

VINCENT PACELLI

DOCTORAL CANDIDATE

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EDUCATION

- Princeton University**, Princeton, NJ 2017 — Now
Doctoral Candidate, Mechanical and Aerospace Engineering,
Advisor: [Anirudha Majumdar](#),
Expecting to Graduate in May, 2023,
- University of Pennsylvania**, Philadelphia, PA 2016 — 2017
Master's of Science in Engineering, Robotics,
Advisor: [Daniel E. Koditschek](#)
- University of Pennsylvania**, Philadelphia, PA 2012 — 2016
Bachelor's of Science in Engineering, Electrical Engineering, *Cum Laude*

RELEVANT EXPERIENCE

PRINCETON UNIVERSITY

📍 Princeton, NJ

ASST. IN RESEARCH

📅 September 2017 — Now

The focus of my research, conducted as part of Princeton's [Intelligent Robot Motion \(IRoM\) Lab](#) under [Anirudha Majumdar](#), is on understanding the role that **task-relevant information** plays in designing performant robots and other decision-making systems. Two particular topics I studied are the benefits of only depending on a necessary amounts of information to achieve performance — leading to **robustness to measurement error** — and characterizing the **fundamental performance limits** of a robot equipped with a specific sensor. These projects involved developing new theory and algorithms that combine methodologies from many fields including, **control theory, information theory, machine learning, and statistical mechanics**.

PRINCETON UNIVERSITY

📍 Princeton, NJ

ASST. IN INSTRUCTION

📅 September 2019 — January 2021

I aided in redesigning the curriculum for Princeton's [Introduction to Robotics](#) course (MAE 345 / 545). In addition to giving feedback on the course content, I designed most of the programming assignments (C and Python) which introduce students to various algorithms central to the field of robotics — including a final project in which students create a camera-based obstacle avoidance system implemented on a quadrotor hardware platform. I also filled in as lecturer when the instructor needed. I received the **Crocco Award for Teaching Excellence** for my work on the course.

PRINCETON UNIVERSITY

📍 Princeton, NJ

STUDENT INSTRUCTOR, AI4ALL

📅 Summer 2018

I worked as a student instructor in [Princeton's AI4ALL program](#), which introduces high school students in underrepresented demographics to artificial intelligence and machine learning through hands-on projects. My responsibilities involved giving introductory lectures on machine learning algorithms as well as designing and advising projects for students interested in cybersecurity applications.

As an intern, I worked on efficient implementations of SLAM algorithms for mapping spaces via an autonomous quadcopter equipped with depth-sensitive cameras. I integrated said algorithms into the project's existing software infrastructure and I designed physical experiments to validate the correctness of said algorithms.

NASA LANGLEY RESEARCH CENTER

 Hampton, VA

RESEARCH INTERN

 Summer 2015

I assisted in modifying quadcopter autopilot firmware for experiments conducted by branch members. I also created software module for efficient state estimation and fault-tolerant mission planning for unmanned aerial vehicles.

AWARDS

Crocco Award for Teaching Excellence

 September 2020

Prize awarded by the faculty of the Department of Mechanical and Aerospace Engineering in recognition of outstanding performance as an Assistant in Instruction.

IEEE RAS Travel Grant (ICRA 2018)

 March 2018

To aid in funding expenses incurred while traveling to present at the conference.

Hon. Harold Berger Award

 May 2016

Given to the senior design team in the Department of Electrical and Systems Engineering whose outstanding senior design project combines conceptual or technical innovation with entrepreneurial possibility.

PUBLICATIONS

Fundamental Performance Limits for Sensor-Based Robot Control and Policy Learning

2022

A. Majumdar and V. Pacelli. In the *Proceedings of Robotics: Systems and Science*.

Systems of Stacking Interlocking Blocks

2022

R. Mangharam, M. E. O'Kelly, V. Pacelli, M. A. Brady. *US Patent 11,213,747*.

Robust Control Under Uncertainty via Bounded Rationality and Differential Privacy

2022

V. Pacelli and A. Majumdar. In the *Proceedings of the IEEE Intl. Conf. on Robotics and Automation*.

Invariant Policy Optimization: Towards Stronger Generalization in Reinforcement Learning

2021

A. Sonar, V. Pacelli, and A. Majumdar. In the *Proceedings of Learning for Dynamics and Control Conf.*

Learning Task-Driven Control Policies via Information Bottlenecks

2020

V. Pacelli, and A. Majumdar. In the *Proceedings of Robotics: Systems and Science*.

Task-Driven Estimation and Control via Information Bottlenecks

2019










V. Pacelli and A. Majumdar. In the *Proceedings of the IEEE Intl. Conf. on Robotics and Automation*.

Integration of Local Geometry and Metric Information in Sampling-Based Motion Planning 2018
V. Pacelli, O. Arslan, and D. E. Koditschek. In the *Proceedings of the IEEE Intl. Conf. on Robotics and Automation*.







Sensory Steering for Sampling-Based Motion Planning 2017
O. Arslan, V. Pacelli, and D. E. Koditschek. In the *Proceedings of the IEEE Intl. Conf. on Intelligent Robots and Systems*.

Joint Exploration of Local Metrics and Geometry in Sampling-based Planning 2017
V. Pacelli. *MSE Thesis*.

TALKS AND PRESENTATIONS

- Robotics: Systems and Science  2022
- IEEE Intl. Conf. on Robotics and Automation  2022
- Learning for Dynamics and Control Conference  2021
- APS March Meeting, Robophysics Track  2021
- Robotics: Systems and Science  2020
- IEEE Intl. Conf. on Robotics and Automation  2019
- Federal Aviation Association Joint University Program Quarterly Meeting  2019
- Northeast Robotics Colloquium  2019
- IEEE Intl. Conf. on Robotics and Automation  2018

PEER REVIEWER

- Autonomous Robots  2022 — Now
- IEEE Control Systems Society Conference  2021 — Now
- Robotics: Systems and Science  2021 — Now
- Learning for Dynamics and Control  2021 — Now
- Workshop on the Algorithmic Foundations of Robotics  2021 — Now
- International Journal of Robotics Research  2019 — Now