

Wai-Sing (Derek) Ngan

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PROFESSIONAL EXPERIENCE

ePropulsion[↗]

Hong Kong SAR

Robotics Engineer, Advanced Driver Assistance System (ADAS) Team

Aug 2022 – Present

- **Localization System**

- Implemented External Kalman Filter in C++ to fuse 9-axis IMU and GPS data to estimate vessel pose, achieving 2 degree heading and 3 meter position accuracy for marine ADAS features
- Developed regression-based velocity prediction model from powertrain data using C++ with mlpack, improving localization availability under GPS denied conditions
- Implemented sensor drivers and IMU calibration algorithm in C++, providing accurate sensor measurements to the sensor fusion algorithm

- **System Integration**

- Integrated localization and control algorithms in ROS2 and deployed on ARMv8 embedded Linux platform
- Integrated ADAS system with in-house HMI devices and electric propulsion system's Vehicle Control Unit over CAN bus
- Implemented an event handling system in C++ and Bash for ADAS nodes, integrating error logging and automatic recovery to improve system reliability
- Optimized ADAS system and algorithms, reducing computational load on embedded platform by 10%

- **ADAS Research & Development**

- Delivered ADAS L1 software to 30+ vessels through OTA update, achieving position and heading hold and omnidirectional motion control with 90%+ customer satisfaction in beta testing
- Developed a differential steering control strategy for inboard and pod motors with control team, enabling ADAS deployment across diverse propulsion systems
- Collaborated with UI/UX and embedded systems teams to develop HMI 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

Jul 2021 – Jun 2022

- Designed PCB for digital audio mixer, integrating analog amplification with embedded control
- Implemented a DSP audio mixing algorithm on XMOS MCU for real-time audio processing

Aerosim (HK)[↗]

Hong Kong SAR

Associate Engineer Intern

Jun 2020 – Apr 2021

- Designed custom PCBs and STM32 firmware for aviation simulator, reducing manufacturing cost per unit by 20%

EDUCATION

City University of Hong Kong[↗], Department of Electrical Engineering

Hong Kong SAR

BEng in Computer and Data Engineering

Sep 2018 – Feb 2023

Related Courses: Data Engineering and Learning Systems, Modelling Techniques, Embedded System Design, Signal and Systems, Digital Signal Processing, Computer Architecture, Data Structures and Algorithms

SKILLS

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

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

Hardware: Altium Designer, STM32, NVIDIA Jetson, CAN protocol, SolidWorks, 3D printing, Arduino

COMPETITIONS & PROJECTS

CityU Underwater Robotics Team (CityUUR)[↗]

Sep 2018 – Jul 2022

Electronics Team Member (2018-2020), Electronics Team Lead (2020-2022)

- Led electronics team (~ 6 people) for 2 years, overseeing hardware development and system integration for ROV and AUV competitions
- Designed modular electronic backplane system[↗] for underwater vehicles, improving electronic system reusability and debugging efficiency
- Designed PCB and firmware for micro ROV[↗] (<4×4 cm) for a task in MATE ROV 2019
- Implemented underwater object detection using OpenCV on Jetson Nano for AUV autonomous tasks
- Implemented pneumatic actuation for ROV manipulators using solenoid valves with embedded control
- Collaborated on 1000W 48V–16V GaN-based DC–DC buck converter research for ROV power system
- Achievements:
 - 2019 MATE ROV Competition – Explore Division[↗] - 5th place
 - 2022 MATE 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

- Selected into CityU HK Tech 300 Start-up Programme[↗] as a Seed Fund Team (3rd Cohort, 2021); received HKD\$100,000 funding for further development
- Co-designed an autonomous underwater device, integrating sensors and control systems for seawater quality monitoring
- Implemented PID controller on STM32 to perform position hold in open-sea conditions
- Fine-tuned PID parameters during field testing, ensuring the performance of position hold

Flight Controller for Underwater Vehicles[↗] – Design Project

Nov 2020 – Jul 2021

- Implemented orientation estimation using 9-axis IMU with Kalman Filter and PID controller to assist manual ROV control in Python; validated in Gazebo simulation
- Designed a PCB integrating BLDC thruster control, IMU and external depth sensors
- Deployed the state estimation and control algorithms on STM32 based-embedded system, achieving precise and stable maneuver on ROV

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 to design robotics STEM courses and prepared instructional materials
- Delivered STEM classes for Grade 3–6 students, providing hands-on experience on building ROV and programming

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