Meriel von Stein

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EDUCATION

PhD Candidate of Computer Science (Software Engineering & Robotics) Charlottesville, VA | Dec. 2024
University of Virginia

Masters of Computer Science (Software Engineering & Robotics) Charlottesville, VA | Aug. 2022
University of Virginia

BA Honors of Art History (Islamic Art & Architecture) Oberlin, OH | May 2016
Oberlin College

PUBLICATIONS

SAFE UNIVERSAL TRANSFORMATIONS

Meriel von Stein, Sebastian Elbaum, Hongning Wang
Under preparation for IEEE Robotics and Automation Letters Journal (IRAL) 2024.
DOI forthcoming.

DEEPMANEUVER: ADVERSARIAL TEST GENERATION FOR TRAJECTORY MANIPULATION OF AUTONOMOUS VEHICLES

Meriel von Stein, David Shriver, Sebastian Elbaum
IEEE Transactions on Software Engineering Journal (TSE) 2023.
DOI: 10.1109/TSE.2023.3301443

PHYSCOV: PHYSICAL TEST COVERAGE FOR AUTONOMOUS VEHICLES

Carl Hildebrandt, Meriel von Stein, Sebastian Elbaum
ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA) 2023. Seattle, WA
DOI: 10.1145/3597926.3598069

FINDING PROPERTY VIOLATIONS THROUGH NETWORK FALSIFICATION: CHALLENGES, ADAPTATIONS AND LESSONS LEARNED FROM OPENPILOT

Meriel von Stein, Sebastian Elbaum
IEEE/ACM International Conference on Automated Software Engineering (ASE) 2022. Rochester, MI.
DOI: 10.1145/3551349.3559500

PREPARING SOFTWARE ENGINEERS TO DEVELOP ROBOT SYSTEMS

Carl Hildebrandt, Meriel von Stein, Trey Woodlief, Sebastian Elbaum
IEEE/ACM International Conference on Software Engineering (ICSE) 2022. Pittsburgh, PA.
DOI: 10.1145/3510456.3514161

AUTOMATED ENVIRONMENT REDUCTION FOR DEBUGGING ROBOTIC SYSTEMS

Meriel von Stein, Sebastian Elbaum
IEEE International Conference on Robotics and Automation (ICRA) 2021. Xi'an, China.
DOI: 10.1109/ICRA48506.2021.9561997.

PROBABILISTIC CONDITIONAL SYSTEM INVARIANT GENERATION WITH BAYESIAN INFERENCE

Meriel von Stein, Sebastian Elbaum, Lu Feng, Shili Sheng
Available via Arxiv as of December 2020.
DOI: 10.48550/arXiv.2012.06615.

HONORS AND LEADERSHIP

University of Virginia Graduate Teaching Award, 2023. Recipient of university-wide award for student teaching.
IEEE ECE/FSE SE4Safe4ML workshop Organizing Committee member (2023) on ML for safety-critical systems.
CRA-W Grad Cohort Workshop selected presenter (2023) on mentoring work and upcoming research.
CSGSG Mentoring Chair (2022-2023) enrich mentoring program, advocate for student well-being in faculty meetings, organize orientation and prospective visits, and host department events.
Recipient of Oberlin College Grant & John F. Oberlin Scholarship (2012-2016).

WORK EXPERIENCE

UNIVERSITY OF VIRGINIA | PhD Candidate — Charlottesville, VA | Aug 2018 - ongoing

- Research assistant (qualified in March 2020)
  - **Project lead; Adversarial enviornments with differentiable rendering** in collaboration with Dr. Claire Le Goues and Squares Lab at Carnegie Mellon University.
  - **Project lead; Safe distribution-aware transformations for sensor hardware versioning.**
  - **Project lead; Off-road benchmark datasets for commercial ruggedized research robots.**
  - **Project lead; State-aware property-driven adversarial testing of system-embedded DNNs.**
- Teaching assistant/Supporting instructor:
  - **Robotics for Software Engineers**, Prof. Sebastian Elbaum.
  - **Software Analysis**, Prof. Mary Lou Soffa.
  - **Introduction to Embedded Computer Systems**, Prof. Joanne Dugan.

