Duy Phuong Nguyen

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Specializing in scaling safe reinforcement learning for high-dimensional robotic systems
through world models, adversarial imagination, and closed-loop foundation model fine-tuning.

Research Focus: Safe Reinforcement Learning, Safe Autonomy, Adversarial RL, Value Alignment,
Human-Robot Interaction, Sim-to-Real, World Models, Foundation Models for Robotics

EDUCATION

Princeton University   **Princeton, NJ, USA**
PhD in Electrical and Computer Engineering, GPA 3.7/4.0   *Expected Graduation: May 2026*
Advisor: Assistant Professor Jaime F. Fisac
M.A. in ECE (en route, 2023)
Certificate in Statistics and Machine Learning (2025)

RMIT University   **HCMC, Vietnam**
BEng, EEE (Honours First Class), GPA 4.0/4.0   *2014-2019*
Supervisor: Professor Anthony Holland, Dr. Thanh Pham

INDUSTRY EXPERIENCE

Waymo   **CA, USA**
Research Intern   *Jun 2025 - Sep 2025*
- Designed large motion forecasting architectures that reduce catastrophic forgetting during RL fine-tuning for safety-critical autonomous planning.
- Built a JAX-based closed-loop simulator with procedural OOD scenario generation, enabling scalable and closed-loop RLFT under distribution shift.

Vulcan Augmetics   **HCMC, Vietnam**
ML Lead, Technical Advisor   *Feb 2020 - Dec 2020*
- Led R&D of embedded bio-signal systems for real-time muscle activity decoding, integrating signal processing and machine learning on edge devices.
- Designed learning pipelines for EMG-based intent recognition with low-latency inference under hardware constraints.
- Advised on end-to-end system design spanning sensors, embedded firmware, and user-facing mobile applications.

Bosch   **Tokyo, Japan**
Electrical and Electronic Engineer Intern   *Jan 2018 - Jan 2019*
- Developed an OCR-based pipeline for automated SIM card serial number recognition in manufacturing workflows.
- Built a real-time sensor monitoring and reporting system managing over 2,000 sensors with automated fault detection.
- Implemented REST-based data crawler with DFS for data collection and processing.

Aubot   **Melbourne, Australia**
Embedded Software Engineer Intern   *Jun 2017 - Dec 2017*
- Developed and deployed control stack for an 8-DOF robotic arm and omnidirectional mobile base with obstacle detection and collision avoidance.
- Implemented sensor-driven motion control and teleoperation for a telepresence robot.

National Instruments   **HCMC, Vietnam**
Application Engineer Intern   *Jun 2016 - Dec 2016*
- Prototyped a self-balancing robot and a 3-DOF robotic arm using NI products.
- Support clients' projects using NI LabVIEW, Multisim, Ultiboard, and vision toolkits.

RESEARCH EXPERIENCE

Princeton University   **NJ, USA**
Graduate Researcher   *Jan 2021 - Present*

- Developed theoretical and learning-based safety frameworks using reinforcement learning under uncertainty, with guarantees via control and game theory.
- Developed adversarial imagination and safety filtering methods enabling zero-shot learned policies deployment on robots.
- Integrated world models, VLMs, and closed-loop simulation for scalable robot learning beyond the training ODD.

RMIT Vietnam   **HCMC, Vietnam**
Research Assistant   *Apr 2019 - Nov 2019*

- Developed models for 2D/3D metal-semiconductor test structure with Synopsys TCAD.
- Modeled TLM test structure for $\rho_{contact}$ analysis.
- Established TCAD FEM capability at RMIT

TECHNICAL SKILLS

Core Areas: Reinforcement Learning (RL), Learning from Demonstration, Optimal Control, Game Theory, Human-Robot Interaction, World Models, Sim-to-Real Transfer, Safety-Critical Systems.

Methods: Adversarial RL, RL Fine-Tuning, Policy and Trajectory Optimization, Reachability Analysis, Safety Filter, State Estimation, Multi-modal Decision Making, System Identification, Real-Time Control and Embedded Systems, Signal Processing, Data-Driven Modeling, Differentiable and Closed-Loop Simulation

Tools & Stack: Python, C++, MATLAB, PyTorch, JAX, CUDA, ROS, MuJoCo (MJX), Isaac Gym/Lab, PyBullet.

SELECTED PUBLICATIONS

[1] **D. P. Nguyen***, K.-C. Hsu*, W. Yu, J. Tan, and J. F. Fisac, "Gameplay filters: Robust zero-shot safety through adversarial imagination," in *8th Annual Conference on Robot Learning*, 2024. [Online]. Available: `https://openreview.net/forum?id=Ke5xrnBFAR`.

