RUSSELL SCHWARTZ

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EDUCATION

Carnegie Mellon University   Pittsburgh, PA
Master of Science in Computer Science   *Aug 2022 – Aug 2024*

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

Honors: *Summa Cum Laude* - 4.00 GPA

PROFESSIONAL EXPERIENCE

APL Intelligent Systems Intern   May 2021 – Aug 2021
Johns Hopkins Applied Physics Laboratory   *Laurel, MD*
- Developed tooling to optimize the flight-plan of fixed-wing aircraft under a complex objective function involving the communication between an onboard device and an orbital satellite. Utilized SNOPT and OTIS to search the space of physically feasible solutions with the help of custom tooling written in both Fortran and Python for non-linear optimiation. Helped with integration of the new tool into an existing desktop architecture for use in the field.
- Created a system for testing automated network security analysis tools (such as APL's AVRA) on simulated networks repeatably. Network parameters include overall topology, OS types/versions, and software distributions. The resulting network is automatically virtualized via Docker and GNS3, and the testing procedure is run autonomously.

NASA Robotics & Artificial Intelligence Intern   Jan 2021 – April 2021
NASA Jet Propulsion Laboratory   *Pasadena, CA*
- Worked with JPL roboticists to investigate various methods for terrain-relative navigation using monocular cameras for robots operating in GPS-denied areas on Earth and for planetary rovers on Mars, resulting in several publications
- Developed robust methods for extracting salient terrain features (e.g. the peak of a distant mountain) from an RGB image via semantic segmentation with DeepLab as well as traditional computer vision techniques
- Studied the effectiveness of using observed features (in conjunction with an accurate map of the area) to estimate robot pose. Developed plugins for QGIS to automatically detect potential landmarks from a DEM, analyze visibility, and compute localization accuracy for every point in the scene. Applied these tools to imagery from Perseverance's Navcams and DEMs of Jezero Crater, resulting in a predicted localization accuracy in the 10s of meters

Software Development Intern   May 2019 – Aug 2019
Ncyber LLC   *Columbia, MD*
- Developed a network analysis app for Android mobile devices that tests network speed and stability, aggregating user data across multiple devices and carriers
- Implemented various real-time data-visualizations including a geographic heatmap of aggregate internet coverage

Software Development & Data Analysis Intern   April 2018 – March 2019
Treble Network   *Baltimore, MD*
- Developed and tested applications for iOS, Android, and Web, contributing to the core design of a new online business networking platform
- Analyzed customer analytics using Firebase, Excel, and Python

Audio-Visual Technologies Intern   June 2016 – Aug 2016
Vision Technologies   *Glen Burnie, MD*
- Aggregated technical specifications for enterprise-grade AV hardware
- Worked with hardware experts to determine requirements for a given application, and aided in installation

🔒 Active TS/SCI Clearance

Other Research Experience

CMU Robotics: AART Lab   Sep 2022 – Present

Worked under Dr. Katia Sycara on a project involving the deployment of a team of robots for simultaneous exploration and monitoring of a dynamic spatio-temporal environment. Phenomenon of interest were modeled using a mixture of gaussian processes, from which optimal sampling trajectories can be computed. Research is ongoing to investigate methods for learning underlying spatio-temporal correlations.

Gemstone Team LEMMA   Aug 2018 – May 2022

Worked with a team of other undergraduates at UMD to develop novel methods to automatically detect and then model the spread of extremism in niche online communities. Framed the problem as an economic trade model on a graph of social connections. Implemented sophisticated NLP tools (e.g. BERT) to automatically identify extreme content in a >5TB dataset. Culminated in a thesis presentation.

UMD Robotics: RAAS Lab   Aug 2019 – May 2022

Investigated task-allocation algorithms for multi-agent robotic systems. Worked to answer the question of how to assign agents to tasks in highly failure-prone (and even adversarial) environments where cooperation leads to higher chance of success. Presented findings at RSS 2020, including efficient algorithms that yield optimal/near-optimal results along with observed performance under simulation.

Publications

- J. Vander Hook, R. Schwartz, K. Ebadi, K. Coble, and C. Padgett, "Topographical landmarks for ground-level terrain relative navigation on mars," in *IEEEAerospace AeroConf*, 2022.

- K. Ebadi, K. Coble, D. Kogan, D. Atha, R. Schwartz, C. Padgett, and J. Vander Hook, "Semantic mapping in unstructured environments: Toward autonomous localization of planetary robotic explorers," in *IEEEAerospace AeroConf*, 2022.

- Schwartz, R., & Tokekar, P. "Robust Multi-Agent Task Assignment in Failure-Prone and Adversarial Environments" in *Robotics: Science and Systems*, 2020

- Schwartz, R., Long, M. "Deriving unexpected mathematical constants from Pascal's Triangle". *HCC Journal of Research in Progress - First Edition*, 2017

Honors

- UMD Banneker/Key Scholarship
- UMD Computer Science Dept. Honors
- ICPC 2018 Regional Finalist
- National Merit Scholar
- Math, Tech, Science Honor Societies
- Winston Family Writing Award
- BSA: Order of The Arrow
- First place at *HoCo Hacks* '16 & '17
- John Lockwood Mathematics Award