NASA GODDARD SPACE FLIGHT CENTER | Pathways Program — Greenbelt, MD | Aug 2017 – Aug 2018

- Develop, update & maintain GMSEC satellite ground system API and component code.
- Reconcile federal infosec requirements with implementation from a top-down/bottom-up approach.
- Support code reviews & evaluate software systems from a security assurance perspective.
- Interview stakeholders on current & projected implementation of NIST and internal security standards.

NASA KENNEDY SPACE CENTER | Software Engineer Intern — Cape Canaveral, FL | Dec 2016 – Aug 2017

- Build & test proof-of-concept Beowulf cluster for granular mechanics and robotics simulations.
- Provide in-house software support for SwampWorks robotics & UAV projects.
- Design, develop and debug automated unit and system testing software for a future launch control system.

UNIV. OF NEBRASKA - LINCOLN | Cybersecurity Research Fellow — Lincoln, NE | Jun 2016 – Aug 2016

- Ran and extended static analysis tools for malicious Android apps using C++ to handle Java 8 Reflection calls.
- Wrote colluding Android apps in Eclipse and Android Studio for sample runs of static analysis tool.

PROJECTS AND ARTIFACTS

ROSBOT DATA COLLECTION & NAVIGATION: A full stack pipeline for collecting data, training a computer vision model, and deploying it on the ROSbot for navigation.

OPENPILOT FALSIFICATION: Extend state-of-the-art falsification tool DNNF to apply to complex deep neural networks used in the commercial safety-critical driver assistance system OpenPilot.

DEEPMANEUVER: Reproduce the technique outlined in DeepBillboard and improve upon it to leverage the kinematics of the vehicle and state of the test environment.

DDENV: End-to-end tool for delta-debugging robotic environments with a semi-known failure distribution.

ROBOTICS FOR SOFTWARE ENGINEERS: A course for undergraduates that pairs robotics concepts and software engineering techniques, prioritizes experiential learning, and lowers barriers to entry.

SERVICE

International Conference on Robotics and Automation (ICRA'24) Reviewer Reviewed two research-track papers for ICRA 2024.
Leadership Alliance Mentor Mentored 3 undergraduates from underrepresented backgrounds in summer research projects.
Research Mentor, 2020-2023. Michael Chinn (UVA, Spring 2020- Spring 2021), Sidhard Burre (UVA, Fall 2022), Sam Ghaeze, Zarif Cabrera and Alexis Davis (Howard University, Summer 2023).
Guest Class Lecturer Software Analysis (graduate) and Robotics for Software Engineers (undergraduate)
UVA CS department 2021-2023 faculty candidate student reviewer Conduct one-on-one interviews with candidates, assess candidate talks, and write recommendations for faculty search committee.
ICSE Co-reviewer, 2023 Assess submitted research-track papers and provide feedback and analysis to authors and fellow reviewers.
ICSE Organizing Volunteer, 2021 Main conference organizing volunteer supporting paper presentation sessions.
FIRST Robotics Software Engineering Mentor, 2016-2017 Software mentor and software-hardware working group liason.
Million Woman Mentor Project, Software and Electrical Engineering mentor, grades 1 through 4, 2016-2017.
Association for Computing Machinery (ACM) member, 2015-2017 Rowan chapter, App Development working group.

Contributor to An Efficient, Robust, and Scalable Approach for Analyzing Interacting Android Apps at University of Nebraska-Lincoln, 2017. Paper accepted by International Conference for Software Engineering (ICSE) 2017
Panelist, thesis presenter at James A. Rawley Graduate Conference in the Humanities, University of Nebraska-Lincoln, 2016
placed second overall for best undergraduate paper.