

# Gavin Martin

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## Education

### The University of Texas at Austin

B.S., Aerospace Engineering (Honors)

Concentration: Space Flight

Dec 2019 | GPA: 3.81

## Skills

**Languages:** Java • Python • Bash • Go • MATLAB

**Libraries:** Guava • Dagger • JUnit • NumPy • SciPy • OpenCV

**Technologies:** Linux • Git • Docker • Jenkins • GraphQL •  $\text{\LaTeX}$

**Interpersonal:** Public Speaking • Project Management

## Work Experience

### NASA Jet Propulsion Laboratory, **Software Systems Engineer**, Pasadena, CA . . . . . May 2020 - Present

- Leading the Activity Planning Software Development Team for the Europa Clipper mission (10 members)
- Consulting on planning software development for the Mars Sample Retrieval Lander mission
- Implementing models of spacecraft engineering subsystems and instruments for use in activity scheduling, resource simulation, constraint-checking, and activity-to-command expansion
- Designing integrated uplink software and processes with stakeholders to satisfy predicted operations needs
- Socializing operations planning and software concepts to large audiences (60+) across a range of mission venues
- Mentoring interns and training them in engineering and software development best practices
- Supporting assessments of evolving mission risks related to uplink software, scope, and schedule

### NASA Jet Propulsion Laboratory, **Engineering Applications Software Eng.**, Pasadena, CA . Jan 2020 - May 2020

- Led the Activity Planning Software Development Team for the Europa Clipper mission (continued above)
- Developed automated translation support tools for migrating code from a JPL domain-specific language to Java
- Supported design of novel automated spacecraft scheduling software and socialized with operations users

### Raytheon / NASA JPL, **Software Systems Engineering Intern**, Remote . . . . . Apr 2019 - Dec 2019

- Collaborated in designing a multi-mission Java framework for spacecraft activity planning and mission simulation
- Developed a generic discrete event engine for simulating activity plans and predicting resource usage
- Created documentation and presentations to socialize new modeling style and simulation paradigms
- Collected feedback from project stakeholders and iterated on components of framework design
- Integrated JPL's SPICE toolkit into the framework for modeling orbital dynamics and time systems

### NASA Jet Propulsion Laboratory, **Mission Planning Intern**, Pasadena, CA . . . . . May 2018 - Aug 2018

- Optimized legacy Europa Clipper mission modeling and simulation software for speed, scalability, and reliability
- Automated mission simulation, mission plan analysis, and data delivery workflow using Jenkins and Docker
- Dockerized legacy tools to enable cloud compatibility and parallel software deployments
- Built dynamic, interactive 3D visualization tool for per-flyby and cumulative science instrument coverage maps on Europa's surface using Google Earth + Python

### Texas Spacecraft Laboratory, **Seeker Vision Project Manager**, Austin, TX . . . . . Oct 2017 - May 2018

- Designed computer vision system for NASA JSC's Seeker mission (launched April 2019 on Cygnus NG-11)
- Delivered vision system and FSW which outperformed that of a NASA-internal team
- Directed 15+ person development team through successful NASA reviews and flight software delivery
- Trained neural networks with TensorFlow to intelligently detect, recognize, and localize nearby vehicles in space
- Validated robust, high-speed performance on embedded systems via hardware-in-the-loop simulations
- Generated high-resolution synthetic imagery for neural network training using Unreal Engine and AirSim

### Texas Spacecraft Laboratory, **ARMADILLO Mission Manager**, Austin, TX . . . . . Mar 2017 - Nov 2017

- Constructed operations infrastructure to support the ARMADILLO CubeSat (launched June 2019 on STP-2)
- Integrated communication and project management platforms while scaling from 5 to 50+ engineers
- Spearheaded development of PyQt5 GUI to process and interpret downlinked spacecraft telemetry in real-time
- Created downlink simulation suite for ground software validation and spacecraft operator training

