

# THAI P. DUONG

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## RESEARCH INTERESTS

Robot Autonomy; Robot Dynamics Learning, Planning and Control; Model-based Reinforcement Learning; Robot Perception and Environment Representation; Robot Exploration and Safety.

## EDUCATION

<b>Ph.D.</b> Electrical and Computer Engineering. Track: Intelligent Systems, Robotics & Control.	<b>University of California, San Diego</b> La Jolla, CA	<b>2018 - 2024 (expected)</b>
<b>M.S.</b> Electrical Engineering and Computer Science.	<b>Oregon State University</b> Corvallis, OR	<b>2015</b>
<b>B.S.</b> Electronics and Telecommunications. Advanced Program.	<b>Hanoi University of Science &amp; Technology</b> Hanoi, Vietnam	<b>2011</b>

## EXPERIENCE

<b>Graduate Researcher</b> Advisor: <a href="#">Prof. Nikolay Atanasov</a> , <a href="#">Existential Robotics Laboratory</a> Working on machine learning for robotics: robot dynamics learning, planning and control, robot exploration and safety, robot perception, decision making under uncertainty, etc. (ROS, C++, python, pytorch, tensorflow, quadrotors, cars)	<b>University of California, San Diego</b> La Jolla, CA	<b>2018 – Present</b>
<b>Research Intern</b> Working on optimization-based motion planning for robot manipulators.	<b>Amazon Robotics</b>	<b>2022</b>
<b>Software Engineer I/II</b> Working on bugs/anomalies detection and power optimizations (C++/C#).	<b>Microsoft Corporation, Office Performance Team</b>	<b>2015 – 2018</b>

## PROJECTS

<b>Robot dynamics learning and control</b>   <i>neural ODE, python/C++, aerial and ground robots</i> • Encoding physics knowledge and Lie group constraints in machine learning models for dynamics learning and control. <i>Papers</i> : <a href="#">[1]</a> <a href="#">[12]</a> <a href="#">[9]</a> <a href="#">[4]</a> . • Adaptive control with disturbance features learned from data. <i>Papers</i> <a href="#">[6]</a> <a href="#">[14]</a> . • Safe navigation using physics-guided dynamics learning. <i>Papers</i> <a href="#">[11]</a> <a href="#">[7]</a> . • Learning distributed control policies from demonstration. <i>Paper</i> <a href="#">[10]</a> .	<b>2020 - Present</b>
<b>Environment understanding for robot navigation</b>   <i>ROS, C++, ground robots</i> • Sparse online Bayesian occupancy map of the environment using relevance vector machine and efficient collision checking algorithms for autonomous navigation. <i>Papers</i> <a href="#">[13]</a> <a href="#">[5]</a> . • Optimal planning with large language model guidance. <i>Paper</i> <a href="#">[3]</a> .	<b>2018 - Present</b>

## PUBLICATIONS

### Preprints

- [1] **T. Duong**, A. Altawaitan, J. Stanley, N. Atanasov, “*Port-Hamiltonian-based Neural ODE Networks on Lie Groups For Robot Dynamics Learning and Control*”, submitted to **T-RO**, 2023 [[website](#)][[pdf](#)][[code](#)].
- [2] E. Sebastian, **T. Duong**, N. Atanasov, E. Montijano and C. Sagues, “*Physics-Informed Multi-Agent Reinforcement Learning for Distributed Multi-Robot Problems*”, submitted to **T-RO**, 2023 [[website](#)][[arxiv](#)][[code](#)].
- [3] Z. Dai, A. Asgharivaskasi, **T. Duong**, S. Lin, M. Tzes, G. Pappas, N. Atanasov, “*Optimal Scene Graph Planning with Large Language Model Guidance*”, submitted to IEEE International Conference on Robotics and Automation (ICRA), 2024 [[arxiv](#)].
- [4] A. Altawaitan, J. Stanley, S. Ghosal, **T. Duong**, N. Atanasov, “*Hamiltonian Dynamics Learning from Point Cloud Observations for Nonholonomic Mobile Robot Control*”, submitted to IEEE International Conference on Robotics and Automation (ICRA), 2024 [[website](#)][[arxiv](#)][[code](#)].

### Journals

- [5] **T. Duong**, M. Yip, N. Atanasov, “*Autonomous Navigation in Unknown Environments with Sparse Bayesian Kernel-based Occupancy Mapping*”, IEEE Transactions on Robotics (T-RO), 2022 [[website](#)][[arxiv](#)][[code](#)].
- [6] **T. Duong**, N. Atanasov, “*Adaptive Control of SE(3) Hamiltonian Dynamics with Learned Disturbance Features*”, IEEE Control Systems Letters (L-CSS), 2022 [[website](#)][[arxiv](#)].
- [7] Z. Li, **T. Duong**, N. Atanasov, “*Robust and Safe Autonomous Navigation for Systems with Learned SE(3) Hamiltonian Dynamics*”, IEEE Open Journal of Control System (OJ-CSYS), 2022 (*Invited Paper*) [[website](#)][[arxiv](#)].

