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 – Aug 2020

- Designed and tested antenna controller in C++ for long-range New Glenn ground and marine communications
- Adhered to AUTomotive Open System ARchitecture (AUTOSAR) standard for path to DAL certification
- Initiated integration of controller with full ground control system to demonstrate end-to-end mission operations

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 MATLAB simulation tool from SCENIC lab 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 open-source NPM package 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/CCAAW.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