

Mateo Guaman Castro

+1 (339) 224-7936 | mateo.guaman1998@gmail.com | <https://www.mateoguaman.com> | <https://www.github.com/mateoguaman>

EDUCATION

Carnegie Mellon University

Master of Science in Robotics

GPA: 4.08/4.00

Pittsburgh, PA

Aug. 2021 – Aug. 2023

Tufts University

Bachelor of Science in Electrical Engineering

GPA: 3.80 Honors: Summa Cum Laude, Member of Eta Kappa Nu (IEEE-HKN)

Medford, MA

Sep. 2016 – May 2020

PUBLICATIONS

- [1] **Guaman Castro, M., Triest, S., Wang, W., Gregory, J. M., Sanchez, F., Rogers III, J. G., Scherer, S. (2022) How Does It Feel? Self-Supervised Costmap Learning for Off-Road Vehicle Traversability.** Submitted to the 2023 IEEE International Conference on Robotics and Automation (ICRA). URL: www.howdoesitfeel.dev
- [2] Triest, S., **Guaman Castro, M.**, Maheshwari, P., Sivaprakasam, M., Wang, W., Scherer, S. (2022) **Learning Risk-Aware Costmaps via Inverse Reinforcement Learning for Off-Road Navigation.** Submitted to the 2023 IEEE International Conference on Robotics and Automation (ICRA)
- [3] Gizzi, E., Lin, W. W., **Castro, M. G.**, Harvey, E., Sinapov, J. (2022) **Toward Life-Long Creative Problem Solving: Using World Models for Increased Performance in Novelty Resolution.** In proceedings of the 13th International Conference on Computational Creativity (ICCC), Bolzano, Italy, June 27 – July 1, 2022.
- [4] Gizzi, E., **Castro, M. G.**, Lin, W.W, and Sinapov, J. (2021) **A Framework for Creative Problem Solving Through Action Discovery.** Presented at the Declarative and Neurosymbolic Representations in Robot Learning and Control Workshop at the Robotics: Science and Systems Conference (RSS). Virtual. July 2021.
- [5] Muhammad, F., Sarathy, V., Tatiya, G., Goel, S., Gyawali, S., **Guaman, M.**, Sinapov, J., Scheutz, M. (2021) **A Novelty-Centric Agent Architecture for Changing Worlds.** In Proceedings of the 20th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS), London, UK, May 3-7, 2021.
- [6] Gizzi, E., **Castro, M. G.**, and Sinapov, J. (2019) **Creative Problem Solving by Robots Using Action Primitive Discovery.** In proceedings of the Joint IEEE 9th International Conference on Development and Learning and Epigenetic Robotics (ICDL-EpiRob), Oslo, Norway, Aug. 19-22, 2019.

EXPERIENCE

AirLab, The Robotics Institute

Graduate Research Assistant. Advisor: Prof. Sebastian Scherer

October 2021 – Present

Carnegie Mellon University, PA

- Develop perception algorithms for autonomous navigation for off-road vehicles using self-supervised deep learning.
- Decreased number of interventions by 57% using self-supervised proprioception-based traversability costs [1], and decreased number of interventions by up to 57% using inverse reinforcement learning [2]. Work in submission to ICRA 2023.
- Led three field-testing trips to an off-site location to test our algorithms on a different robot platform and environment.

Multi-Agent Robotic Motion Lab (MARMoT Lab)

Research Intern, Remote. Advisor: Prof. Guillaume Sartoretti

May 2020 – August 2021

National University of Singapore, Singapore

- Lead a 4-person research team to develop reinforcement learning-based domain decomposition algorithms for multi-robot distributed search-and-rescue.
- Formulated domain decomposition as a reinforcement learning problem, developed a simulation environment and implemented deep reinforcement learning methods to solve this problem.

Multimodal Learning, Interaction, and Perception Lab (MuLIP Lab)

Research Staff. Advisor: Prof. Jivko Sinapov

May 2020 – June 2021

Tufts University, MA

- Developed robot controllers and infrastructure for research in lifelong creative problem solving [3, 4]. Presented our work at the RSS 2021 Workshop on Declarative and Neurosymbolic Representations in Robot Learning and Control [4].
- Developed novelty handling capabilities and infrastructure for our DARPA "Science of Artificial Intelligence and Learning for Open-world Novelty" (SAIL-ON) AI agent. Co-authored a paper published in AAMAS 2021 [5].

