Yangmengfei (Murphy) Xu

Department of Mechanical Engineering, Level 3, Engineering Block D, Grattan Street,
University of Melbourne, Parkville, Victoria, 3010, Australia
yangmengfei@unimelb.edu.au

EDUCATION

Doctor of Philosophy (Engineering and IT), The University of Melbourne, expected Oct 2026

- Rowden White Scholarship (awarded to the highest-ranked applicant in the department; one recipient per year)
- Melbourne Research Scholarship

Master of Philosophy (Engineering and IT), The University of Melbourne, 2022

- Melbourne Research Scholarship

Master of Engineering (Mechatronics Engineering), The University of Melbourne, 2018

Bachelor of Engineering (Electrical & Electronic Engineering), The University of Liverpool, 2016

Bachelor of Engineering (Electrical & Electronic Engineering), Xi'an Jiaotong-Liverpool University, 2016

REASEARCH EXPERIENCES

Epistemic Logic Modeling of Human Theory of Mind, Project Leader, 2024 - Present

- Developed the *Predictive Justified Perspective (PJP)* models to represent and infer higher-order beliefs in multi-agent and human–robot settings; integrated epistemic logic with cognitive reasoning to formalize how agents predict and interpret others' beliefs in dynamic environments.
- Demonstrated the framework's ability to model bounded human reasoning through pilot user studies (published in *CHI EA,* 2025) and extended it to dynamic epistemic planning with predictive belief updates (under review).

Community Service Robots for Social Cohesion and Sustainability, Project Leader, 2024 - Present

- Designed and developed the Neighbor Koala, an autonomous community-sharing robot that fosters social connection and sustainability by enabling item exchange and collective memory creation among residents.
- Demonstrated how robotics can enhance community belonging and environmental responsibility, with the prototype presented at the *HRI 2025 Student Design Competition* and won the sustainability recognition.

Control and Planning Design for Autonomous Robots in Mining Engineering, Researcher, 2022 - Present

- Developed robust and adaptive control and planning frameworks for autonomous and multi-robot systems, integrating Active Disturbance Rejection Control for tracked ground vehicles and geometry-based distributed connectivity maintenance for visual-sensing agents; contributed core modules and functions to the open-source PyPose library to support reproducible, learning-based control and trajectory optimization.
- Demonstrated effective disturbance rejection in harsh environment (published in *Unmanned Systems*, 2023) and connectivity preservation in uncertain environments (published in *Unmanned Systems*, 2024); Gained over 1.5k GitHub stars and 220k+ pip download on PyPose (published in *IROS Workshop,* 2023*)*.

Human Motor Adaptation in Rehabilitation Robotics, Researcher, 2018 - Present

- Designed and conducted human experiments to induce implicit motor adaptation through energy-based cost shaping using a manipulandum platform; developed and analyzed the Indirect Shaping Control model for movement retraining.
- The results showed the feasibility to induce indirect and implicit human motor adaptation through the artificial force field from robotic device (published in *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2021);

established the quantitative link between human motor cost estimation and human movement adaptation (published in *IROS Workshop*, 2025).

INDUSTRIAL EXPERIENCES

Research Engineer (Project Lead), Boton Technology & The University of Melbourne**,** 2021-2023

- Led an industry – university collaboration developing autonomous cleaning robots for material - handling systems in the mining sector.
- Responsible for system design, autonomous navigation, computer vision, and AI decision-making modules for large-scale industrial deployment.

TEACHING EXPERIENCES

Course Tutor and Project Supervisor, The University of Melbourne, 2020-Present

- Deliver tutorials and laboratory workshops across multiple engineering and robotics subjects; responsible for preparing teaching materials, designing assessment content, marking assignments and examinations, and providing structured feedback to students.
- Co-supervised more than 20 capstone and research projects, guiding students through project planning, experimental design, and implementation. Provided technical mentorship, coordinated weekly progress reviews, and supported students in achieving publishable research outcomes.

ADDITIONAL ACTIVITIES

Ausdroid AI & Robotics Graduate Student Group, Founder and President, 2017-present

Suzhou Full House Charity Shop, Volunteer, 2012-2016

Suzhou Ocean Paradise Autistic Children's Rehabilitation Center, Volunteer, 2012-2013

PUBLICATIONS

Li, W., Zhang, C., Li, W., Hu, G., & **Xu, Y.** (2025, April). Modeling Higher-order Human Beliefs Using the Justified Perspective Model. In *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (pp. 1-8).

Xu, Y., Tian, S., Wang, G., & Tang, B. (2025, March). From Isolation to Connection: Community Service Robots for Social Cohesion and Sustainability. In *2025 20th ACM/IEEE International Conference on Human-Robot Interaction (HRI)* (pp. 1953-1956).

Li, X., Fu, J., Liu, M., **Xu, Y.,** Tan, Y., Xin, Y., ... & Oetomo, D. (2024). A Geometry-Based Distributed Connectivity Maintenance Algorithm for Discrete-time Multi-Agent Systems with Visual Sensing Constraints. *Unmanned Systems*, *12*(02), 261-275.

Liu, M., **Xu, Y.,** Lin, X., Tan, Y., Pu, Y., Li, W., & Oetomo, D. (2024). On active disturbance rejection control for unmanned tracked ground vehicles with nonsmooth disturbances. *Unmanned Systems*, *12*(06), 1023-1037.

Zhan, Z., Li, X., Li, Q., He, H., Pandey, A., Xiao, H., ... & Wang, C. (2023). PyPose v0. 6: The imperative programming interface for robotics. In 2023 *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop*.

Xu, Y., Crocher, V., Fong, J., Tan, Y., & Oetomo, D. (2021). Inducing human motor adaptation without explicit error feedback: a motor cost approach. *IEEE transactions on neural systems and rehabilitation engineering*, *29*, 1403-1412.

Mohammadi, A., **Xu, Y.,** Tan, Y., Choong, P., & Oetomo, D. (2019). Magnetic-based soft tactile sensors with deformable continuous force transfer medium for resolving contact locations in robotic grasping and manipulation. *Sensors*, *19*(22), 4925.