

# Timothy James Ewing

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**EDUCATION**                      **University of Colorado Boulder**                      **2016 - 2021**  
Bachelor of Science - Engineering Physics

## EXPERIENCE

**Software Engineer - Components Test, SpaceX, Redmond, Washington**                      **2022 - Present**

- Debugged complex networked systems using both software tools (tcpdump, ip-netns, ifconfig) and electrical tools (multimeters, oscilloscopes, current transformers).
- Wrote drivers for power supplies, IR cameras, and other ground support equipment.
- Built test systems and made critical safety decisions for high voltage (>10kV), high current (>1000A), high pressure (>3000 psi), and ultra-high vacuum (<1e-8 torr) tests.
- Acted as Data Acquisition Officer for tests during a critical path root cause investigation.
- Used OpenCV and SciPy to reliably perform region-of-interest detection and gather measurements for a production test on flight hardware.

**Software Developer, Toro Robotics, Longmont, Colorado**                      **2021 - 2022**

- Developed complex path planning algorithms for autonomous landscaping robots in Python.
- Built a modular, reusable, and scalable pipeline for path planning using Docker, Pulsar, Golang, and Python.
- Designed a novel projection from 3D surfaces to 2D for planning paths on variable-height terrain.
- Met two-year functionality goal for path planning in less than a year.

**Satellite Flight Controller, Southwest Research Institute, Boulder, Colorado**                      **2017 - 2021**

**CYGNSS - NASA Earth System Science Pathfinder Mission**

- Performed real-time commanding during safe-mode recovery operations.
- Replayed error data while solo-staffing a ground station pass during an unexpected spacecraft fault.
- Doubled satellite contact cadence and improved data delivery time through automated data validation and replay using Python and bash scripts.

**LUCY - NASA Discovery class mission**

- Developed a Django/Python based tool for planning instrument observations.
- Worked with a small team to quickly iterate on UI/UX changes in response to feedback.

**Mission Non-Specific Work**

- Developed a web interface for an in-house orbital trajectory analysis tool (Lambert solver).
- Translated concepts from Fortran to Python to help teach established scientists.

**Software Developer, Left Hand Robotics, Longmont, Colorado**                      **2016 - 2017**

- Developed software for controlling a snow clearing robot.
- Programmed a Raspberry Pi using Python and ROS. Software tasks included base station to robot communications and motor/pneumatic control algorithms.

## ACCOMPLISHMENTS

### Independent Study, New Horizons

- Designed an optical filter conversion algorithm for unresolved Pluto and Charon observations.
- Implemented least-squares Fourier series fit to analyze Pluto/Charon phase curve.
- Built a modular, testable pipeline in Python.

### Independent Study, MAXWELL Cubesat

- Worked with the University of Colorado Nanosat Program on MAXWELL, a 6U cubesat designed to test S-Band and X-Band antennas.
- Developed validation and calibration methods for a 6-axis gyro/accelerometer.
- Defended conclusions at a Technical Interchange Meeting with NASA personnel.

## RELEVANT COURSEWORK

- **Physics:** Classical Mechanics I-II, Electricity and Magnetism I-II, Quantum Mechanics I-II, Thermodynamics and Statistical Mechanics, Cosmochemistry
- **Mathematics:** Statistics, Calculus I-III, Linear Algebra, Differential Equations, Differential Geometry
- **Computer Science:** Data Structures, Computer Systems, Data Science, Algorithms

## PUBLICATIONS

### Django as a Mission Planning Tool Interface for the CYGNSS Mission

*Ewing, Timothy; Redfern, Jillian; Alexander, Amanda; Medina, Richard; Birath, Emma;*  
2021 IEEE Aerospace Conference

### Lucy Science Planning: Incorporating Lessons Learned from over a Decade of Space Ops Experience

*Medina, Richard; Birath, Emma; Ewing, Timothy;*  
2021 IEEE Aerospace Conference

### When You Have More Satellites Than People: The Evolution of CYGNSS Flight Operations

*Medina, Richard; Redfern, Jillian; Wells, William; Birath, Emma; Lamb, Derek; Alexander, Amanda; Ewing, Timothy;*  
2019 IEEE Aerospace Conference

## TECHNICAL SKILLS

Skill	Active Use	Years of Experience	Experience Level
Python	2014 - Present	9	Expert
git	2012 - Present	11	High
Unix Shell (BASH)	2012 - Present	11	High
C++	2014 - 2017	4	Moderate
Java	2012 - 2018	7	Moderate
Go	2021 - 2022	1	Moderate
MATLAB	2017 - 2021	4	Moderate
Javascript, HTML	2016 - Present	7	Moderate
Solidworks, Fusion 360	2015 - 2020	5	Moderate