Duc-Cuong VU, BSc.

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Education

Master of Science in Automation and Control *Jul 2024 - present*

School of Electrical - Electronics Engineering, Hanoi University of Science and Technology (HUST), *Hanoi, Vietnam*

- **Research project:** *Design control structures for Parallel Platforms in Maritime applications*
- **Funded by:** *Master, PhD Scholarship Programme of Vingroup Innovation Foundation (VinIF)*

Bachelor of Science in Automation and Control *Oct 2020 - Mar 2024*

School of Electrical - Electronics Engineering, Hanoi University of Science and Technology (HUST), *Hanoi, Vietnam*

- **Excellent degree**, GPA: 3.71/4 (Rank: 22/499). Finished the 4-year BSc program in **just 3.5 years**.
- **Thesis:** *Balancing, motion planning, and tracking control for ballbot systems* [pdf] (The best thesis defense)

Selected publications

Journal Ocean Engineering (SCIE Q1) (2025)

Glocal trajectory generation and tracking control for AUVs with optimal coverage sensor networks [pdf]

Duc Cuong Vu*, *Son Tran**, *Tung Lam Nguyen, and Duc Chinh Hoang*

Journal Ocean Engineering (SCIE Q1) (2025)

Lagrangian-based modeling and safety-critical controls for Stewart platforms under marine operations [pdf]

Duc Cuong Vu, *Danh Huy Nguyen, Minh Nhat Vu, and Tung Lam Nguyen*

Journal IEEE Acess (SCIE Q2) (2025)

CBFs-based Model Predictive Control for Obstacle Avoidance with Tilt Angle Limitation for Ball-Balancing Robots [pdf]

*Minh Duc Pham, **Duc Cuong Vu**, Thi Thuy Hang Nguyen, Thi Van Anh Nguyen, Minh Nhat Vu, and Tung Lam Nguyen*

Journal Results in Engineering (ESCI Q1) (2025)

A novel approach of Consensus-based Finite-time Distributed Sliding Mode Control for Stewart platform manipulators motion tracking [pdf]

Duc Cuong Vu, *Danh Huy Nguyen, and Tung Lam Nguyen*

Journal International Journal of Robust and Nonlinear Control (SCIE Q1) (2024)

Time-optimal trajectory generation and observer-based hierarchical sliding mode control for ballbots with system constraints [pdf]

Duc Cuong Vu, *Minh Duc Pham, Thi Thuy Hang Nguyen, Thi Van Anh Nguyen, and Tung Lam Nguyen*

Work experience

VinRobotics *Sep 2025 - present*

Robotics Engineer *Hanoi, Vietnam*

- Responsible for System Identification, State Estimation, Model Predictive Control (MPC), and Whole Body Control (WBC) for VinRobotics Humanoids robot.

Mechatronics Engineering Group at HUST *Oct 2021 - present*

Research Assistant supervised by Assoc.Prof.PhD. Tung Lam Nguyen, *Hanoi, Vietnam*

- Conducted research on advanced control strategies, robotics, motion control, and multi-agent systems, focusing on both theoretical development and practical implementation.

Academic projects

Advanced Control of a Ship-Mounted Stewart Platform for Marine Applications *Mar 2025 - Dec 2025*

Research assistant supervised by PhD. Minh Nhat Vu (PI) and Assoc.Prof.PhD. Tung Lam Nguyen

- Field: Marine Robotics and Control Systems.
- International Collaboration of Korea Institute of Science and Technology and Institute (KIST) for Control Engineering and Automation (HUST) via the *KIST School Partnership Project*.
- Designing and implementing advanced control algorithms for the Stewart platform, including safety-critical and robust control strategies tailored for marine environments.
- Developing high-fidelity simulation (Simscape, MuJoCo) that capture marine environmental disturbances (such as waves, currents, and ship motion) and accurately represent the platform's kinematics and dynamics.
- Building the experimental setup, including mechanical assembly, hardware integration, Linux-based real-time kernel configuration, and EtherCAT communication for precise control and data acquisition.
- Collaborating with cross-institutional teams to refine system requirements, troubleshoot technical challenges, and ensure seamless integration of hardware and software components.
- Preparing detailed technical documentation, authoring scientific publications, including Ocean Engineering (OE) and Results in Engineering, and presenting project outcomes to both academic and industrial collaborators.

