Zelong Xu

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EDUCATION

South China University of Technology **Sep 2018 - June 2022**

Bachelor of Engineering (Information Engineering) **Guangzhou**

The Hong Kong University of Science and Technology **Sep 2024 - now**

Master of Philosophy (Electronic and Computer Engineering) **Hong Kong**

WORK EXPERIENCE

Guangdong Epropulsion Technology Co., Ltd. **July 2022 - present**

Embedded Software Engineer **Dongguan**

- Main Developer of MPU and Internet of Boat
- Masterfully engineered and implemented a range of essential software functionalities using Linux and ROS systems, including Over-The-Air (OTA) updates, comprehensive ship data integration and reporting, and sophisticated navigation log systems.This work contributed significantly to the advancement of maritime operations' intelligence and enhance my coding ability on tcp connection, data processing and interaction, linux and ROS system.
- Participated in the development of certain functionalities within the Advanced Driver Assistance Systems (ADAS), involving the acquisition of GPS data and its subsequent processing. This included real-time comprehensive location tracking, optimizing data filtering techniques to enhance accuracy. Additionally, Constructed a framework for serial communication interaction between the Vehicle Control Unit (VCU), the Internet of Boat (IOB), and the Advanced Driver Assistance Systems (ADAS), ensuring the stability of internal communications. This involved developing a robust protocol for data exchange, implementing error-checking mechanisms to maintain the integrity of the transmitted information.

RESEARCH EXPERIENCE

Postgraduge Project: Fully autonomous docking system suitable for small sized vessels **Sep 2024 - now**

- Designed a four-layer autonomy stack (perception, HMI, path planning, motion control) for end-to-end docking in narrow waters (marinas, buoys), emphasizing deployability and reliability.
- Implemented a hybrid A + Reeds–Shepp (RS)* planner on cost maps, fusing obstacle clearance, channel deviation, and steering effort to generate low-risk, dynamically feasible reference paths in real time.
- Built a 3-DoF vessel model and formulated NMPC with constraints on thrust, rudder angle, angular rate, and minimum standoff distance for robust path tracking. Converted NMPC outputs to executable thrust/rudder commands, improving convergence and disturbance rejection during terminal alignment and berthing.
- Conducted simulation validation in VRX (ROS 2 + Gazebo), demonstrating the full pipeline from far-field guidance to final berthing in cluttered environments.

Undergraduate Thesis: Fine-grained Classification of Bone Marrow Cells Using Deep Learning Nov 2021 - Jun 2022

- Utilized the Pytorch framework
- To improve the accuracy of fine-grained image classification of bone marrow cells, evaluated and contrasted three cell classification algorithmic models: the Resnet50, Pairwise Interaction Network, and the Attention Pyramid Model
- To address the issue of the lack of bone marrow cell datasets, conducted an analysis of diverse data augmentation strategies, encompassing conventional methods, Progressive GAN, and Style GAN2, to ascertain their impact on model performance.
- The Attention Pyramid model improved the accuracy of classification, while Style GAN2 augmented the dataset.I combine Pyramid Model with Style GAN2, culminating in further improvement in the fine-grained classification accuracy of bone marrow cells.

SCUT Robotics Lab - RoboMaster National University Student Robot Competition

Embedded Team Member **Sep 2019 - Aug 2020**

- Main developer in Engineer robotic vehicle for the RoboMaster competition.
- Utilized a cascaded control system, employing both velocity and position loops to control the motor's rotation angle and speed,facilitated high-speed movement of the robot's chassis and precise control of the upper task execution structures.
- To verify the trajectory of robot movement and prevent damage to the mechanism from untested logic, utilized Coppeliasim to simulate finite state machine algorithms for automating the ammunition reloading process.

Vice Captain & Embedded Team Leader **Sep 2020 - Aug 2021**

- Spearheaded the development of a robotic arm as the Vice Captain and Embedded Team Leader.
- Achieved simulation of the six degrees of freedom in the robotic arm's joint movements using a combination of Coppeliasim simulations and Matlab computations.
- Enhanced the arm's motion smoothness using cascaded control systems and polynomial interpolation algorithms.

All terrain unmanned epidemic prevention robot based on cantilever six wheel chassis **May 2020 - May 2021**

National College Students' Innovation and Entrepreneurship Training Program

- Main software developer of an innovative all-terrain unmanned epidemic prevention robot, a project in the field of robotic epidemic response.
- Responsible for the selection of the robot's main controller and sensors, aligning with the project's functional requirements.
- Employed cascaded control systems to masterfully orchestrate the movement of the robot's chassis and its epidemic prevention disinfection mechanism, ensuring seamless operation in diverse environmental conditions.

ACADEMIC PROJECTS

Computer Vision-Based Study Room Seat Availability System **Mar 2021 - June 2021**

- Main developer in vision detection
- Applied the YOLOv4 model for object detection, training the model to accurately identify occupied and available seats.
- Integrated detection results into a database, which were then displayed on a mobile application, providing users with real-time information about seat availability.

Tigery – Intelligent Logistics Transport Unit **Apr 2021 - Aug 2021**

- Enhanced an existing manually operated robotic arm by installing additional equipment, including laser lidar, to advance its capabilities.
- Integrated Google's open-source Cartographer library for precise location mapping, crucial for the robot's navigational accuracy.
- Utilized the Navigation stack in ROS for strategic path planning and velocity computation, vital for smooth navigation.
- Successfully implemented the system to automatically calculate and transmit linear and angular velocities to the lower-level machinery, achieving full automation in grasping and transportation tasks.

Prize-awarding robot for Internet+ Event **Nov 2020**

- Led a project to refurbish a robot for the prestigious Internet+ award ceremony, tasked with delivering trophies on stage.
- Designed the electronic scheme for the robot, incorporating pneumatic control devices to manage air pumps, integrating them with the robot's control system, and programming the control logic to achieve the gripping and lifting of trophies.

EXTRA-CURRICULAR ACTIVITIES

South China University of Technology Outstanding Talents Robomaster2020 Summer Campus **Aug 2020**

South China University of Technology Outstanding Talents Robomaster2021 Winter Campus **Jan 2021**

Teaching Assistant

- Provided guidance and assistance to high school students in tasks related to 3D drawing and code writing.

AWARDS

ROBOMASTER2021 National College Robot Competition, First Prize **Aug 2021**

2021 Huawei Embedded Software Competition - Light Chaser(Southern Division), Secnod Prize **Jul 2021**

ROBOMASTER2020 National College Robot Competition, First Prize **Aug 2020**

Guangdong Collegiate Programming Contest, Third Prize **May 2019**

SKILLS

- **Language Skills:** English (IELTS Band 6.5 , CET-6), Chinese(Native)
- **Coding Skills:** C++ (Proficient) | C (Proficient) | Python (Skilled) | Matlab (Experienced)
- **Robotics Skills:** STM32 (Skilled) | ROS 2 (Skilled) | Freertos (Skilled)
- **AI Skills:** PyTorch (Experienced) | OpenCV (Experienced) | YOLO (Experienced)