

# Meriel von Stein

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## EDUCATION

**PhD of Computer Science (Software Engineering & Robotics)**      Charlottesville, VA | Est. Dec. 2024  
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

### **DIFFERENTIABLE ENVIRONMENTS FOR ADVERSARIAL OBJECT GRASPING**

HAILIE MITCHELL, MERIEL VON STEIN, TRENTON TABOR, CLAIRE LE GOUES, SEBASTIAN ELBAUM  
UNDER PREPARATION FOR IEEE ROBOTICS AND AUTOMATION LETTERS JOURNAL (IRAL) 2024.  
DOI FORTHCOMING.

### **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 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](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 ECE/FSE SE4SAFE4ML WORKSHOP ORGANIZING COMMITTEE MEMBER (2023) on ML for safety-critical systems. Highest attended workshop at FSE'24.

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.

## 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.

**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

**IEEE Robotics and Automation Letters (IRAL) Reviewer** Reviewed three journal papers for IRAL.

**International Conference on Robotics and Automation (ICRA'24) Reviewer** Reviewed 2 research-track papers.

**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** 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.