Isidore Mones

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PROJECTS

THRUST-VECTOR CONTROL ROCKET PROTOYPE

Nonlinear Model Predictive Control + Collocation Methods

Jun 2025 – present

- Designed and built an end-to-end TVC VTOL prototype: 3D CAD/mechanical and avionics/electronics integration with a servo-gimballed dual-BLDC drive; Pixhawk + Raspberry Pi running ROS 2 for NMPC guidance and control.
- Developed the rocket's guidance and control software around a 6-DOF physics model in Python (CasADi, do-mpc) and developed three NMPC formulations: orthogonal collocation via do-mpc, Runge–Kutta multiple-shooting, and Chebyshev pseudospectral collocation.
- Engineered, tested, and debugged complex systems with emergent behavior using modular architecture and rigorous unit tests; built data-logging and visualization tools to evaluate performance, diagnose instability, and refine controllers.

BALANCING ROBOT Linear Quadratic Gaussian + Extended Kalman Filter

Mar 2024 - Jun 2025

- Built a two-wheeled Raspberry Pi balancer; implemented and compared PID, LQR, and LQG with EKF for upright stability.
- Integrated electronics, software, controls/simulation, and custom CAD and mechanical design.

JAMES WEB SPACE TELESCOPE DATA VISUALIZATION

2022 – 2023

- Built an interactive JWST web app (Astropy) that lets users remap infrared filters to the visible spectrum.
- Helped create a JavaScript library to read and display telescope data in the FITS (Flexible Image Transport System) file format.

MUSIC APP Aug 2024 – Sep 2024

- Developed an app in TypeScript with React that tracks new releases from your favorite artists by connecting to Spotify's Web API.

EXPERIENCE

PIPEWORKS STUDIOS Engineering Intern

Summer 2024

- Built an internal game-dev project tracker; shipped full-stack features in React/TypeScript and added a Jest test suite.
- Learned industry-standard software engineering practices, including version control workflows, structured bug tracking, and rigorous testing processes, while collaborating within a professional development environment.

AGGIE PROPULSION & ROCKETRY LEAGUE Controls Subteam

Jan 2024 – June 2024

- Developed vehicle-dynamics models (coordinate frames, state-space), built Simulink Linear Quadratic Regulator controllers/sims.

EDUCATION

UC DAVIS

Double Bachelor of Science in Aerospace Engineering and Mechanical Engineering
Expected Jun 2027 | Davis, CA
Dean's List (Jan 2024 - present)
Cum. GPA: 3.943 / 4.0
Eng. GPA: 3.980 / 4.0
SAT: 1550

SKILLS

PROGRAMMING

Python • C++
MATLAB • Simulink
Typescript • React
HTML • CSS
Git • GitHub Flow

TECHNOLOGY

Avionics • ROS 2 • PX4/ArduPilot
Raspberry Pi • Arduino • Robotics

CONTROL

NMPC • LQR/LQG • State Space
Kalman Filters • 6-DOF • CasADi
do-mpc • Collocation Methods
IPOPT • MUMPS • MA27/57

ENGINEERING

Circuitry • PCB Design • CAD
CAM • Manufacturing • 3D Printing

HIGH LEVEL

Problem Solving • Team Dynamics
Resilience • Managing Complexity
Independent Research/Implementation
Object Oriented Development

COURSEWORK

Calculus I-III • Vector Analysis
Linear Algebra • Differential Equations
Classical Physics I-III • Statics
Dynamics • Mechanics of Materials
Fluid Mechanics • Thermodynamics
Circuits • Manufacturing Processes

LINKS

Github: **izzymones**
Websites:
Project Portfolio, **Music App**, **JWST App**