- GE Aviation, Software Engineering Intern, San Marcos, TX** ..... May 2016 - Aug 2016
- Built custom enterprise resource planning software using Java's Swing framework, allowing multiple users to search, view, edit, filter, and process over 200,000 data points in real-time
  - Automated customer service reporting by integrating custom ERP software with the Apache POI API
  - Value-stream mapped facility's repair station to identify areas for efficiency improvement

## Professional Honors & Awards

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- Discovery Award (Individual)** | NASA Jet Propulsion Laboratory ..... 2021  
*For shepherding Europa Clipper adaptation of Merlin planning tool*
- Bonus Award (Team)** | NASA Jet Propulsion Laboratory ..... 2020  
*For contributions to the successful Europa Clipper PCE, MP S/W, and P&E S/W Peer Review*
- Voyager Award (Individual)** | NASA Jet Propulsion Laboratory ..... 2020  
*For foundational advancement of Europa Clipper and Aerie Merlin simulation and scheduling concepts*
- Above & Beyond Bronze Award** | General Electric ..... 2016

## Academic Honors & Awards

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- Graduation with Honors** | Cockrell School of Engineering ..... 2019
- Longhorn Poster Session Audience Favorite Award (1st Place)** | UT Research Week ..... 2019  
*Titled "Machine Learning in Space: Seeker 1's Intelligent Vision System" – [bit.ly/ML-in-space](https://bit.ly/ML-in-space)*
- Tejas Scholarship Recipient** | UT-Austin ..... 2017 - 2019
- UT-Austin Engineering Honors Program** | Cockrell School of Engineering ..... 2015 - 2019
- Uniden Corporation of America Endowed Scholarship** | Cockrell School of Engineering ..... 2015 - 2019
- Class of 2019 Representative** | UT Aerospace Department Advisory Board (LUNAR Council) ..... 2015 - 2019
- Plan II Honors Program** | UT-Austin College of Liberal Arts ..... 2015 - 2019
- National Merit Scholar** | National Merit Scholarship Corporation ..... 2015

## Publications

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- [1] C. Schubert, K. Black, D. Fonseka, A. Dhir, J. Deutsch, N. Dhamani, G. Martin, and M. R. Akella. A Pipeline for Vision-Based On-Orbit Proximity Operations Using Deep Learning and Synthetic Imagery. In *2021 IEEE Aerospace Conference*. 2021.
- [2] N. Dhamani, G. Martin, C. Schubert, P. Singh, N. Hatten, and M. R. Akella. Applications of machine learning and monocular vision for autonomous on-orbit proximity operations. In *AIAA Scitech 2020 Forum*. 2020.
- [3] M. Kumar, A. Rothstein-Dowden, and G. Martin. A Higher-Order Temporal Reasoning Approach to Authoring Semantically Precise Flight Rules for Spacecraft Systems. In *The 16th International Conference on Space Operations 2020*. 2020.

## Projects

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### **Seeker Vision** – <https://bit.ly/seeker-vision>

- Developed spacecraft detection and relative bearing estimation system for NASA mission using deep neural nets
- Co-architected cloud-based ML pipeline for synthetic image generation, CNN training, and evaluation
- Tools: Python, TensorFlow, OpenCV, AWS

### **ADCS Simulator** – [bit.ly/adcs-simulator](https://bit.ly/adcs-simulator)

- Developed object-oriented simulation engine for spacecraft attitude determination and control systems
- Can be used to demonstrate the viability of a specific suite of sensor, actuator, and controller designs
- Wrote research paper detailing models for dynamics, actuators, sensors, and control algorithms in simulator
- Tools: Python, NumPy, SciPy, Matplotlib, Sphinx, L<sup>A</sup>T<sub>E</sub>X

### **Rotor Control Service** – [bit.ly/rotor-control-service](https://bit.ly/rotor-control-service)

- Designed RESTful microservice for automated ground station tracking of overhead satellites
- Created Slack bot for notifying spacecraft operators of daily & imminent communications passes
- Tools: Golang, MongoDB, Docker Compose, Slack API