Russell Schwartz

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Education

Carnegie Mellon University Pittsburgh, PA
Master of Science in Robotics *Aug 2022 – Aug 2024*
Research Lab/Advisor: TBD

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. 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. The user specifies network topology, OS types, and software distributions, and 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*

- Researched 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 a number of publications
- Developed robust methods for extracting salient terrain features (e.g. the peak of a distant mountain) from an 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 pose. Developed plugins for QGIS that automatically detect potential landmarks from a DEM, analyze their visibility, and compute localization accuracy for every point in the scene. Applied these techniques/tooling 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 Top-Secret Security Clearance

Other Research

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 environments where cooperation leads to higher chance of success. Presented findings on stochastic and adversarial failure models at RSS 2020, including efficient algorithms that yield optimal or near-optimal results.

Gemstone Team LEMMA Aug 2018 – May 2022

Worked with a team of other undergraduates 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 to automatically identify extreme content in a >5TB dataset. Culminated in a thesis presentation.

Publications

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

Leadership & Volunteer Work

- **Boy Scouts of America** – Served as Patrol Leader, Quartermaster, and Senior Patrol Leader for Boy Scout troop. Oversaw 80 younger scouts while organizing weekly meetings, camping trips, and service projects. (2012 – 2018)
- **Math Team Captain** – Participated for 4 years in Howard High School mathematics team. Led the team to win first place in the division senior year. (2013 - 2017)
- **Math Honor Society Vice President** – Organized meetings and wrote challenge problems for 100 students. (2014 – 2017)
- **MS Chesapeake Challenge** – Participated in a charity event for the National Multiple Sclerosis Society by raising over $1,000 for MS research. Participated in the metric century bike ride and volunteered at rest stops. (June 2016, 2017, and 2018)

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