[2] K.-C. Hsu*, **D. P. Nguyen***, and J. F. Fisac, "Isaacs: Iterative soft adversarial actor-critic for safety," in *Proceedings of The 5th Annual Learning for Dynamics and Control Conference*, N. Matni, M. Morari, and G. J. Pappas, Eds., ser. Proceedings of Machine Learning Research, vol. 211, PMLR, 15–16 Jun 2023, pp. 90–103. [Online]. Available: `https://proceedings.mlr.press/v211/hsu23a.html`.

[3] D. D. Oh*, **D. P. Nguyen***, H. Hu, and J. F. Fisac, *Provably optimal reinforcement learning under safety filtering*, 2025. arXiv: `2510.18082 [cs.LG]`. [Online]. Available: `https://arxiv.org/abs/2510.18082`.

[4] K.-C. Hsu, A. Z. Ren, **D. P. Nguyen**, A. Majumdar, and J. F. Fisac, "Sim-to-lab-to-real: Safe reinforcement learning with shielding and generalization guarantees," *Artificial Intelligence*, vol. 314, p. 103 811, 2023, ISSN: 0004-3702. DOI: `https://doi.org/10.1016/j.artint.2022.103811`. [Online]. Available: `https://www.sciencedirect.com/science/article/pii/S0004370222001515`.

[5] R. Pandya, M. Bland, **D. P. Nguyen**, C. Liu, J. F. Fisac, and A. Bajcsy, *From refusal to recovery: A control-theoretic approach to generative ai guardrails*, 2025. arXiv: `2510.13727 [cs.AI]`. [Online]. Available: `https://arxiv.org/abs/2510.13727`.

[6] D. R. Anthony, **D. P. Nguyen**, D. Fridovich-Keil, and J. F. Fisac, "Back to the future: Efficient, time-consistent solutions in reach-avoid games," in *2022 International Conference on Robotics and Automation (ICRA)*, 2022, pp. 6830–6836. DOI: `10.1109/ICRA46639.2022.9812243`.

[7] J. Wang, H. Hu, **D. P. Nguyen**, and J. F. Fisac, *Magics: Adversarial rl with minimax actors guided by implicit critic stackelberg for convergent neural synthesis of robot safety*, 2024. arXiv: `2409.13867 [cs.RO]`. [Online]. Available: `https://arxiv.org/abs/2409.13867`.

[8] **D. Nguyen Phuong** and T. Pham Chi, "A hybrid indoor localization system running ensemble machine learning," in *2018 IEEE Intl Conf on Parallel Distributed Processing with Applications, Ubiquitous Computing Communications, Big Data Cloud Computing, Social Computing Networking, Sustainable Computing Communications (ISPA/IUCC/BDCloud/SocialCom/SustainCom)*, 2018, pp. 1071–1078. DOI: `10.1109/BDCloud.2018.00160`.

* Equal contribution

FEATURED PROJECTS

2023 – Present: DARPA LINC: Developed introspective safety mechanisms for adaptive robot control under uncertainty, field-tested on a hybrid track-based robot and crane robot [*press release, demo video*]

2022 – 2024: Robust learning-based safety filter on quadruped robot for locomotion [*video*]

2022 – 2023: Reconfigurable modular robots utilizing 3D origami Miura-Ori structure

2021: 3-channel EMG controlled prosthesis with edge online learning [*video*]

2016 – 2018: 10 DOF prosthesis using BCI, EMG and computer vision [*repository, presentation*]

HONORS AND AWARDS

2022: Outstanding Teaching Assistant Award, Princeton University

2020: First Year Fellowship in Natural Sciences and Engineering, Princeton University

2019: Outstanding Graduate of Degree Program, RMIT

2019: RMIT Certificate of Achievement

2019: Best Concept Award, Hackaday Prize

2018: Best Paper Award, BDCloud

ACADEMIC ACTIVITIES

Princeton University   **Princeton, NJ, USA**
Assistant in Instruction   *2021 - 2023*
ECE 346/566 Intelligent Robotic Systems [*GitHub, press release*]
Instructor: Assistant Professor Jaime F. Fisac
Designed and built mobile robots, prepared lab components for planning under uncertainty, active perception, learning-based control, and multi-agent decision-making using ROS, visual SLAM, iLQR, MDP/POMDP and reachability analysis

Princeton AI4All 2022
Curriculum Developer, Lecturer   *2022*
Taught high school students sampling and learning based motion planning in robotics; Developed teaching materials a 3-week program; Delivered lectures and programming tutorial sessions

LEADERSHIP EXPERIENCE

CYOBot - Create Your Own Robot [*website*]
Founder and Product Lead   *2020*
Open-source educational robotics platform used for hands-on STEM learning.

Project Cocoon - Open-source Engineering Platform [*website*]
Founder and Product Lead   *2017 - 2020*
Platform for managing, logging and sharing open-source projects for makers and students.

REFERENCES

Jaime Fernández Fisac	Assistant Professor, ECE, Princeton University
	jfisac@princeton.edu
Liting Sun	Staff Research Scientist, Waymo
	litingsun@waymo.com
Jie Tan	Director, Google Deepmind
	jietan@google.com