Meriel von Stein

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EDUCATION

PhD of Computer Science (Software Engineering & Robotics) Charlottesville, VA | Est. May 2025
University of Virginia, advised by Sebastian Elbaum

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 (9/9)

NATURAL ADVERSARIAL PATCH REFINEMENT THROUGH REALISTIC STYLE TRANSFORMATIONS
Meriel von Stein, Sebastian Elbaum
Under submission to IEEE/ACM International Conference on Software Engineering (ICSE) 2025.

STEERING THE FUTURE: A CATALOGUE OF FAILURES IN DEEP LEARNING-ENABLED ROBOTIC NAVIGATION SYSTEMS
Meriel von Stein, Yili Bai, Trey Woodlief, Sebastian Elbaum
Under submission to IEEE/ACM International Conference on Software Engineering (ICSE) 2025.

AUTOMATED GENERATION OF TRANSFORMATIONS TO MITIGATE SENSOR CHANGES IN ADS
Meriel von Stein, Hongning Wang, Sebastian Elbaum
IEEE Robotics and Automation Letters Journal (IRAL) March 2024.
DOI: 10.1109/LRA.2024.3405810

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.
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.
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.
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.
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 Copenhaver Graduate Fellowship (2024-2025 Academic year). Fellowship awarded by panel of UVA School of Engineering and Applied Science faculty for research excellence ($12,000).
University of Virginia Graduate Teaching Award (May 2023). Recipient of university-wide award for student teaching. First CS student to receive this award since 2008 ($500).
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.
CRA-W Grad Cohort Workshop selected speaker (2023) on mentoring work and upcoming research.
Recipient of Oberlin College Grant & John F. Oberlin Scholarship (2012-2016). $35,000/year.

WORK EXPERIENCE

UNIVERSITY OF VIRGINIA | PhD Candidate — Aug. 2018 - ongoing

- Research assistant (qualified in March 2020). Project lead for *Reinforcement learning for human-in-the-loop autonomous driving*; *Spatial partitioning and prioritization for debugging robotic systems*; *State-aware property-driven adversarial testing of system-embedded DNNs.*
- Teaching assistant/Supporting instructor: *Robotics for Software Engineers*, Prof. Sebastian Elbaum. Fall 2020 - Fall 2022. *Software Analysis*, Prof. Mary Lou Soffa. Fall 2019. *Introduction to Embedded Computer Systems*, Prof. Joanne Dugan. Spring 2019.

NASA GODDARD SPACE FLIGHT CENTER | Software Engineer — 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 — 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 — Jun. – 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 multiple ROSbot platforms for navigation.

PREFIXER: An unsupervised low-cost methods for learning transformations between vision datasets to overcome sensor hardware versioning and preserve downstream DNN prediction.

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: Developed a new adversarial patch generation technique 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

Reviewer for IEEE Transactions on Cyberphysical Systems Journal (Sept. 2024). Reviewed 1 paper.
IEEE ASE ASYDE workshop Program Committee (2024) on automated software development & verification, reviewed 3 papers.

Reviewer for IEEE Transactions on Software Engineering Journal (Aug. 2024). Reviewed 1 paper.
IEEE ECE/FSE SE4Safe4ML workshop Organizing Committee Lead (2023) on ML for safety-critical systems. Highest attended workshop at FSE'23 (44 attendees).
Reviewer for IEEE Robotics and Automation Letters (IROS 2024). Reviewed 1 paper.
Reviewer for International Conference on Robotics and Automation (ICRA 2024) Reviewed 2 papers.
Leadership Alliance Mentor (2023-2024) Mentored 6 undergrads from underrepresented groups in research projects.
Research Mentor (2020-2024). Michael Chinn (UVA, Spring 2020- Spring 2021), Sidhard Burre (UVA, Fall 2022), Sam Ghaeze, Zarif Cabrera and Alexis Davis (Howard University, Summer 2023), Johann Mission (UMBC, 2024), Mathshuman Mathyvanan (UMBC, 2024), Yili Bai (UVA, 2024), Zachariah Risheq (UVA, 2024), Mira Khan (UVA, 2024).
Guest Class Lecturer Software Analysis (graduate) and Robotics for Software Engineers (undergraduate)
UVA CS department faculty candidate student reviewer (2021-2023) Conduct one-on-one interviews with candidates, assess candidate talks, and write recommendations for faculty search committee.
ICSE Co-reviewer (2023) Provide feedback and analysis on submitted research-track papers 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 group liason.
Million Woman Mentor Project, Software and Electrical Engineering mentor (2016-2017). Grades 1 through 4.
Association for Computing Machinery member (ACM 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 at 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.

SKILLS

Languages: Python, Java, Bash, C/C++, SQL
Robotics/ML Frameworks: ROS, PyTorch, ONNX, TensorFlow, Keras
Simulation Development: Gazebo, Udacity, FlightGoggles, BeamNG, Unity, Blender, particle simulation
Spoken/Written Languages: English, Spanish, Turkish, French.
Other: Git/GitHub, MatLab, R, AutoCAD, VirtualBox, Docker, LaTeX, Gimp, JavaScript, TypeScript, HTML/CSS