Xuchen Liu

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Department of Mechanical and Automation Engineering
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EDUCATION

The Chinese University of Hong Kong　　　　　　　　　　　　　　　　　　　　Hong Kong SAR, China
Ph.D. in Mechanical and Automation Engineering　　　　　　　　　　　　　　　　　　　Aug. 2020 − now
　− *Thesis: Design, Modelling and Motion Control of an Aerial-Aquatic Vehicle*
　− *Candidacy Panel: Ben M. Chen (Supervisor), Xi Chen, Fei Chen, Biao Wang*

The Chinese University of Hong Kong　　　　　　　　　　　　　　　　　　　　Hong Kong SAR, China
M.Sc. in Mechanical and Automation Engineering　　　　　　　　　　　　　　　　Aug. 2019 − Jul. 2020

Beihang University　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Beijing, China
B.Eng. in Mechanical Manufacturing and Automation　　　　　　　　　　　　　　　Aug. 2014 − Jul. 2018
　− *Thesis: Control of stepper, DC motor, BLDC motor and PMSM with general servo controller*
　− *Supervisor: Rui Fan*

PUBLICATIONS

Journals

- **Xuchen Liu**, Minghao Dou, Ruixin Yan, Dongyue Huang, Songqun Gao, Biao Wang*, Jinqiang Cui, Qinyuan Ren, Lihua Dou, Zhi Gao, Jie Chen and Ben M. Chen. "TJ-FlyingFish: An Unmanned Morphable Aerial-Aquatic Vehicle System", Special Issue on Autonomous Systems and Automation Technologies, Unmanned Systems, 2024.

- Dongyue Huang, Minghao Dou, **Xuchen Liu**, Xinyi Wang, Chenggang Wang* and Ben M. Chen. "Aqua Slide: An Underwater Leveling MotionScheme for M-UAAV Utilizing Singularity", IEEE Transactions on Industrial Electronics (**TIE**) (Under review).

Conferences

- **Xuchen Liu**, Minghao Dou, Dongyue Huang, Songqun Gao, Ruixin Yan, Biao Wang*, Jinqiang Cui, Qinyuan Ren, Lihua Dou, Zhi Gao, Jie Chen and Ben M. Chen. "TJ-FlyingFish: Design and Implementation of an Aerial-Aquatic Quadrotor with Tiltable Propulsion Units", IEEE International Conference on Robotics and Automation (**ICRA**), 2023.

- Minghao Dou, **Xuchen Liu**, Dongyue Huang, Biao Wang*, Jinqiang Cui, Qinyuan Ren, Lihua Dou, Jie Chen and Ben M. Chen. "Modeling and Operating Point Analysis for Aquatic Translational Motion of a Cross-medium Vehicle", the 42nd Chinese Control Conference (**CCC**), 2023. **Guan Zhao-Zhi Award**.

- Junjie Wen (319735), Jinqiang Cui*, Benyun ZHAO, Bingxin HAN, **Xuchen Liu**, Zhi Gao, Ben M. Chen. "EnYOLO: A Real-Time Framework for Domain-Adaptive Underwater Object Detection with Image Enhancement", IEEE International Conference on Robotics and Automation (**ICRA**), 2024.

- Zuoquan Zhao*, Yu Zhai, Chuangxiang GAO, Wendi Ding, Ruixin Yan, Songqun Gao, Bingxin Han, **Xuchen Liu**, Zixuan Guo, Ben M. Chen. "Sea-U-Foil: A Hydrofoil Marine Vehicle with Multi-Modal Locomotion", IEEE International Conference on Robotics and Automation (**ICRA**), 2024.

- Dongyue Huang, Minghao Dou, **Xuchen Liu**, Ruixin Yan, Songqun Gao, Zixuan Liu, Biao Wang*, Lihua Dou, Ben M. Chen. "First Principle Modeling of a Morphable Unmanned Aerial-Aquatic Vehicle: Mirs-Alioth", International Conference on Control and Automation (**ICCA**), 2024.

