

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 (9/10))

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 FOUNDATIONS OF SOFTWARE ENGINEERING (FSE) 2025.

NATURALADV: AN EXPLORATORY FRAMEWORK TO BALANCE ADVERSARIAL STRENGTH AND STEALTH IN AUTONOMOUS DRIVING ENVIRONMENTS

MERIEL VON STEIN

AAAI DATASAFE WORKSHOP ON DATASETS AND EVALUATORS OF AI SAFETY 2025.

OpenReview for AAAI 2025 DATASAFE Workshop

AUTOMATED GENERATION OF TRANSFORMATIONS TO MITIGATE SENSOR CHANGES IN ADS

MERIEL VON STEIN, HONGNING WANG, SEBASTIAN ELBAUM

IEEE ROBOTICS AND AUTOMATION LETTERS JOURNAL (RA-L) 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.

FORTHCOMING PUBLICATIONS

SPURIOUS CORRELATIONS IN HIGH-PERFORMANCE NEURAL NETWORKS

MERIEL VON STEIN, SEBASTIAN ELBAUM

UNDER PREPARATION FOR INTERNATIONAL CONFERENCE ON COMPUTER VISION (ICCV) 2025.

DIFFERENTIABLE ENVIRONMENTS FOR ADVERSARIAL OBJECT GRASPING

HAILIE MITCHELL, TRENTON TABOR, MERIEL VON STEIN, CLAIRE LE GOUES

UNDER PREPARATION FOR THE IEEE CONFERENCE ON ENGINEERING RELIABLE AUTONOMOUS SYSTEMS 2025.

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 Springer Empirical Software Engineering Journal (Feb. 2025). Reviewed 1 paper.

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, L^AT_EX, Gimp, JavaScript, TypeScript, HTML/CSS