

WAI SING NGAN

✉ derekngan99@gmail.com · ☎ (852)63185819 · 📧 Derek Ngan · 🏠 Personal Webpage

PROFESSIONAL EXPERIENCE

ePropulsion

Hong Kong, SAR

Robotics Engineer, Advanced Driver-Assistance System(ADAS) Team

Aug 2022 – Present

- **Perception System**

- Implemented External Kalman Filter in C++ to fuse 9-axis IMU and GPS data, delivering reliable pose estimation for surface vessels in ADAS applications
- Developed a regression model to perform real-time vessel velocity prediction from powertrain data using C++ with mlpack, improving perception robustness under GPS denied conditions
- Implemented I2C and UART based sensor driver and IMU calibration algorithm, providing accurate sensor measurements to the sensor fusion algorithm

- **System Integration**

- Integrated perception and control algorithms in ROS2; deployed in ARMv8 embedded Linux platform
- Integrated ADAS system with HMI Devices and Vehicle Control Unit over the CAN protocol for in-house powertrain integration
- Implemented an event handling system in C++ and Bash, enabling error backtracking and automatic relaunch for ADAS nodes to improve system stability
- Optimized ADAS system and algorithms, reducing computational load on embedded platform by 10%

- **ADAS Research & Development**

- Delivered ADAS software on the X-Series Outboard Motor, achieving position and heading hold and omnidirectional motion control; received >90% customer satisfaction in beta testing
- Developed a control strategy for I-Series Inboard Motor without rudder control with control team, enabling deployment of ADAS system across a wider range of products
- Collaborated with UI/UX and embedded system teams to design HMI displays and user interfaces for ADAS system
- Prototyped a pattern and path-following algorithm for surface vessels with control team; deployed and tested in Gazebo simulation

Suga International Holdings Limited

Hong Kong, SAR

Electronics Engineer Intern, Research and Development Department

Jul 2021 – Jun 2022

- Designed electronic circuits and PCB for a USB multichannel audio mixer, integrating analog amplification and embedded system functionality
- Implemented a DSP audio mixing algorithm in C and deployed it on an embedded system for real-time audio processing

EDUCATION

City University of Hong Kong, Department of Electrical Engineering

Hong Kong, SAR

BEng in Computer and Data Engineering; CPGA 3.15/4.3; Major GPA 3.33/4.3

Sep 2018 – Feb 2023

Related Courses: Data Engineering and Learning Systems, Signal and Systems, Computer Architecture, Data Structures and Algorithms, Java Programming and Applications, Cloud Computing Systems, Operating Systems

SKILLS

Programming Languages: C/C++, Python, Bash, Java, SQL, MATLAB

Software Tools: Git, ROS/ROS2, Gazebo, Docker, OpenCV, TensorFlow

Embedded Systems: STM32, NVIDIA Jetson, Arduino, RTOS, Communication protocols(CAN, UART, I2C)

Hardware Tools: PCB design (Altium Designer), Oscilloscope operation, CAD design (SolidWorks)

COMPETITIONS & PROJECTS

CityU Underwater Robotics Team (CityUUR)

Sep 2018 – Jul 2022

- Developed a compact (<4×4 cm) embedded system with custom PCB and STM32 firmware to control a micro Remotely Operated underwater Vehicle (ROV) for a pipe inspection task at MATE ROV 2019
- Designed a modularized electronic backplane system with custom PCBs, enabling plug-and-play embedded modules for underwater vehicles; deployed in MATE ROV 2022 and SAUVC 2022
- Developed an object detection algorithm with OpenCV to identify the qualification gate and color-coded drums; deployed on Jetson Nano to perform underwater autonomous tasks at SAUVC 2022
- Implemented pneumatics actuation for ROV manipulators using solenoid valves with embedded control
- Collaborated on 1000W 48V–16V GaN-based DC–DC buck converter research for powering ROV
- Achievements:
 - 2019 MATE International ROV Competition – Explore Division - 5th place
 - 2022 MATE International ROV Competition – Explore Division - 9th place
 - IEEE SAUVC (Singapore AUV Challenge) 2019 - 5th place, Innovative Engineering Prize
 - IEEE SAUVC (Singapore AUV Challenge) 2022 - 9th place

Open Underwater Research System

Jan 2021 – Jan 2022

- Participated in CityU HK Tech 300 Start-up Programme as a Seed Fund Team, and selected into the 3rd cohort (2021), receiving USD 12,000 funding for further development
- Collaborated on design of an actuated underwater device, integrating sensors and control systems for sea-water quality monitoring
- Implemented PID control in C on an embedded system for position hold of the device in open-sea conditions
- Tuned the PID control parameters during open-sea testing, ensuring the performance of position hold

Flight Controller for Underwater Vehicles – Design Project

Nov 2020 – Jul 2021

- Developed an embedded system with RTOS integrating BLDC thruster control, IMU and external depth sensors for underwater vehicles
- Implemented orientation estimation using 9-axis IMU with Kalman Filter; prototyped in MATLAB and deployed in C on STM32
- Implemented PID-based stabilization for manual ROV control in Python; validated in Gazebo simulation and ported to C for STM32 deployment

LEADERSHIP EXPERIENCE

Student tutor of Peer-Assisted Learning scheme (PALSI) at CityUHK

Jan – Dec 2021

- Led weekly tutoring sessions for *Electronic Devices and Circuits (EE2005)* and *Java Programming and Applications (EE3206)*
- Mentored groups of up to 10 students, providing supplemental instruction and guidance on coursework

Assistant of CDNIS Summer School STEM Programme at CityUUR

May – Jul 2022

- Collaborated on robotics course design and prepared materials for STEM activities
- Delivered STEM classes for Grade 3–6 students, providing hands-on experience on building ROV and coding

PATENTS

- Pose estimation algorithm for surface vessels (co-inventor) - Filed Feb 05, 2024; Published Dec 10, 2024; **CN118168506**; Method for acquiring attitude data of water area carrier and related equipment
- Position hold algorithm for surface vessels with a single outboard motor (co-inventor) - Filed Feb 26, 2024; Published Dec 13, 2024; **CN119137557**; Method for keeping position of water area carrier based on single propeller and related equipment
- Heading hold algorithm for surface vessels with a single outboard motor (co-inventor) - Filed Feb 05, 2024; Published Aug 14, 2025; **WO2025166518**; Method for realizing direction maintenance of water vehicle on the basis of single propeller, and related device