

OSWALDO RAMIREZ

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Education

Carnegie Mellon University

August 2021 – May 2025

Bachelor of Science in Computer Science (Algorithms and Complexity) & Mathematical Sciences

Pittsburgh, PA

- HSF Scholar, 2023 & 2024

Relevant Coursework

Distributed Systems, Algorithms for Big Data, Parallel Algorithms, Algorithm Design & Analysis, Topics in Algorithmic Problem Solving, Linear Algebra, Spectral Graph Theory, Modern Computer Algebra

Experience

Theory Research @ Carnegie Mellon University

Spring 2025 – Present

Research Assistant

Pittsburgh, PA

- Proved computing the balance of a graph in the streaming model requires at least quadratic space (via reduction from the Index problem)
- Developing streaming algorithms for sparsifying graphs while preserving cut balance properties
- Researching space-efficient algorithms for graph problems in the streaming setting

Air Lab @ Carnegie Mellon University Robotics Institute

January 2023 – Present

Research Assistant

Pittsburgh, PA

- Optimized algorithm for informed pathfinding by improving runtime of root-finding in a complex equation, achieving a 100x speedup in computation
- Developed an algorithm for solving curve-curve-curve trochoid path problem, leveraging 2D Newton-Raphson
- Currently assembling a demo using a Crazyflie quadrotor with ROS and Raspberry Pi, showcasing real-time implementation of the trochoid path algorithm

FLIP National Fellowship @ FLIP National

May 2024 – August 2024

Technology Fellow

New York City, NY

- Designed and developed FLIP National's revamped website using React and Tailwind CSS
- Programmed a mailing list component integrated with HubSpot to streamline communication and manage user subscriptions
- Created a contact page to improve user engagement and facilitate inquiries
- Built a donation page with a secure billing component, integrating PayPal and Stripe for seamless transaction processing

FirstTogether Officer @ Carnegie Mellon University

August 2023 – May 2025

Outreach Chair

Pittsburgh, PA

- Spoke at Carnegie Mellon's Center for Student Diversity and Inclusion First-Gen Celebration; presented at the 2025 1vyG Conference hosted by Brown University
- Research volunteer opportunities and scholarship opportunities to be shared during weekly emails
- Cooperate with the Alumni Association to increase FT Alumni engagement

Relevant Projects

Key-Value Store with RPC Communication | Go, Network & RPC

Fall 2024

- Built a distributed key-value store with multi-component communication over RPC, ensuring consistency for replicated state across clients and servers

Trochoids Research Demonstration | Python, Manim

Spring 2023

- Created an animated visualization using Manim to illustrate trochoid curves, supporting a research presentation in CMU's Air Lab

Graph Problems in the Streaming Model | LaTeX

Spring 2025

- Surveyed recent papers on cut sparsification in offline and streaming models; summarized trade-offs in space and approximation guarantees

Pell Equations and Continued Fractions | LaTeX, Beamer

Fall 2024

- Studied structure of Pell equations and implemented algorithms for computing continued fraction expansions of quadratic irrationals

Technical Skills

Computer Languages: Go, Python, C, C++, Standard ML, Julia, HTML/CSS

Technologies/Frameworks: LaTeX, Linux, Git, Unreal Engine, Manim

Human Languages: Native/bilingual proficiency in English and Spanish