

# 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

### **AUTOMATED GENERATION OF TRANSFORMATIONS TO MITIGATE SENSOR CHANGES IN ADS**

MERIEL VON STEIN, HONGNING WANG, SEBASTIAN ELBAUM  
UNDER REVISIONS FOR IEEE ROBOTICS AND AUTOMATION LETTERS JOURNAL (IRAL) 2024.  
DOI: [10.1109/LRA.2024.3405810](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.48550/ARXIV.2012.06615)

## HONORS AND LEADERSHIP

IEEE ASE ASYDE WORKSHOP PROGRAM COMMITTEE (2024) on automated software dev. & verification.

IEEE ECE/FSE SE4Safe4ML WORKSHOP ORGANIZING COMMITTEE (2023) on ML for safety-critical systems. Highest attended workshop at FSE'23 (44 attendees).

UNIVERSITY OF VIRGINIA GRADUATE TEACHING AWARD (2023). Recipient of university-wide award for student teaching. First CS student to receive this award since 2008.

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.

## FORTHCOMING PUBLICATIONS

### NATURAL ADVERSARIAL PATCH REFINEMENT THROUGH REALISTIC STYLE TRANSFORMATIONS

MERIEL VON STEIN, SEBASTIAN ELBAUM

UNDER PREPARATION FOR INTERNATIONAL CONFERENCE ON SOFTWARE ENGINEERING (ICSE) 2025.

### SPURIOUS CORRELATIONS IN HIGH-PERFORMANCE NEURAL NETWORKS

MERIEL VON STEIN, SEBASTIAN ELBAUM

UNDER PREPARATION FOR INTERNATIONAL CONFERENCE ON SOFTWARE ENGINEERING (ICSE) 2025.

### DEFECTS4DEEPAV: A CATALOGUE OF FAILURES IN DEEP LEARNING-ENABLED ROBOTIC NAVIGATION SYSTEMS

MERIEL VON STEIN, TREY WOODLIEF, YILI BAI, SEBASTIAN ELBAUM

UNDER PREPARATION FOR IEEE ROBOTICS AND AUTOMATION LETTERS JOURNAL (IRAL) 2024.

### DIFFERENTIABLE ENVIRONMENTS FOR ADVERSARIAL OBJECT GRASPING

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

UNDER PREPARATION FOR IEEE ROBOTICS AND AUTOMATION LETTERS JOURNAL (IRAL) 2024.

## WORK EXPERIENCE

### UNIVERSITY OF VIRGINIA | PhD CANDIDATE

Aug. 2018 - ongoing

- Research assistant (qualified in March 2020)
  - **Project lead; Adversarial environments 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 | 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 ASYDE 2024 Workshop (colocated with ASE 2024).** Reviewed 3 papers.

**Reviewer for IEEE Transactions on Software Engineering Journal.** Reviewed 1 paper.

**Reviewer for IEEE Robotics and Automation Letters (IROS).** Reviewed 1 paper.

**Reviewer for International Conference on Robotics and Automation (ICRA'24)** 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 Riquesh (UVA, 2024).

**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** 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, 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.