# Moises Mata

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## Education

Columbia University, BA in Computer Science and Applied Mathematics ..... Sept 2022 – May 2026

## Publications

Mahajan, Ishaan, Khai Nguyen, Sam Schoedel, Elakhya Nedumaran, **Moises Mata**, Brian Plancher, and Zachary Manchester (2026). *Code Generation and Conic Constraints for Model-Predictive Control on Microcontrollers with Conic-TinyMPC*. IEEE Robotics & Automation Society (In review). arXiv: 2403.18149 [cs.RO]. URL: https://arxiv.org/abs/2403.18149.

## Research & Work Experience

**Barnard/Dartmouth Accessible and Accelerated Robotics Lab** ..... New York, NY
Undergraduate Researcher ..... Jan 2025 – Present

- Diagnosing hardware constraints and modernizing the **C++** codebase for TinyMPC, an open-source convex Model Predictive Control solver designed for resource-constrained platforms. Advising professor: Brian Plancher.
- Implementing **meta-learning** algorithms to enable online controller optimization and adaptation across systems with different dynamics.

**Columbia SNL Lab** ..... New York, NY
Undergraduate Researcher ..... Sept 2025 – Present

- Developing a high-assurance, real-time runtime for spacecraft flight software using **eBPF**, **F Prime**, and **C/C++**, enabling dynamic multithreaded execution of mission logic with strict safety and millisecond deadline guarantees. (**Publication In Progress**, advisor: Junfeng Yang)

**NASA Jet Propulsion Lab, Small Scale Flight Software Group** ..... Pasadena, CA
Intern, Flight Software Engineering ..... May 2025 – Aug 2025

- Developed core infrastructure for the F Prime flight software framework (v4.0.0 release).
- Architected and implemented reusable software stacks (Communications, Command and Data Handling, Filesystem Support, Data Products), reducing setup time for new missions.

**NASA Jet Propulsion Lab, Exoplanet Discovery & Science** ..... Pasadena, CA
Undergraduate Research Fellow ..... May 2024 – Aug 2024

- Trained binary classification models using **Python**, **scikit-learn**, within **Jupyter Notebook** to predict the presence of habitable planets from simulated observational data.
- Collaborated with Dr. Yasuhiro Hasegawa to apply models to Kepler multi-planet systems. (**Publication In Progress**)

**Columbia Center for Student Advising** ..... New York, NY
Tutor, Calculus I and Digital Systems ..... Sept 2023 – Sept 2024

- Tutor for Calculus I and Fundamentals of Computer Systems (CSEE 3827); tracked student progress and prepared targeted material for class and exams.

**Columbia Astronomy** ..... New York, NY
Undergraduate Researcher ..... Dec 2022 – Jul 2023

– Collaborated with Professor Kathryn Johnston to study Milky Way stellar streams using **Gaia** and **Pan-STARRS** data.
– Analyzed the substructure of the Ophiuchus stream and simulated initial formation conditions.

## Leadership Experience

**Columbia Space Initiative** ..... New York, NY
Executive Board, Co-President ..... March 2025 – Present

– Leading **Columbia's largest engineering club** (**250+ active members**, **$200k annual budget**) as **Co-President**, coordinating strategy across **13 active projects** and managing overall budget allocation.
– Organizing major events including company visits, faculty talks, and astronaut visits, engaging Columbia and the broader NYC community in aerospace.
– Conducting career development workshops (resume/CV, internships) for Columbia's undergraduate engineering population and leading external outreach to **1000+ middle and high school students**, primarily translating engineering concepts into Spanish to inspire underrepresented demographics.

**Columbia Space Initiative** ..... New York, NY
Executive Board, Treasurer ..... March 2024 – March 2025

– Administered and operated the club's **$200k annual budget**, managing procurement, orders, and financial coordination across **13 projects** and the Mechanical Engineering department.

## Projects

**Columbia Space Initiative** ..... New York, NY
Columbia Flight Software Lead, PROVES Alcyone (LionCub) ..... Aug 2024 – Present

– 1U CubeSat on a manifested launch for April 2026. Will be **Columbia's first satellite**, with a mission to take pictures of the Earth from space. Part of the larger PROVES project.
– Implemented critical **F Prime** components including hardware watchdog and power load switch management. Developed camera control software with **UART** communication for image capture and onboard storage, enabling Columbia's first satellite imaging capabilities.
– Mentored younger members on flight software concepts and best practices.

**Columbia Space Initiative** ..... New York, NY
NASA SUITS Mission Co-Lead ..... Sept 2023 – Jul 2024

– Co-authored a proposal selected as one of **17 national finalists** and led testing activities at **NASA Johnson Space Center**.
– Developed an AR interface in **Unity** (**C#**) for astronaut assistance, deployed on **Microsoft HoloLens 2**. Testers successfully completed a simulated Mars mission on-site.

## Skills

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| Programming | C, C++, C#, Python, CircuitPython, MATLAB, F´/F Prime, Unity, scikit-learn, Jupyter |
| Domains | Robotic Optimization and Control, Embedded Systems, Flight Software |
| Languages | English, Spanish (native proficiency), French (limited) |
| Certifications | Amateur Radio (Technician Class) |