- Dongyue Huang, **Xuchen Liu***, Minghao Dou and Ben M. Chen. "Systematizing Rotor-Based Morphable Unmanned Aerial-Aquatic Vehicles Design: From Theory to Prototype", MTS/IEEE Proceedings of OCEANS, 2024.

- Songqun Gao, Ruixin YAN, Minghao DOU, ZHAO Zuoquan, **Xuchen Liu**, Dongyue Huang, Qinyuan Ren, Ben M. Chen. "Dynamic Modeling of a Lightweight Unmanned Underwater Vehicle: Sea-U-Dragon", the 43rd Chinese Control Conference (**CCC**), 2024.

PRESS COVERAGE

South China Morning Post: Could this flying, diving drone one day help with ocean rescues? Its Hong Kong and mainland China developers say it's possible. 2023
Hong Kong 01: CUHK Research Team Invents Water-Air Amphibious Cruiser: It Can Be Used for Disaster Search and Rescue, Water-Air Exploration and Survey. 2023
CUHK in Touch: The amphibious drone: A bird in the air, a fish in the water 2023
IEEE Spectrum: TJ-FlyingFish: Aerial-Aquatic Quadrotor With Tiltable Propulsion 2023
New Atlas: TJ-FlyingFish drone flies through the air and swims underwater. 2023
New Scientist Technology: Diving drone can switch between flying and swimming 2023

INTERNSHIP EXPERIENCE

Pengcheng Laboratory   Shenzhen, China
Visiting Student, Intelligent Collaborative Studio   Jan. 2021 − Dec. 2022
− International Micro Air Vehicle Conference and Competition (IMAV) mission: cooperative delivering by UAV multi-agents.
− Aerial-aquatic communication and cooperation by the aerial-aquatic vehicle.

VisionNav Robotics Company   Shenzhen, China
Intern   Nov. 2019 − Feb. 2020
− Sensor integration of automated guided forklifts.

Tianjin Advanced Equipment Research Institute of Tsinghua University   Tianjin, China
Research Assistant   Mar. 2019 − May 2019
− Wear detection of high-speed railway pantograph graphite coating.

Beijing Jingdiao CNC Machine Tool Co., Ltd   Beijing, China
Intern   Jul. 2017 − Sep. 2017
− Formulation of process cards and CAM in Unigraphics.

PROJECT WORK

Aerial-aquatic communication by an Aerial-aquatic messenger   Jun. 2021 − Dec. 2021
− Collaborated in team of 4 on cross-medium communication.
− Developed an Aerial-aquatic vehicle serving as a messenger.
− Deployed the traditional airborne communication method underwater by the cross-medium mobility of the messenger.
− Writing relevant project application documents.

Cooperative Slung-load Transport by a Multi-copter System   Jan. 2021 − Aug. 2021
− Collaborated in team of 4 on IMAV multi-agent mission.
− Modelling and control of the UAVs-load system on Matlab.
− Implemented the control algorithm by ROS and Gazebo.

Elastical Formation Control of UGVs   Jul. 2020 − Oct. 2020
− Collaborated in team of 8 on Innovation Competition for Advanced Technology in Zhongguancun.
− Implemented the elastical formation control algorithm by ROS and MoCap.

Wheeled-leg Robot with Omni Wheels   Sep. 2019 − Dec. 2019
− Design a robot with 3 sets of legs and omni wheels.
− Modelling and control of the separate set of legs and omni wheels in Matlab

AWARDS & HONONRS

Postgraduate Studentship in the Chinese University of Hong Kong   2020-2022
Guan Zhao-Zhi Award of Chinese Control Conference   2023

OTHER SKILLS

Language: IELTS Score 7
Software Related: Robot Operating System (ROS), PX4 Autopilot, Matlab, C++, C$^{\#}$, Python
Mechanical Related: CAD and FEA in Solidworks, CAM and CAPP in Unigraphics and Fusion 360, CNC machining