.R.Kumar, Prof. Wei Zhao, Prof. Xiaotie Deng, Prof. Lionel
M. Ni, Prof. John C.S. Lui, Prof. Shanghua Teng, Prof. Yunhao Liu, Prof. Yong Rui

Anhui University of Science and Technology (AUST), Huainan, China *Sept.2014 - Jun.2018*
Bachelor of in Applied Physics
Advisor: Assoc. Prof. Bing Wang

RESEARCH EXPERIENCE

Reasoning Grasping Based on Implicit Affordance Maps with VLMs *Oct.2024 - present*
Advisor: Prof.Yanyong Zhang & Assoc.Prof.Jianmin Ji *USTC*

· We propose a method that utilizes VLMs and chain-of-thought to reason about implicit grasping requirements. By inputting human implicit demands and scene point clouds into the vision large language model, the grasping actions, grasping points and the pose of the robotic arm are inferred based on the perceived materials, shapes and the center of gravity of objects.

Sparse Camera & LiDAR Fusion for Autonomous Driving *Feb.2024 - Sept.2024*
Advisor: Prof.Yanyong Zhang & Assoc.Prof.Jianmin Ji *USTC*

· We proposed a novel sparse camera and LiDAR fusion algorithm to enhance perception and planning in autonomous driving. By effectively integrating multi-modal sensor data with lane-level sparse priors, the approach reduces computational overhead while ensuring high accuracy and robustness in complex environments, ultimately improving the precision and robustness of both perception and planning.

Transformer-Enhanced Multi-View Autonomous Driving *Jan.2023 - Jan.2024*
Advisor: Prof.Yanyong Zhang & Assoc.Prof.Jianmin Ji *USTC*

· We focused on integrating perception and planning and constructed a brand-new lane-level autonomous driving system. Utilizing the Transformer architecture, distinctive lane-level data structure, and sparse lane-level queries, we efficiently extracted traffic features from multi-camera. By combining feature-level and result-level fusion techniques, we maximized the utilization of network features. This resulted in a system with both high computational efficiency and improved planning safety

Domain Adaptation In Reinforcement Learning *Apr.2022 - Dec.2022*
Advisor: Prof.Yanyong Zhang & Assoc.Prof.Jianmin Ji *USTC*

· We proposed a novel prompt-based model transfer algorithm to address the challenges of transferring reinforcement learning models from simulated environments to real-world autonomous driving applications. This approach improved the generalization of models trained in simulation to dynamic real-world traffic conditions. Our work aimed to bridge the simulation-to-reality gap, enhancing the robustness and adaptability of autonomous driving systems in unstructured environments.

Reinforcement Learning for Autonomous Driving *Aug.2021 - Mar.2022*
Advisor: Prof.Yanyong Zhang & Assoc.Prof.Jianmin Ji *USTC*

· We proposed a reinforcement learning framework for autonomous driving, focusing on end-to-end path planning and multi-agent coordination in dynamic traffic environments. The framework allowed vehicles to make real-time decisions by addressing challenges such as sparse feedback and high-dimensional state spaces. Our research improved the adaptability and robustness of autonomous systems, enabling them to efficiently plan paths and interact with other agents, with a strong focus on real-world applicability.

Rule-based Decision Making And Motion Planning · Jan.2020 - July.2021
Advisor: Prof.Yanyong Zhang & Assoc.Prof.Jianmin Ji · *USTC*

· We researched rule-based autonomous driving planning and decision-making algorithms for outdoor environments, providing a foundation for future research on perception and planning algorithms. We also build and iterate the hardware platform for the autonomous driving" car (Sonic), enabling it to gather data and perform system testing.

INTERN EXPERIENCE

Hefei Comprehensive National Science Center, Hefei, China · Feb.2022 - Jan.2023
Research Intern at Artificial Intelligence Research Institute Mentor: Assoc. Prof. Jianmin Ji

We applied reinforcement learning to autonomous driving, focusing on path planning and multi-agent coordination in complex traffic scenarios. Building on this work, we identified challenges in transferring models from simulation to real-world environments and developed a novel prompt-based transfer algorithm to enhance model generalization. This research aimed to bridge the simulation-to-reality gap, improving the robustness and adaptability of autonomous systems in dynamic traffic conditions.

PUBLICATIONS

[1] **You G**, Yang Y, Jiang T, et al. Collision Avoidance for An Ackermann-Steering Vehicle via Map-Based Deep Reinforcement Learning.

[2] **You G**, Chu X, et al. Perception Helps Planning: Facilitating Multi-Stage Lane-Level Integration via Double-Edge Data Structures, IEEE Robotics and Automation Letters (RA-L).

[3] **You G**, Chu X, et al. P^3O: Transferring Visual Representations for Reinforcement Learning via Prompting, IEEE International Conference on Multimedia and Expo (ICME).

[4] **You G**, et al. LFP: Efficient and Accurate End-to-End Lane-Level Planning via Camera-LiDAR Fusion, Submitted to IEEE International Conference on Intelligent Robots and Systems (IROS).

[5] Chu X, Deng J, **You G,** et al. RaCFormer: Towards High-Quality 3D Object Detection via Query-based Radar-Camera Fusion, IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR).

[6] Chu X, Deng J, **You G**, et al. RayFormer: Improving Query-Based Multi-Camera 3D Object Detection via Ray-Centric Strategies, ACM Multimedia (ACM-MM).

[7] Chu X, Deng J, **You G,** et al. GraspCoT: Integrating Physical Property Reasoning for 6-DoF Grasping under Flexible Language Instructions, under review.