### Conferences

- [8] E. Sebastian, **T. Duong**, N. Atanasov, E. Montijano and C. Sagues, “*Learning to Identify Graphs from Node Trajectories in Multi-Robot Networks*”, International Symposium on Multi-Robot & Multi-Agent Systems (MRS), 2023 [[website](#)][[arxiv](#)][[code](#)].

- [9] V. Duruisseaux, **T. Duong**, N. Atanasov, M. Leok, “*Lie Group Forced Variational Integrator Networks for Learning and Control of Robot Systems*”, Learning for Dynamics & Control Conference (L4DC), 2023 [[website](#)][[arxiv](#)][[code](#)].
- [10] E. Sebastian, **T. Duong**, N. Atanasov, E. Montijano and C. Sagues, “*LEMURS: Learning Distributed Multi-robot Interactions*”, IEEE International Conference on Robotics and Automation (ICRA), 2023 [[website](#)][[arxiv](#)][[code](#)].
- [11] Z. Li\*, **T. Duong\***, N. Atanasov, “*Safe Autonomous Navigation for Systems with Learned SE(3) Hamiltonian Dynamics*”, Learning for Dynamics & Control Conference (L4DC), 2022 [[website](#)][[arxiv](#)] (\*equal contribution).
- [12] **T. Duong**, N. Atanasov, “*Hamiltonian-based Neural ODE Networks on the SE(3) Manifold For Dynamics Learning and Control*”, Robotics: Science and Systems (RSS), Virtual, 2021 [[website](#)][[arxiv](#)] [[code](#)].
- [13] **T. Duong**, N. Das, M. Yip, N. Atanasov, “*Autonomous Navigation in Unknown Environments using Sparse Kernel-based Occupancy Mapping*”, International Conference on Robotics and Automation (ICRA), Virtual, 2020 [[website](#)][[pdf](#)] [[code](#)].

## Workshops

- [14] **T. Duong**, N. Atanasov, “*Physics-guided Learning-based Adaptive Control on the SE(3) Manifold*”, Physical Reasoning and Inductive Biases for the Real World Workshop at NeurIPS, Virtual, 2021 [[pdf](#)].

## TALKS

- “Learning and Control of Hamiltonian Dynamics on the SE(3) Manifold”, 2022 SIAM Conference on Mathematics of Data Science ([MDS’22](#))
- “Autonomous Navigation in Unknown Environments with Sparse Bayesian Kernel-based Occupancy Mapping”, 2023 International Conference on Robotics and Automation ([ICRA’23](#))
- “Learning Environment and Dynamics Representations for Autonomous Robot Navigation”, Robograd Seminar, UCSD, 2023

## SERVICES

**Reviewers:** IEEE Transactions on Robotics (T-RO), IEEE Robotics and Automation Letters (RAL), IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), American Control Conference (ACC), Learning for Dynamics and Control (L4DC).

## Program Committee:

[AAAI’23](#) workshop “[When Machine Learning meets Dynamical Systems: Theory and Applications](#)”.

## TECHNICAL SKILLS

**Programming:** C++/Python/Matlab, Object-oriented Design.

**Operating Systems:** Linux, ROS.

**Libraries and Toolbox:** CasADi, Pytorch, Pybullet, Gazebo, Docker.

**Robot Platforms:** RaceCar, PX4 Quadrotors.

## HONORS AND AWARDS

<b>ICRA 2023 Travel Grant</b> , IEEE Robotics and Automation Society	2023
<b>ECE Department Fellowships</b> , University of California, San Diego	2018-2019
<b>Jacobs Fellowships</b> , University of California, San Diego	2018
<b>First place, Microsoft Coding Competition</b> , Oregon State University	2013
<b>Phi Kappa Phi Society</b> , Oregon State University	2013
<b>President’s Honors List</b> , Hanoi University of Science & Technology	2011
<b>Department’s Honors List</b> , Hanoi University of Science & Technology	2010

## TEACHING EXPERIENCE

<b>Teaching Assistant</b> , Planning & Learning in Robotics, University of California, San Diego	Spring 2021
<b>Teaching Assistant</b> , Sensing & Estimation in Robotics, University of California, San Diego	Winter 2020
<b>Teaching Assistant</b> , Stochastic Signals & Systems, Oregon State University	Fall 2014
<b>Teaching Assistant</b> , Discrete Structures in Computer Science, Oregon State University	Summer 2014
<b>Teaching Assistant</b> , Intro. to Probability & Random Signals, Oregon State University	Winter 2014

## MENTORING

### M.S. students:

Sambaran Ghosal (UCSD)	2022-present
Rishabh Bhattacharya (UCSD)	2023
Quan Lou (UCSD)	2022

### Undergraduate students:

Jason Stanley (UCSD)	2022-present
Yuchen Zhang, Behrad Rabiei, Adin Ackerman, Anthony Tseng (UCSD)	2022
Minh Pham (UCSD)	2020-2022

### MAE Women’s Mentoring Program:

Dehao Lin(UCSD), Zihang He(UCSD), David Yount(UCSD), Emily Huang(UCSD)	2023 - 2024
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### International student office’s mentorship program:

Iman Sayyadzadeh (UCSD), Taiga Morioka (UCSD)	2023
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