

# Patrick Li-Yu Lo

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## EDUCATION

**The Hong Kong Polytechnic University**

M.Phil. in Robotics & Control (Presidential Fellowship)

*Dec 2024*

GPA: 3.77/4.3

**The Hong Kong Polytechnic University**

B.Eng. (1st Honour) in Aeronautical and Aviation Engineering (APEC Entry Scholarship)

Exchange: University of Queensland, Australia

*Jun 2021*

GPA: 3.75/4.3

## RESEARCH EXPERIENCE

**Improving Adaptability of Koopman Operators for Legged Robots**

*Sep 2024 - Present*

*Research Assistant*

Prof. Chih-Yung Wen (PolyU)

- Proposed an adaptive framework to compensate the data insufficiency for Koopman operator-based controllers.
- Developed a policy network for controller parameters tuning.
- Demonstrated the performance via simulation environments and physical experiments.

**Adaptive Optimal Controllers via Extended State Observer (ESO)**

*Sep 2023 - Aug 2024*

*M.Phil. Student*

Prof. Chih-Yung Wen (PolyU)

- Proposed an adaptive framework for MPC, LQR, and EKF on mobile robots via disturbance observation.
- Improved, analyzed, and implemented General ESO (GESO) and Error-State ESO (ESES0) for lump disturbances estimation.
- Developed reinforcement learning (RL) for parameters optimization.
- Demonstrated its performance on UAV MPC control, heterogeneous UAV-UGV relative state estimation, and multi-UAVs sliding-mode control (SMC).

**Non-Robocentric Dynamic Landing for Quadrotor UAVs**

*Sep 2020 - Jul 2024*

*Undergraduate/M.Phil. Student*

Prof. Chih-Yung Wen (PolyU)

- Proposed a non-inertial autonomous dynamic landing framework where no airborne exteroceptive sensors were used.
- Developed an IEKF-based state estimator on SE(3).
- Designed kinematic and dynamic constrained trajectory with differential flatness & minimized jerk.
- Demonstrated the applicability of the system via physical experiments using self-designed UAV-UGV hardware system.

## WORK EXPERIENCE

**Hong Kong Center for Construction Robotics (HKCRC)**

*Jul 2021 - Jul 2022*

*Research Assistant*

- Developed learning-based model via adversarial training, data augmentation for CV-based construction logistics monitoring system
- Developed PID controllers and EKF estimators for an automation system to aid prefabrication component installation, currently pending patent.

## PUBLICATIONS

- **L.-Y. Lo**, B. Li, C.-Y. Wen, and C.-W. Chang, "Experimental Non-Robocentric Dynamic Landing of Quadrotor UAVs with On-Ground Sensor Suite," IEEE Transactions on Instrumentation and Measurement (TIM), vol. 73, 2024. *Links: [pdf](#), [code](#).*
- **L.-Y. Lo**, Y. Hu, B. Li, C.-Y. Wen, and Y. Yang, "An adaptive model predictive control for unmanned underwater vehicles subject to external disturbances and measurement noise," in 2024 14th Asian Control Conference (ASCC). IEEE, 2024, pp. 01–07. *Links: [pdf](#), [code](#).*
- Y. Yang, K. Liu, **L.-Y. Lo**, T. Huang, Y. Fu, and C.-Y. Wen, "Fixed-time adaptive consensus control for multi-quadrotor subject to external disturbances via deep reinforcement learning," submitted to IEEE Transactions on Automation and Science Engineering (TASE), 2024.

- W. Yang, Z. Tan, Y. Xue, **L.-Y. Lo**, K. Liu, and C.-Y. Wen. “Hierarchical 3D scene graph based metric semantic slam for object mapping and counting,” submitted to IEEE Transactions on Circuits and Systems II: Express Briefs, 2024.
- **L.-Y. Lo**, B. Li, C.-Y. Wen, and C.-W. Chang, “Landing a quadrotor on a ground vehicle without exteroceptive airborne sensors: A non-robotocentric framework and implementation,” in 2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC). IEEE, 2023, pp. 6080–6087. *Links:* [pdf](#).
- **L.-Y. Lo**, C. H. Yiu, Y. Tang, A.-S. Yang, B. Li, and C.-Y. Wen, “Dynamic object tracking on autonomous uav system for surveillance applications,” Sensors, vol. 21, no. 23, p. 7888, 2021. Editor’s Choice Article. *Links:* [pdf](#), [code](#).

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## AWARDS & SCHOLARSHIP

- First Runner-up of UAV Challenge, 2023 & 2024 IEEE International Conference on Unmanned Aircraft Systems (ICUAS). *Links:* [web 2023](#), [web 2024](#).
- PolyU Presidential Postgraduate Fellowship Scheme (’22 - ’24).
- Dean’s list of PolyU Faculty of Engineering: ’17/18, ’18/19 & ’20/21.
- PolyU Undergraduate APEC Entry Scholarship (’17 - ’21).

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## CORE SKILLS

**Languages & Tools:** C++, Python, ROS, Matlab, Docker, PX4, BlueROV2, PyTorch, & OpenCV.

**Robotics:** Dynamic Analysis, Optimal Control, Nonlinear Control Theory, Convex Optimization, Machine Learning.

**Links:** [Project Pages](#), [Learning Notes](#).

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## OTHERS

- **Languages:** English (IELTS 7.5), Mandarin (Native), Cantonese (Proficient), Taiwanese (Proficient).
- **Services:** Reviewer of IEEE Transactions on Instrumentation and Measurement; IEEE Transactions on Mechatronics; IEEE Transactions on Vehicular Technology; IEEE Sensor Journal; 2023 IEEE International Conference on Intelligent Transportation System.
- **Volunteering:** Student ambassador of PolyU (’19-’21); Teaching Assistant at HeartFire Education Service, China (Dec ’19), African Evangelistic Enterprise, Rwanda (Jun ’19), Royal University of Phnom Penh, Cambodia (May - Jun ’18).