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 via continued graduate studies.

EDUCATION

University of Texas at Austin	**B.S Electrical and Computer Engineering, B.S Mathematics**	**May 2021**
GPA: 3.90/4.0	*Concentration:* Communications, Signal Processing, and Embedded Systems	

COURSEWORK
* indicates Spring 2020 course

Linear Systems and Signals	Algorithms	Software Engineering
Embedded Systems	Statistics and Probability	Multicore Computing*
Circuit Theory	Linear Algebra	Digital Communications*

RELEVANT EXPERIENCE

Blue Origin | **Advanced Development Programs Intern** | *Kent, WA*   Sep 2019 – Dec 2019
- Led software development efforts for a large-scale, research level embedded computing platform survey in C/C++
- Ported performance benchmarking workloads to a variety of SoC's, single board computers, and microcontrollers
- Architected and injected a generic porting layer into each workload that enables rapid porting for new platforms
- Developed a rigorous, automated build infrastructure that ensures experimental repeatability
- Implemented control script in Python to facilitate environmental test campaigns via simple terminal interface
- Post-processed and visualized experimental data using Python to effectively communicate key conclusions

Jet Propulsion Laboratory | **Mission Simulation Intern** | *Pasadena. CA*   May 2019 – Aug 2019
- Converted Europa Clipper mission simulation to cloud based architecture based on Docker and Jenkins
- Automated transitions between simulation steps to reduce human workload by over 80% per simulation run
- New architecture abstracted simulation pipeline complexity, opening simulation use to many more lab members
- Scalable cloud architecture enabled the first parallel simulation runs, improving analysis turn-around time by an order of magnitude and greatly lowering barrier to additional simulations
- Integrated external Johns Hopkins Applied Physics Laboratory scheduling tool with JPL simulation pipeline

Texas Spacecraft Laboratory | **Undergraduate Researcher** | *Austin, TX*   Jan 2019 – Aug 2019
- Led research efforts to achieve full pose estimation of spacecraft on-orbit via a single monocular camera
- 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*)
- Aided in development of open-source Python CLI to simplify curating image datasets for model training (Jigsaw)
- Integrated these tools into an end-to-end model training pipeline supported by AWS that enables project members to build datasets and train models from anywhere 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 a proof-of-concept reinforcement learning agent which optimizes on-orbit satellite data downlink autonomously to maximize data throughput and reduce human workload
- Repurposed existing simulation tools written in MATLAB to generate necessary training episodes quickly

- Wrote an OpenAI Gym environment in Python to facilitate the use of training episodes and provide agent rewards
- Modeled agent policy using a neural network developed and trained with PyTorch
- Tuned network hyperparameters via grid search and trained agent using K-fold cross validation
- Final agent achieves over 98% of maximum possible reward on the test set, demonstrating optimal behavior

Nate Controls | Remote Cloud Engineering Contractor   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 service in Rust to connect arbitrary BeagleBone IOT devices to wireless access point via captive portal
- Designed and wrote a new IOT device backend from scratch in Typescript using AWS Lambda, DynamoDB, and S3
- Implemented an automated Javascript testing workflow using Jest 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 mission based on a single monocular camera
- Aided in development of a convolutional neural network for target identification using Google's TensorFlow
- Developed and tested all flight software in C to facilitate vision algorithms and send solutions to guidance system
- Implemented two tier process monitoring between Bash, C, and Python resulting in zero crashes during testing
- Wrote a custom suite of scripts to characterize performance onboard target hardware, providing key feedback for iterative algorithm development
- Final system selected for flight over competing solutions due to robustness and used during mission in Sep. 2019

SKILLS

Programming Languages	Technologies	Miscellaneous
C | C++ | Python | Java	PyTorch | OpenCV | Docker	Project Management
Javascript | Typescript | Bash	AWS | GitLab CI | ROS | Git	Technical Writing
MATLAB | Rust	Jenkins | 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

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 backend RESTful API for LED control
- Externally hosted, mobile friendly VueJS frontend allows for customizing animations/colors and saving favorites
- RESTful API enables voice control of lights via any configurable home assistant

Chain Reaction Robotics (FRC 6171) | *chainreaction6171.org*   Oct 2015 – Aug 2016
- Co-founded team and secured over $20,000 in grants and donations to get team off the ground
- Led the development and fabrication of all subsystems to their successful integration in six weeks
- Developed Java software for closed-loop autonomous and piloted control of robot drivetrain and actuators
- Led the team as captain to the Rookie-All-Star award at Dallas Regional and a spot in World Championships

ACTIVITIES/HONORS

1st Place, NASA International SpaceApps Hackathon, Cleveland Event   Oct 2018
Student Engineering Council, University of Texas at Austin   Sep 2017 – Present