Undergraduate Research Assistant. Advisor: Prof. Jivko Sinapov

June 2018 - May 2020

- Developed motion controllers, computer vision methods, and evaluation infrastructure for Baxter and UR5 robots for research in creative problem solving. Co-authored a paper published in ICDL 2019 [6].

Biorobotics Lab, The Robotics Institute

Research Intern. Advisor: Prof. Howie Choset and Prof. Guillaume Sartoretti

May 2019 – Aug. 2019
Carnegie Mellon University, PA

- Developed a SLAM-based deep reinforcement learning algorithm for active perception for a hexapod robot.
- Designed a visual simulator in Unity3D and a dynamics simulator in Gazebo for research in shaky perception.

Electrical and Computer Engineering (ECE) Department

Teaching Assistant - Introduction to Electrical Systems

Sep. 2018 – Dec. 2018
Tufts University, MA

- Led laboratory sessions for a group of 15 students.

SharkNinja Operating LLC

Electrical Engineering Intern

June 2018 – Aug. 2018
Needham, MA

- Designed and assembled a testbed for STM32 ARM Cortex-M0 microcontrollers to decrease future production costs for Ninja kitchen products and Shark cleaning products.

PROJECTS

Fall Prediction using Anomaly Detection in Gait Patterns | Senior Design Project

Machine Learning, Biosensors, Python

Sep. 2019 – May 2020
Tufts University, MA

- Created a smart capacitive insole to watch for abnormal gait patterns to help prevent falls before they happen.
- Developed PCA-based and deep learning-based time-series anomaly detection algorithms using recurrent autoencoders.

Stable Locomotion in Unstructured Terrain Using Reinforcement Learning

Reinforcement Learning, Robotics, Locomotion, C/C++, Python

Sep. 2018 – Dec. 2018
Tufts University, MA

- Used deep reinforcement learning to adapt the gait of a hexapod robot online in multiple custom-made Gazebo environments with varied topographies.

Semantic Autonomous Mapping

Robotics, Navigation, Computer Vision, Python, C/C++

Jan. 2018 – May 2018
Tufts University, MA

- Developed an algorithm (using ROS) for a Turtlebot robot to create a semantic map of a building by performing optical character recognition to save semantic information while the robot navigates a building.

Smart Bike Lights | MakeHarvard Make-athon

Filtering, Electronics, IoT, MATLAB, Python

Feb. 2018
Harvard University, MA

- Led a team of five that built automatic turning and braking lights using a Kalman filter by reverse engineering a set of bike lights to interface with a Raspberry Pi
- Won Reverse Engineering and Documentation Award

SKILLS

Languages: Python, C/C++, MATLAB, Julia, HTML/CSS

Frameworks and Libraries: Robot Operating System, Tensorflow, PyTorch, Scikit, OpenCV, Unity3D, Gazebo, PyBullet

Developer Tools: Git, Linux, Docker, SLURM, Google Cloud Platform, Raspberry Pi, Arduino

Crafting: Soldering (Through-hole and SMD), Laser Cutting, Circuitry

Languages: Spanish (native)

ACTIVITIES

Field Robotics Center Activities Committee

Chair

2022
The Robotics Institute, Carnegie Mellon University, PA

- Organized weekly FRC Tea Time, a social event with food for all students, staff, and faculty of FRC, with attendance of about 30 people per event.
- Organized the FRC Summer BBQ, a large social event attended by 110 members of FRC, including students, staff, and faculty.

CMU AI Undergraduate Mentoring Program

Mentor

2022
Carnegie Mellon University, PA

- Mentored a Latino undergraduate student in different topics in AI.

ICLR and ICML Virtual Conferences

Volunteer

2020
Virtual Format

- Moderated three poster presentations and helped to make sure virtual platforms run smoothly.

ECE Department

Member of Electrical Engineering student board

Sep. 2017 – May 2018
Tufts University, MA

- Appointed by the department chair to provide semesterly student feedback about classes and the EE and CompE programs to a board of ECE professors.

IEEE Club

Class of 2020 Representative

Jan. 2018 – May 2020
Tufts University, MA

- Organize events relevant to the EECS community at Tufts and outreach