Arnauld Martinez

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Education

California Institute of Technology
B.S. Computer Science
B.S. Business, Economics, and Management

Major GPA: 4.0 / 4.0
Cumulative GPA: 4.0 / 4.0
Graduation Date: June 2026

Coursework + Skills

Computer Science: Learning Systems[graduate], Data Mining[graduate], Algorithms, Data Structures and Parallelism, Theory of Computation
Relevant Courses: Differential Equations, Linear Algebra, Classical and Quantum Mechanics, Probability and Inferential Statistics

Programming Languages: Python, Java, OCaml, Rust, C++, C
Data Science: Sci-kit learn, Pandas, Tensorflow, Manim
Natural Languages: English (native), Spanish (fundamental)
Design: AutoCAD, Fusion360

Experience

Software Engineering Intern — **SpaceX** — *June 2024 - September 2024*
Mr. James Dearman, Dr. John Herman
- Built a physics simulation to capture the entire constellation of starlink satellites using C++, Python, and real-time telemetry data.
- Created a custom rk4 solver to propagate the satellites' ephemerides states forward, accurate to ~2 weeks.
- Developed models for on-board batteries and antennae, with the ability to bootstrap to a future time and simulate numerous failure modes.

Control and Dynamics Research Fellow — **ARC Lab** — *June 2023 - August 2023*
Professor Soon-Jo Chung
- Created a physics simulation modeling spacecraft kinematics and actuator systems as Markov Decision Problems.
- Integrated physics engine into existing fault detection algorithms to isolate faulty reaction wheels and sensors in spacecraft.
- Developed a neural network to convert RGB images to infrared images, artificially added hot pixels and solar glare.

Machine Learning Research Assistant — **Caltech** — *June 2022 - August 2022*
Professor Lu Wei
- Quantified the vibrational modes of non-homogenous food samples using Raman Spectroscopy.
- Developed and compared a k-nearest-neighbor, decision tree, and random forest machine learning model to identify analytes in sample.
- Trained each model to identify unknown analytes with >80% accuracy.

Personal Projects

Medical Imaging
- Designed and built a neural network and transfer learning model to identify 11 different pathologies in chest x-rays using CheXpert dataset.
- Integrated the codebase into Caltech's high performance computing center (HPC).

Physics Engine
- Built a custom physics engine in C, capable of simulating bodies, forces, impulses, momentum, and collisions.
- Developed 10+ test suites and 5+ physics games to demonstrate the accuracy of the simulation.
- Integrated the front-end user interface with the back-end physics engine

Undergraduate Housing
- Built and managed the Lloyd House website for Caltech
- Created secure databases and streamlined the user interface to manage college events and housing assignments.

Project Global
- Designed and 3D printed 6,000+ face shields for frontline workers during the Coronavirus pandemic.
- Organized a free math tutoring program throughout Southern California reach students who could not afford tutors.
- Led a community group to write and sew face masks for the elderly and those who cannot see their family.

Honors + Awards

Vice President – Lloyd Undergraduate House
- Lead house events, create/manage house website, represent undergraduate students before Caltech administration.

Finalist – California Robotics Championship
- Captain for robotics team that placed 2nd out of 150+ teams in the California State Robotics Championship.

Qualifier – United States National Chemistry Olympiad (USNCO)
- Scored in the top 1,000 out of 20,000+ students on the US National Chemistry Olympiad.

Qualifier – American Invitational Mathematics Exam (AIME)
- Scored in the top 2.5% out of 300,000+ students in the American Mathematics Competition.