Russell Schwartz

Robotics Software Engineer
Pittsburgh, PA

(US Citizen, Active TS/SCI)

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Education

Carnegie Mellon University *GPA: 4.0* Aug 2022 – Dec 2023
Master of Science in Computer Science *Pittsburgh, PA*

University of Maryland *GPA: 4.0* Aug 2018 – May 2022
Bachelor of Science in Computer Science *College Park, MD*
Bachelor of Science in Mathematics

Professional Experience

Astrobotic Technology May 2023 – Present
Perception Software Engineer III *Pittsburgh, PA*

- Developed perception algorithms for autonomous terrain-relative navigation and hazard-detection for the Griffin lunar lander
- Implemented flight software in C++ responsible for real-time sensor data processing, filtering, and decision making aboard the spacecraft
- Worked with a variety of sensors: monocoluar camera, stero cameras, LiDAR, doppler LiDAR, IMU, sun-tracker, star-tracker
- Utilized modern robotics methods: feature extraction, visual odometry, fiducials, ICP, global pointcloud registration, Gaussian proccesses, surface meshes, uncertainty propogation, kalman filtering
- Developed Python prototypes and simulations for early-stage testing and supported field testing of later-stage integrated systems

Johns Hopkins Applied Physics Lab May 2021 – Aug 2021
Intelligent Systems Intern *Laurel, MD*

- Developed tooling in Python and C++ to optimize motion planning for aircraft under complex objective functions involving the communication between an onboard device and an orbital satellite
- Utilized modern non-linear solvers in conjunction with legacy high-fidelity physics simulations

NASA Jet Propulsion Lab Jan 2021 – April 2021
Robotics & Autonomy Intern *Pasadena, CA*

- Worked with the Mars 2020 team to investigate methods for ground-level terrain-relative navigation using onboard rover cameras
- Developed robust methods for extracting salient terrain features from imagery via semantic segmentation as well as conventional vision techniques
- Modeled the effectiveness of using observed features in conjunction with an accurate map to estimate rover pose

Skills

Languages
Python | C++17 | Rust | C# | Java | JavaScript | Matlab

Frameworks
Numpy | OpenCV | Open3D | Eigen | PCL | GDAL | PyTorch | Scikit-learn | cFS | ROS 2

Technical
Git | Jira | Docker | CMake | LaTeX

Non-Technical
Mathematical modeling | Systems engineering | Data visualization | Technical communication

Research Experience

CMU Robotics 2022 – 2023

Evaluated methods (both classical and learning-based) for coordinating a team of robots for exploration and monitoring of dynamic environments modeled as a mixture of Gaussians. Developed controllers for a swarm of Khepera mobile robots.

UMD Robotics 2019 – 2022

Investigated task-allocation algorithms for multi-agent robotic systems operating in highly failure-prone (and adversarial) environments, where cooperation leads to higher chance of success. Presented findings at RSS 2020.

UMD LEMMA Group 2018 – 2022

Worked with early large language-model BERT to develop novel methods for detecting extremist content in niche online communities. Implemented tooling for processing large (>50TB) datasets and for fine-tune training of the model.

Select Publications

- "Hazard Detection LiDAR System for Robotic Lunar Landers," R. Schwartz, C. Owens, A. Horchler, et al., *AIAA SciTech*, 2025
- "Topographical landmarks for ground-level terrain relative navigation on mars," J. Vander Hook, R. Schwartz, K. Ebadi, K. Coble, and C. Padgett, *IEEEAerospace AeroConf*, 2022
- "Semantic mapping in unstructured environments: Toward autonomous localization of planetary robotic explorers," K. Ebadi, K. Coble, D. Kogan, D. Atha, R. Schwartz, C. Padgett, and J. Vander Hook, *IEEEAerospace AeroConf*, 2022
- "Robust Multi-Agent Task Assignment in Failure-Prone and Adversarial Environments," R. Schwartz, P. Tokekar, *Robotics: Science and Systems*, 2020