

Hong-Vinh Vu

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ABOUT

Control and Automation Engineering undergraduate at HUST with research experience in intelligent control (Fuzzy Logic, Neural Networks) and dynamic optimization (MPC, Reinforcement Learning). Aiming to specialize in optimal control and multi-agent reinforcement learning for autonomous robotic systems.

EDUCATION

Hanoi University of Science and Technology (HUST), B.Sc. of Automation Engineering. Sep 2024 – Present
• **GPA:** 3.45 / 4.0
• **Coursework:** Modern Control Theory, Optimization, Multi-Agent Control Systems
Le Quy Don High School for the Gifted, Specialized Physics Program. Aug 2021 – May 2024
• Won the Second Prize, Provincial Physics Olympiad.

ACADEMIC EXPERIENCES

Research Assistant, Multi-Agent System Control (MASC) Research Laboratory, SEEE, HUST. Mar 2026 – Present
• **Supervisor:** Assoc.Prof. Hoai Nam Nguyen
• **Research topic:** Applied Optimal Control Algorithms and Intelligent Control Algorithms to optimize trajectory tracking for Quadrotors.
• **Key Contribution:** Developed a hybrid flight control framework by integrating PyTorch-based Deep Reinforcement Learning (DRL) for high-level dynamic trajectory planning with Model Predictive Control (MPC) and ANFIS for optimal trajectory tracking and nonlinear disturbance compensation.

Research Assistant, Mechatronics Engineering Group (MEG), Motion Control and Applied Robotics Laboratory (MoCAR LAB), SEEE, HUST. Jul 2025 – Mar 2026
• **Supervisor:** Assoc.Prof. Danh Huy Nguyen
• **Research topic:** Kinematic Modeling and Control of a 6WD-6WS Mobile Robot based on ROS2.
• **Key Contribution:** Developed mathematical kinematic/dynamic models and motion control algorithms for a 6WD-6WS (6-Wheel Drive, 6-Wheel Steering) omnidirectional vehicle, implementing custom ROS2 navigation nodes, Gazebo physics simulations, and embedded MCU firmware for real-time trajectory tracking and multi-mode steering coordination.

PERSONAL PROJECTS

ISSA-Optimized BP Neural Network PID Attitude Controller for Quadrotor: Designed an adaptive BP neural network PID controller for quadrotor attitude control, using the Improved Sparrow Search Algorithm (ISSA) to optimize the network's initial weights and biases offline for real-time disturbance compensation, improving trajectory-tracking robustness against unmodeled dynamics and parameter uncertainty.

Nonlinear MPC Controller for Quadrotor: Formulated a cascaded NMPC scheme on full 12-state nonlinear dynamics, decoupling attitude and position loops with torques as MVs and thrust as a measured disturbance. Solves a constrained finite-horizon optimal control problem online, predicting trajectory deviation over a receding horizon for anticipatory disturbance rejection.

Fuzzy-PD Controller for Quadrotor: Developed a Self-Tuning Fuzzy-PD controller that dynamically adjusts K_p and K_d gains based on real-time tracking errors, significantly improving dynamic response and overshoot reduction.

Direct Adaptive Fuzzy Controller for Quadrotor: Implemented a Direct Adaptive Fuzzy Control (DAFC) scheme using Lyapunov stability theory to approximate unmodeled dynamics and external disturbances, achieving robust trajectory tracking with minimal steady-state error.

PID Controller for Quadrotor: Designed and tuned a discrete PID controller in MATLAB/Simulink for 6-DOF Quadrotor position and attitude stabilization.

HONORS & AWARDS

Academic Achievement Scholarship, Grade: Excellent.

Apr 2025

This is a prestigious award given to students with the highest scores in the entire department ($\approx 5\%$).

SKILLS

Languages: Python, C, C++ , MATLAB/Simulink.

DL / Optimization: PyTorch, Deep Learning.

Robotics Developments: ROS2 framework, Gazebo, SLAM.

Tools: LaTeX, STM32CubeIDE.