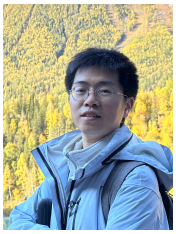

Pengfei Zhang

xiya852234496@gmail.com
+86 18810929052
Personal Website
Haidian District, Beijing, China

Summary of Qualifications

Algorithm engineer at a leading autonomous driving company with expertise in motion planning and decision-making algorithms. Skilled in robotic platforms such as underwater robots, vehicles, and drones,with the capability to build complete robot systems from scratch. Published 15+ research papers (6 as first author) and excel in proposing innovative solutions in robotics and AI.

Education

Institute of Automation, Chinese Academy of Sciences, Beijing, China 2017.09 – 2022.07

Ph.D. Control Science and Engineering

Central South University, Changsha, Hunan, China 2013.09 – 2017.07

B.S. Detection Guidance and Control Technology

Research Experience

Institute of Automation, Chinese Academy of Sciences, Beijing, China 2017.07 – 2022.07

Graduate Researcher

Developing a novel robotic fish inspired by the hitch-hiking behavior of remoras to enhance the endurance and operational capabilities of existing robotic fish. The specific contents include:

- Development of a prototype of robotic fish with an adhesive system, construction of a multi-modal dynamic model, and establishment of a visual simulation environment.
- Design and implementation of underwater stereo visual-inertial localization methods with refraction correction and an LED-marker-based underwater fisheye vision localization method.
- Design and implementation of multiple controllers (NMPC, SMC, and DOBC) for controlling the position, depth, and heading of a robotic fish.
- Achievement of fully autonomous hitchhiking behavior in response to both stationary and moving hosts using the presented robotic remora and its algorithms.

The related technologies encompass robotic system development (mechanical design, electronic systems, and control software), dynamic modeling and simulation, visual localization, and motion control for underactuated systems.

Work Experience

Baidu, Inc., Beijing, China 2022.07 – present

Senior Algorithm Engineer for Autonomous Driving Decision-Making and Planning

Developing the advanced motion planner and the behavior decider tailored for complex and uncertain environments. The specific contents include:

- Design and implementation of fast and stable motion planning algorithms, including the development of optimization solvers (e.g., iLQR, L-BFGS, Projected Gradient), formulation of optimization problems (e.g., trajectory model, convex corridor, ESDF), and generation of initial solutions.
- Design and implementation of a spatiotemporal behavior decider for uncertain environments, leveraging a sampling-evaluation framework. Key components include heuristic tree sampling, risk-aware cost evaluation, and rulebook-based candidate selection.
- The proposed methods have been widely applied in over 500 fully autonomous robotaxis, with the path planner independently developed being one of the key foundational modules.

The related technologies include constrained optimization algorithms (e.g., iLQR, ADMM, L-BFGS, PGM, IPM), sampling and search methods (e.g., A*, RRT), and decision-making algorithms (e.g., MDP, POMDP, MCTS).

Publications

I have published over 15 papers as the first author and co-author (GoogleScholar). A selection of my work is presented below:

Autonomous dynamic hitch-hiking control of a bionic robotic remora, *IEEE Transactions on Industrial Electronics*, vol. 71, no. 3, pp. 2893–2902, 2023

Development and control of a bio-inspired robotic remora for hitch-hiking, *IEEE/ASME Transactions on Mechatronics*, vol. 27, no. 5, pp. 2852–2862, 2022.

Reaction-wheel-based roll stabilization for a robotic fish using neural network sliding mode control, *IEEE/ASME Transactions on Mechatronics*, vol. 25, no. 4, pp. 1904–1911, 2020.

Nonlinear model predictive position control for a tail-actuated robotic fish, *Nonlinear Dynamics*, vol. 101, no. 4, pp. 2235–2247, 2020.

An open-source, fiducial-based, underwater stereo visual-inertial localization method with refraction correction, in *Proceedings of IROS 2021*, pp. 4331–4336, 2021.

Technical Skills

- Experienced in independently building complete robotic systems, with a strong familiarity in technologies such as mechanical design (SolidWorks), PCB design (Altium Designer), embedded programming (STM32, ESP32), and GUI programming (QT).
- Familiar with theories related to motion planning, motion control, robot localization, and deep reinforcement learning.
- Familiar with C++, Python, MATLAB, Linux, ROS, Issac Sim

Honors and Awards

- Baidu Innovation Award, 2023
- Outstanding Graduate of Beijing, 2022
- Climbing Scholarship of Institute of Automation, 2021
- Outstanding Graduate of Hunan Province, 2017
- National Scholarship, 2014