Robot navigation system integrating sensor network and wireless communication *Jan 2025 - Dec 2027*

Research assistant supervised by PhD. Chinh Hoang Duc (PI) and Assoc.Prof.PhD. Tung Lam Nguyen.

- Field: Communications, Optimization, Robotics, and Control Systems.
- Funded by Hanoi University of Science and Technology (HUST).
- Designing and developing a comprehensive simulation environment for Autonomous Underwater Vehicles (AUVs) using the MuJoCo physics engine, enabling accurate modeling of underwater dynamics, sensor feedback, and environmental disturbances.
- Implementing and validating advanced control algorithms for robust navigation, obstacle avoidance, and trajectory tracking in challenging underwater scenarios.
- Integrating sensor network data and wireless communication protocols into the simulation framework to evaluate system performance under realistic communication constraints.
- Collaborating with team members to troubleshoot technical challenges, optimize simulation fidelity, and ensure seamless integration between sensing and control systems.
- Documenting research findings, preparing technical reports, and authoring a peer-reviewed scientific paper for submission to an international journal or conference based on the project outcomes.

Balancing, motion planning, and tracking control for ballbot systems *Jul 2023 - Jul 2024*

Bachelor graduated project supervised by Assoc.Prof.PhD. Tung Lam Nguyen

- Field: Optimization, Robotics, and Control Systems.
- Developed mathematical models and simulation environments for 3D ballbot systems, focusing on nonlinear dynamics, trajectory generation, and safety constraints.
- Designed and implemented advanced control algorithms, including observer-based hierarchical sliding mode control and nonlinear model predictive control (NMPC) with control barrier functions (CBFs) for obstacle avoidance and tilt angle limitation.
- Formulated and solved time-optimal trajectory planning problems using flatness theory and optimization techniques, enabling smooth and efficient motion planning for ballbot navigation.
- Authored and co-authored peer-reviewed journal papers based on the project outcomes, including publications in the International Journal of Robust and Nonlinear Control (RNC) and IEEE Access.

Academic activities

Invited review for

Nonlinear Dynamics (*this is my first time as a reviewer*)

Seminars and Talks

2025: Talk "MuJoCo for Advanced Physics Simulation: From manipulators to autonomous vehicles" for "Motion Control" master course at HUST and MoCAR seminar [pdf]

2025: Seminar "Underwater Vehicles" for modeling training of Autonomous Underwarter Vehicle at MEG-MoCAR [pdf]

Conferences

IEEE 12th International Conference on Control, Automation and Information Sciences (IEEE ICCAIS 2023)

Hanoi, Vietnam

2024 International Conference on Advanced Technologies for Communications (IEEE ATC2024)

Ho Chi Minh City, Vietnam

International Conference on Intelligent Systems and Networks (Springer ICISN 2023)

Hanoi, Vietnam

Honours & awards

Master, PhD Scholarship Programme

Vingroup Innovation Foundation (VINIF)

Best Thesis Defense Award

Hanoi University of Science and Technology

Skills

Programming	Proficient in Python, C/C++, and MATLAB for algorithm development, numerical computation, and embedded system applications.
Simulation	Experienced with Simulink, Simscape, and MuJoCo for multi-domain physical modeling, robot dynamics simulation, and virtual prototyping.
Control & Math	Solid foundation in rigid body dynamics, control theories, motion control, optimization, and Guidance–Navigation–Control (GNC) systems.
Engineering	Hands-on experience with version control (Git), PCB design and debugging, 3D CAD modeling using SolidWorks, and designing experimental platforms for validation.
Systems	Familiar with EtherCAT-based Linux kernel development, real-time control architectures, and embedded systems programming for robotics and automation.
Research	Capable of conducting scientific research, writing academic publications, and presenting technical findings at international conferences. Experienced in literature review, hypothesis formulation, and experimental validation.