

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**  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)**  2018
To aid in funding expenses incurred while traveling to present at the conference.
- Hon. Harold Berger Award**  2016
Given to the senior design team in the Department of Electrical and Systems Engineering whose outstanding 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 Conf.  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

STUDENT MENTORING

- | | |
|---|---|
| • Anoopkumar Sonar  2021 | • Divi Pachisia  2018 |
| • Colby Chang  2021 | • Gargi Sadalgekar  2018 |

PEER REVIEWER

- Autonomous Robots  2022 — Now
- IEEE Conference on Decision and Control  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

REFERENCES

Anirudha Majumdar

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Assistant Professor
University of Michigan
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