

Khai Nguyen

<https://xkhainguyen.github.io>

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EDUCATION	Carnegie Mellon University (CMU) <i>M.S. in Mechanical Engineering – Research Program</i> • Thesis: TinyMPC: Model-Predictive Control on Resource-Constrained Microcontrollers	Pittsburgh, PA May 2024
	ETH Zürich (ETHZ) <i>Robotics Summer School and Robotics Student Fellowship Programs</i>	Zürich, Switzerland Summer 2023
	Hanoi University of Science and Technology (HUST) <i>B.S. in Control Engineering and Automation – Talent Program</i> • Thesis: Robust Optimal Control for Nonlinear Systems Based on Reinforcement Learning	Hanoi, Vietnam Oct 2021

PUBLICATIONS	<ul style="list-style-type: none">• Model Tensor Planning <i>Transactions on Machine Learning Research (TMLR)</i>, 2025 [pdf] [website] A. T. Le, K. Nguyen, M. N. Vu, J. Carvalho, J. Peters• DEQ-MPC: Deep Equilibrium Model Predictive Control <i>Conference on Robot Learning (CoRL)</i>, 2025 [pdf] [website] S. Gurumurthy, K. Nguyen, A. Bishop, Z. Manchester, Z. Kolter• Code Generation for Conic Model-Predictive Control on Microcontrollers with TinyMPC <i>arXiv Preprint</i>, 2024 [pdf] [website] S. Schoedel*, K. Nguyen*, E. Nedumaran, B. Plancher, Z. Manchester• TinyMPC: Model-Predictive Control on Resource-Constrained Microcontrollers <i>International Conference on Robotics and Automation (ICRA)</i>, 2024 [pdf] [website] K. Nguyen*, S. Schoedel*, A. Alavilli*, B. Plancher, Z. Manchester Best Paper Award in Automation; Best Conference Paper and Best Student Paper Finalists• Formation Control with Reinforcement Learning for a Group of Multiple Surface Vehicles <i>International Journal of Robust and Nonlinear Control (IJRNC)</i>, 2023 [pdf] K. Nguyen, V. T. Dang, D. D. Pham, and P. N. Dao
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ABSTRACTS, POSTERS, AND OTHERS	<ul style="list-style-type: none">• Model Tensor Planning <i>International Conference on Robotics and Automation (ICRA) Workshop RoboARCH</i>, 2025 [pdf] [host] A. T. Le, K. Nguyen, M. N. Vu, J. Carvalho, J. Peters• Deep Equilibrium Model Predictive Control <i>Conference on Robot Learning (CoRL) Workshop Differentiable Opt. Everywhere</i>, 2024 [pdf] [host] S. Gurumurthy, K. Nguyen, A. Bishop, Z. Manchester, Z. Kolter• A Robot Learning System for Viewpoint-aware Legible Motion Planning <i>Robotics: Science and Systems (RSS) Workshop Learning for Assistive Robotics</i>, 2024 [pdf] [host] K. Nguyen*, Y. H. Chiu*, P. Tyagi*, S. Kambil*, I. Kang• Optimizing at All Scales: Edge (Non)linear Model Predictive Control from MCUs to GPUs <i>Robotics Science and Systems (RSS) Workshop Frontiers of Optimization for Robotics</i>, 2024 [pdf] [host] E. Adabag*, X. Bu*, K. Nguyen*, S. Schoedel*, ..., Z. Manchester, B. Plancher Spotlight Talk• Enforcing Non-Fixed Hard Convex Constraints on Neural Networks and Its Applications <i>Robotic Systems Lab, ETH Zürich, Switzerland</i>, 2023 K. Nguyen, J. Tordesillas, V. Klemm, M. Hutter
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EXPERIENCE

VinRobotics

Founding Robotics Engineer

Hanoi, Vietnam
Jan 2025 – Present

- Building whole-body control systems for novel AI-powered humanoid robots.

Laurent's Group, VinUniveristy

Research Assistant, advised by Prof. Laurent El Ghaoui

Hanoi, Vietnam
July 2024 – Present

- Managing a research group of six students, directing tasks, resources & fostering collaboration.
- Studying the generalization and robustness of deep implicit networks in tasks such as reasoning, language modeling, and computer vision.

Robotic Exploration Lab, CMU

Research Assistant, advised by Prof. Zachary Manchester

Pittsburgh, PA
Sep 2022 – May 2024

- Co-led TinyMPC, a high-speed and low-memory-footprint MPC solver, outperforming existing solvers on compute-limited platforms; collaborated with Prof. Brian Plancher.
- Built a pipeline to auto-generate fast multi-threaded robot dynamics on CPU and GPU.
- Developed DEQ-MPC, a novel approach that co-develops the solver and architecture unifying the optimization solver and deep network inference problems.

Robotic Systems Lab, ETHZ

Research Assistant, advised by Prof. Jesus Tordesillas, Prof. Marco Hutter

Zürich, Switzerland
Summer 2023

- Proposed two frameworks to strictly enforce runtime varying constraints on neural networks through implicit optimization-based and explicit learning-based modules.
- Employed the frameworks to learn to solve constrained optimization problems with different types of constraints; aiming to realize safe learning-enabled control.

