

# Tae Hyeon Kweon

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**Research Interests:** My research focuses on active perception and learning for robust robotic manipulation and autonomous decision-making.

## Education

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### University of Waterloo

Ontario, Canada

*MASc in Mechanical and Mechatronics Engineering* | GPA: 88.5

Sep. 2024 – Present

Advisor: Prof. Soo Jeon

Courses: Optimal Control, Adaptive Control, Video Processing, Machine Learning

### The Hong Kong Polytechnic University (HKPolyU)

Kowloon, Hong Kong

*B.Eng. (Honours) in Mechanical Engineering*

Sep. 2018 – Jun. 2024

Graduated with First Class Honors

(Mandatory Military service: 2021–2023)

Thesis: *A Mobile Robot with an Active Suspension System for Navigation in Uneven Terrain*

## Research & Work Experience

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### Mechanical Systems Control Lab, UWaterloo

Ontario, Canada

Graduate Student Researcher

Sep. 2024 – Present

Advisor: Prof. Soo Jeon

- Developing an active perception framework (Next-Best-View) for robotic grasping under occlusion.
- Conducting research on Vision-Language-Action (VLA) and World Model integration for embodied robotic planning.

### Robotics and Machine Intelligence Lab, HKPolyU

Kowloon, Hong Kong

Student Researcher (Undergraduate Research and Innovation Scheme) Sep. 2023 – Jun. 2024

Advisor: Prof. David Navarro-Alarcon

- Designed motion-planning and control strategies for a dual-arm TIAGo++ robot performing bimanual manipulation.

Undergraduate Research Assistant

Dec. 2020 – Jun. 2021

- Built a mobile robot capable of autonomous navigation over liquid and muddy terrain.
- Implemented a vision-based localization and navigation system using artificial markers.

### Origami Labs (Start-up)

Tsuen Wan, Hong Kong

*Engineering Intern*

Jul. 2020 – Sep. 2020

- Integrated an accelerometer-based trigger system for automatic microphone activation.
- Applied signal-processing filters to reduce environmental noise in wearable prototypes.

## Selected Projects

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### End-to-End Visual Grasping with PPO, UWaterloo

Jan. 2025 – Apr. 2025

SYDE 673 Video Processing and Analysis (Course Project)

- Trained a PPO-based grasping policy using the Barrett WAM arm in the Genesis simulator.
- Designed a visual reward function based on corner overlap, contact detection, and lift height.
- Built a multi-environment camera system for robust, parallelized vision-based training.

### Adaptive Control of a 2-DOF Robotic Arm, UWaterloo

Sep. 2024 – Dec. 2024

ME780 Adaptive Control (Course Project)

- Implemented a Model Reference Adaptive Control (MRAC) scheme to adaptively estimate unknown dynamics and ensure stable trajectory tracking.
- Derived Lyapunov-based adaptation laws and validated controller performance in MATLAB/Simulink.

**Active Suspension for Navigating Rough Terrain**, HKPolyU      Sep. 2023 – Jun. 2024  
 Undergraduate Thesis  
 – Designed a mobile robot with four independently actuated suspension units driven by stepper motors.  
 – Integrated IMU feedback to detect terrain pitch and actively adjust body height for stable navigation.

## Teaching Experience

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**ME549/MTE544 Autonomous Mobile Robotics**      University of Waterloo  
*Teaching Assistant*      Winter 2025, Fall 2025  
 – Ran lab sessions, hosted office hours, provided technical assistance, and graded assignments and exams.

## Scholarships & Awards

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International Master's Award of Excellence (IMAE), University of Waterloo      2024 – 2025  
 Undergraduate Research Program Scholarship, Hong Kong PolyU      2023  
 Dean's Honour List, Hong Kong PolyU      2020/21, 2023/24  
 Full Entry Scholarship, Hong Kong PolyU      2018 – 2024

## Extracurricular Activities

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Volunteer (Score Tally), MME Graduate Research Symposium, UWaterloo      Nov. 2024  
 Peer Tutor in AMA1120 (Basic Mathematics II), HKPolyU      Jan. 2024 – May 2024  
 Mentor, Korean Student Association, HKPolyU      Sep. 2023 – Dec. 2023  
 Team Leader, STEM Learning Kits for Overseas Students, HKPolyU      Jun. 2020 – Aug. 2020

## Skills

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**Programming:** Python, C++, MATLAB, Shell  
**Tools:** PyTorch, ROS 1 & 2, OpenCV, Git, L<sup>A</sup>T<sub>E</sub>X  
**Robots:** Franka Panda, Barrett WAM, Tiago++, TurtleBot  
**Simulation:** PyBullet, Genesis, Gazebo, Simulink  
**Hardware:** IMU, RealSense L515/D455, Arduino, Jetson Orin, Raspberry Pi