[8] Duan Y, Zhang X, Li Y, **You G**, et al. CELLmap: Enhancing LiDAR SLAM through Elastic and Lightweight Spherical Map Representation, IEEE International Conference on Robotics and Automation (ICRA).

[9] Li X, Duan Y, Wang B, Ren H, **You G**, et al. EdgeCalib: Multi-Frame Edge Features for Automatic LiDAR-Camera Calibration, IEEE Robotics and Automation Letters (RA-L).

[10] Duan Y, Zhang X, **You G**, et al. Rotation Initialization and Stepwise Refinement for Universal LiDAR Calibration, Submitted to IEEE Transactions on Robotics (T-RO).

[11] Li X, Duan Y, Wang B, Ren H, **You G**, et al. ElectricSight: 3D Hazard Monitoring for Power Lines Using Low-Cost Sensors, Submitted to IEEE Robotics and Automation Letters (RA-L).

[12] Software Copyright: Autonomous Driving Navigation and Obstacle Avoidance System Software Based on Self-Play and Trajectory, China National Copyright Administration, 2022SR0670269

[13] Patent: End-to-End Obstacle Avoidance Method for Autonomous Driving Based on Deep Reinforcement Learning, China National Intellectual Property Administration, CN115469663A

[14] Patent: A Method and Device for Visual Representation Transfer, China National Intellectual Property Administration, CN116486186A

[15] Patent: An End-to-End Autonomous Driving Algorithm for Aggregated Perception and Planning, China National Intellectual Property Administration, CN118683571A

PARTICIPATED GRANTS

R&D Application of Embodied AI Platform for Industrial Robots　　*2024 - Present*
- Hunan Province Major Scientific and Technological Program No.2024QK2001

Robot Knowledge Graph Generation and Offline Programming Platform　*2023 - Present*
- National Key Research and Development Program of China under Grants No.2023YFB4704500

R&D of High-Performance, High-Reliability Domain Controller Systems　*2020 - 2024*
- Key-Area Research and Development Program of Guangdong Province No.2020B0909050001

Meta-model driven Open Environment Adaptive Perception　　*2019 - 2023*
- National Key Research and Development Program of China under Grants No.2018AAA0100500

TEACHING EXPERIENCE

Teaching assistant for CS 01113502 Computer Architecture, USTC　*Mar.2022 - Jun.2022*
- Weekly office hours for Q&A, and handle assignments and exams.

- Lab instruction on RISC-V, Tomasulo simulator, and multi-cache coherence simulator.

Teaching assistant for CS 01113502 Computer Architecture, USTC　*Mar.2021 - Jun.2021*
· - Weekly office hours for Q&A, and handle assignments and exams.

- Lab instruction on RISC-V, Tomasulo simulator, and multi-cache coherence simulator.

Teaching assistant for DSCI6003P01 Reinforcement Learning, USTC *Sept.2020 - Nov.2020*
· - Weekly office hours for Q&A, and handle course papers.

- Lab instruction on analyzing basic RL algorithms and their application in autonomous driving.

PROJECT EXPERIENCE

· **Development of Autonomous Driving System for Tunnel**　　*Dec.2022 - Jan.2024*
Project Leader

Developed global & local path planning algorithms for complex driving scenarios; devised parking algorithms to guarantee precise parking both on the roadside and within parking lots; formulated convoy driving algorithms by utilizing vehicle-to-vehicle communication for coordinated convoy movement; and implemented hazard detection in cooperation with remote control systems to ensure operational safety. Moreover, we designed a perception module dedicated to capturing the static and dynamic elements of traffic environments in underground mine scenarios.

Meta-model Driven Open Environment Adaptive Perception　　*Sept.2019 - Mar.2023*
Hardware & Planning Algorithm Leader

We built the hardware platform for Sonic, an autonomous driving vehicle, designed a sensor configuration, and developed rule-based navigation algorithms. Additionally, we proposed and implemented an end-to-end navigation algorithm for autonomous driving on Sonic. We also created a time synchronization system to ensure the accuracy of data from multiple sensors on the vehicle.

Intelligent Vehicle-Infrastructure Cooperative Systems Project   *Jun.2020 - Sept.2020*
Sensor Data Fusion Module Leader

Fused roadside sensor data with pedestrian and vehicle GPS data to provide real-time ground truth information on object pose. Solved the time synchronization problem of vehicle and pedestrian GPS data and roadside measurement unit data using 1PPS/GPRMC pulse synchronization and PTP time synchronization technologies.

AWARDS

- *Sept.*2024 · The Second Class Scholarship of School of Computer Science & Technology, USTC
- *Dec.*2023 ·The Second Prize for Outstanding Individuals in LINKE Lab, School of Computer Science & Technology, USTC
- *Sept.*2023 · The First Class Scholarship of School of Computer Science & Technology, USTC
- *Sept.*2022 · The Second Class Scholarship of School of Computer Science & Technology, USTC
- *Sept.*2021 · The Second Class Scholarship of School of Computer Science & Technology, USTC

CAMPUS ACTIVITIES

- *Sept.2023·* GOSIM Workshop - Invited talk - Global Open-Source Innovation Meetup (GOSIM)
- *Aug.2021* · ACM China Turing Award Celebration Conference - Volunteer - ACM
- *Jul.2020* · Information Intelligence Summit Forum - Volunteer - USTC
- *Oct.2019* · Open Source High-Performance Computing Seminar - Volunteer - Google
- *Oct.2016* · Tencent Cloud Campus Workshop - Organizer - Tencent

TECHNICAL STRENGTHS

Computer Languages	Python, C/C++
Tools	Pytorch, TensorFlow, Gazebo, Carla, Linux, ROS, Docker, git, LaTeX