

Carson Schubert

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PERSONAL SUMMARY

- Highly motivated engineer passionate about and focused on space technology, systems, exploration, and business.
- Demonstrated and diverse track record of meaningful project contributions.
- Detail oriented with a focus on long term usability of developed processes and systems.
- Effective communicator with over four years of experience presenting, documenting, and leading technical work.
- Working toward a career at the forefront of space research and leadership.

EDUCATION

University of Texas at Austin **B.S Electrical and Computer Engineering, B.S Mathematics** **May 2021**
GPA: 3.91/4.0 *Concentration: Communications, Signal Processing, and Embedded Systems*

COURSEWORK

** indicates Fall 2020 course*

Intro to Digital Comm.	Electromagnetic Eng.*	Algorithms
Real-Time DSP Laboratory	Stochastic Processes*	Multicore Computing
Digital Image Processing*	Mathematical Statistics	Embedded Systems

RELEVANT EXPERIENCE

Blue Origin | **New Glenn Communications Intern** | *Kent, WA* May 2020 – Present

- Designing and testing low-level antenna control software for New Glenn ground and marine communications
- Reviewing vendor interface control document and directly communicating questions and software bugs to vendor

Blue Origin | **Advanced Development Programs Intern** | *Kent, WA* Sep 2019 – Dec 2019

- Led software development efforts for an in-depth, research-grade embedded computing platform survey
- Developed a comprehensive benchmarking suite of software workloads to characterize each embedded platform
- Architected generic porting layer for entire suite that enabled porting to new platforms in mere hours
- Developed a rigorous, automated build infrastructure that automatically enforces experimental repeatability
- Build system and porting layer together ensured on-schedule testing and timely delivery of actionable data

Jet Propulsion Laboratory | **Mission Simulation Intern** | *Pasadena, CA* May 2019 – Aug 2019

- Converted Europa Clipper APGen mission simulation to cloud architecture based on Docker and Jenkins
- Designed new configuration interface to abstract pipeline complexity and open sim. use to more lab members
- Automated simulation stage transitions after initial trigger, reducing workload by over 70% per simulation run
- Enabled scalable parallel simulation runs for the first time, improving turn-around time by an order of magnitude
- Integrated external Johns Hopkins Applied Physics Laboratory scheduling tool with JPL simulation pipeline

Texas Spacecraft Laboratory | **Undergraduate Researcher** | *Austin, TX* Jan 2019 – Present

- Led and now advise research efforts for full pose estimation of spacecraft on-orbit via a single monocular camera
- Communicating with NASA JSC consistently to explore applications for the research beyond Seeker 1 mission
- Developed an open-source, plugin-based Python CLI that simplifies training machine learning models and vastly improves model iteration time, allowing greater exploration of the solution space (bit.ly/ravenML)
- Designed and now maintain an AWS-based model training pipeline that enables remote work on scalable compute

UT Nuclear Robotics Group | **Undergraduate Research Assistant** | *Austin, TX* Jan 2019 – May 2019

- Improved communications for an industrial robot from 100Mb/s to 10Gb/s via a fiber optic tether
- Prototyped a field deployable wireless mesh for robot communication on offshore oil platforms
- Wrote and released a Python ROS package for programmatic topic communication throttling (rosthrottle)

NASA Glenn Research Center | **Research Intern** | *Cleveland, OH* Aug 2018 – Dec 2018

- Developed proof-of-concept reinforcement learning agent that optimizes on-orbit satellite data downlink

- Repurposed existing simulation tools from SCENIC team to generate realistic LEO training episodes quickly
- Wrote an OpenAI Gym environment in Python to facilitate the use of training episodes and provide agent rewards
- Designed agent as neural network with PyTorch, utilizing hyperparameter grid search and k-fold cross validation
- Final agent achieves over 98% of maximum possible reward on the test set, demonstrating optimal behavior

Nate Controls | Remote Cloud Engineer

Aug 2018 – Dec 2018

- Developed a Continuous Integration/Continuous Deployment pipeline for Balena IOT devices
- Wrote and released an open source NPM package (balena-staged-releases) to provide staged application deployment for a Balena device fleet
- Used GitLab CI/CD scripts to trigger fleet actions that advance devices through alpha, beta, and stable stages

Nate Controls | Cloud Engineering Intern | Austin, TX

Jun 2018 – Aug 2018

- Developed a service in Rust to connect any number of IOT devices to a wireless access point via captive portal
- Designed and wrote a new device backend from scratch in Typescript using AWS Lambda, DynamoDB, and S3
- Implemented an automated testing workflow that greatly improved developer confidence

Texas Spacecraft Laboratory | Seeker-1 Vision Flight Software Lead | Austin, TX

Sep 2017 – May 2018

- Developed a novel visual navigation system for NASA JSC's Seeker-1 CubeSat mission
- Aided in development of a convolutional neural network for target identification using Google's TensorFlow
- Designed and tested all flight software in C to facilitate vision algorithms and send solutions to guidance system
- Implemented double-redundant process monitoring for reliable operation during testing and in-flight
- Wrote a custom suite of scripts to characterize algorithm performance onboard target hardware, providing key feedback for iterative development
- Developed and conducted official command execution and full functional test procedures prior to delivery
- Final system selected for flight over competing solutions due to robustness and flew during mission in Sep. 2019

PROJECTS

RPILED | bit.ly/RPILED

Jun 2018 – Present

- Open-source, full-stack web application for controlling digital LED lights via Raspberry Pi running balenaOS
- Uses NodeJS, Express, and SQLite to expose a RESTful API for LED control
- Externally hosted, mobile friendly Vue frontend allows for customizing animations/colors and saving favorites

ravenML | pypi.org/project/ravenml

Feb 2019 – Present

- Open-source Python CLI for rapid, simple training of machine learning models
- Enables dataset creation, dataset inspection, and model training from a single command line interface
- Hooks into AWS S3 to store and access user-crafted datasets and upload final trained models in organized scheme
- Leverages a plugin system for unlimited extensibility to different model types, architectures, and libraries

SKILLS

Programming Languages	Technologies	Miscellaneous
Python C C++ Java	Git Docker Jenkins AWS	Project Management
Javascript Typescript Bash	Gitlab CI ROS PyTorch	Technical Writing
MATLAB Rust	NodeJS Latex	Ability to work independently

PUBLICATIONS

C. Schubert, R. Roche, and J. Briones, "Reinforcement Learning Applied to Cognitive Space Communications," *2019 IEEE Cognitive Communications for Aerospace Applications Workshop*, pp. 1-8. doi: 10.1109/CCAAS.2019.8904912

N. Dhamani, G. Martin, C. Schubert, et. al, "Applications of Machine Learning And Monocular-Vision for Autonomous On-Orbit Proximity Operations," *AIAA SciTech 2020 Forum*, Orlando, FL, Jan. 2020. doi: 10.2514/6.2020-1376

HONORS

Dr. James Rankin Digital Avionics Scholarship - AIAA, 2020

Astronaut Scholarship Foundation UT Austin Nominee - UT Austin, 2020