Advanced Control and Robotics Group, HUST

Research Assistant, advised by Prof. Phuong Nam Dao

Hanoi, Vietnam
Mar 2019 – Aug 2022

- Explored motion/force robust control algorithms for cooperative mobile manipulators.
- Leveraged control theory to boost the adaptability and robustness of RL algorithms.
- Developed scalable hierarchical formation control for multi-agent systems with guarantees.

Viettel Aerospace Institute (VTX)

Autopilot Intern/Engineer

Hanoi, Vietnam
Aug 2020 – May 2022

- Investigated guidance and control; tuned an attitude controller to improve performance.
- Implemented controllers in embedded systems including STM32 ARM (C/C++) and FPGA.
- Authored one peer-reviewed article in the internal Institute Journal on genetic algorithm-based control design for pneumatic actuators.

Advanced Power Electronic System Lab, HUST

Research Assistant, advised by Prof. Trung Kien Nguyen

Hanoi, Vietnam
Nov 2019 – Feb 2021

- Developed efficient static and dynamic wireless power transfer systems for electric vehicles.
- Proposed using extended Kalman filter to dynamically estimate vehicle states and parameters.

TEACHING

Assistant, Carnegie Mellon University, Fall 2023

Advanced Control Systems Integration (graduate level), with Prof. Mark Bedillion.

Instructor, GSTT Initiative, 2018

Advanced STEM subjects for the Talent Program's entry exams at HUST.

ACADEMIC
SERVICES

Reviewers for: *International Journal of Robust and Nonlinear Control (IJ-RNC)*
Transactions on Automation Science and Engineering (T-ASE)
Robotics and Automation Letters (RA-L)
Journal of the Franklin Institute (J-FI)
International Conference on Intelligent Robots and Systems (IROS 2024, 2025)
Conference on Decision and Control (CDC 2024)
International Conference on Humanoid Robots (Humanoids 2024)
International Conference on Robotics and Automation (ICRA 2025)
American Control Conference (ACC 2025)

Organizers for: *Robotics Acceleration with Computing Hardware and Systems, an ICRA 2025 Workshop*

AWARDS
AND
HONORS

- **Best Paper Award Finalist**, IEEE TC on Model-based Optimization for Robotics 2024
- **Runner-up of Best Poster Award**, IEEE TC on Model-based Optimization for Robotics 2024
- **Best Paper Award in Automation**, International Conference on Robotics and Automation 2024
- **Best Conference Paper Finalist**, International Conference on Robotics and Automation 2024
- **Best Student Paper Finalist**, International Conference on Robotics and Automation 2024
- **Best Poster Award**, CMU Mechanical Engineering MS Research Symposium 2024
- **ETH Zürich Robotics Student Fellowship**, awarded to 08 students world-wide 2023
- **ETH Zürich Robotics Summer School**, awarded to 50 students world-wide 2023
- **Vingroup Scholarship**, full-ride scholarship for graduate studies 2022
- **Award for Graduating with Excellence**, outstanding graduating students at HUST 2022
- **Honda Scholarship**, awarded to 100 outstanding students nation-wide 2021
- **Top 15 Finalists of The Honda Young Engineer and Scientist's Award** 2021
- **CCU Virtual Internship Program**, National Chung Cheng University, Taiwan 2021
- **University Academic Scholarship**, "top 1% GPA" undergraduates at HUST 2018 – 2022
- **Global Project-Based Learning Program**, Shibaura Institute of Technology, Japan 2020
- **Acecook Happy Scholarship**, Acecook Vietnam 2020
- **Top 2 Best Oral Presentation Award**, Student Forum 2020 – Renewable Energy 2020
- **Best Poster Award**, HUST Departmental Undergraduate Research Symposium 2020
- **Third Prize in the Olympic Circuit Theory**, School of EE, HUST 2019

EXTRA
CURRICULARS

Member, *Carnegie Autonomous Racing*, 2023
 Co-led the team finishing at 04/12 at the 12th F1TENTH Grand Prix at CPS-IoT 2023.

Member, *MIT-PITT-RW Racing Team*, 2023
 Verified GPU-based MPPI controller on optimal planning and obstacle avoidance.

Organizer, *European Union*, 2019
 Organized European music concerts to promote cultural exchanges in Vietnam.

Interpreter, *Plan International*, 2019
 Visited remote areas to raise awareness of child rights and safety in Vietnam.

SKILLS

Domains: Machine Learning, Optimization, Planning, Controls, State Estimation, System Identification, Rigid Body Dynamics, Simulation

Programming: Python, MATLAB, Julia, C/C++

Tools: Git, Simulink, Eigen, ROS 1/2, Torch, JAX, Drake, OCS2, MuJoCo, IsaacGym, Gazebo, CARLA, Trello, and various optimization libraries.

Robots: Unitree G1/H1-2 humanoid, Unitree Go1 quadruped, Crazyflie quadrotor, F1TENTH car, SuperMegaBot vehicle, , xArm6 manipulator, ANYmal quadruped (sim)