

Cyrus Nolan

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OBJECTIVE

Launch a career working on guidance, navigation, and control of launch vehicles or spacecraft.

EDUCATION

Cornell University, College of Engineering, Ithaca, NY **May 2024**
Master of Engineering in Aerospace Engineering **GPA: 3.90**

Selected Coursework: Orbital Mechanics • Spacecraft Attitude Dynamics and Control • Multivariable Control Theory • Model Based Estimation • Classical Control Theory • Dynamics of Flight Vehicles • Newtonian & Lagrangian Mechanics

Cornell University, College of Engineering, Ithaca, NY **Dec 2019**
Bachelor of Science in Mechanical Engineering

Selected Coursework: Aeronautics • System Dynamics • Fluid Mechanics • Heat Transfer • Oscillations, Waves, and Quantum Physics • Electromagnetism • Mechatronics • Mechanical Synthesis

Experience

Space Systems Design Studio – Magneto Spacecraft Guidance & Control, Cornell University **Aug 2023 - Present**

- Created a 6-DoF dynamic model of a one cubic meter blob in Simulink with quaternion attitude representation.
- Implemented a PD attitude control scheme to track given reference attitudes.
- Modeled the spacecraft dynamics using masses, springs, and dampers, and replaced the blob with this to-scale, higher-fidelity version that captures gravity gradient effects.
- Used object oriented programming to write the sim's initialization program, improving sim modularity, robustness, readability, and iterability.
- Designed a LQR controller with gain scheduling to pay tethers connected to the spacecraft in and out so that their lengths track a given optimal reference trajectory.

Academic Projects

Bowling Ball Dynamics, MAE 5730: *Intermediate Dynamics*, Cornell University **Fall 2023**

- Derived the equations of motion for a bowling ball in the slipping and rolling cases using both Newtonian and Lagrangian mechanics.
- Animated the equations of motion using MATLAB with initial conditions typical of a professional bowling shot, most notably ~30 rad/s of angular velocity parallel to the lane, which causes ball's trajectory to hook as it travels down the lane.

Trajectory Optimization, MAE 5830: *Astronautic Optimization*, Cornell University **Fall 2023**

- Used Pontryagin's maximum principle to analytically find the fuel-minimizing control input for a double-integrator quadratic-cost point-to-point maneuver like satellite reorientation or space launch.
- Ran Monte-Carlo simulations (1500 runs) with Gaussian white sensor noise and uniform inertia noise to compare implementation using model-predictive control versus a PD control law.

Full Engineering Portfolio: <https://cyrusnolan.github.io>

SKILLS

- Programming: MATLAB (Control Systems, Symbolic Math, Signal Processing), Simulink (Aerospace), Python (NumPy, SciPy, Control, Matplotlib), C++ (Eigen, CMake), Pybind11, Object-Oriented Programming, Linux, Git
- Estimation Algorithms: Least Squares, Kalman Filter, EKF, UKF, Measurement Gating, Filter Consistency Testing
- Control Algorithms: PID, Loop Shaping, Pole Placement, LQR, Pontryagin's Maximum Principle, Bellman Equation, Dynamic Programming, MPC, H-infinity

CORNELL FOOTBALL HONORS

- **Red Key Athlete Honor Society**: Nominated by my coaches for displaying integrity, leadership, responsibility, and a commitment to academics and community service. 2018
- **Sid Roth Award**: Most Valuable Down Lineman 2018
- **Frank "Doc" Kavanagh Award**: Training Room Athlete of the Year 2018
- **Bernie Olin Award**: Underdog Who Showed Determination, Grit, and Perseverance 2017