

Carl Hildebrandt

Ph.D. Candidate, University of Virginia

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I specialize in autonomous systems and software testing, focusing on creating and executing test suites that bridge software, hardware, and physical world interactions. Outside academia, I'm an athlete and adventurer, with achievements like summiting Kilimanjaro and competing in the world's largest ultramarathon.

Education

- 2018 – 2024 **University of Virginia, USA**
Ph.D. Computer Science
Advisor: Dr. Sebastian Elbaum
Lab: LESS (less-lab-uva.github.io)
- 2013 – 2016 **University of Pretoria, South Africa**
B.Eng. in Computer Engineering

Experience

- 2018 – Research Assistant, LESS Lab, University of Virginia (less-lab-uva.github.io)
- 2022 – 2022 Graduate Research Intern, Raytheon BBN (www.rtx.com)
- 2019 – 2022 Head of Technology, Vuetech Health Innovations LLC(www.vuetechhealth.com)
- 2017 – 2018 Research Assistant, Nimbus Lab, University of Nebraska (www.nimbus.unl.edu)
- 2016 – 2017 Software Engineer, Cheesecake Trails

Honors & Awards

External

- 2020 **Distinguished Artifact Award**
Feasible and Stressful Trajectory Generation for Mobile Robots (ISSTA)
- 2018 **Best Paper Award on Safety, Security, and Rescue Robotics**
Fire-Aware Planning of Aerial Trajectories and Ignitions (IROS)

Internal

- 2023 **All-University Graduate Teaching Award**
The University of Virginia - Office of Graduate and Postdoctoral affairs
- 2022 **Graduate Teaching Award**
The University of Virginia - Annual Computer Science Department End-of-Year Awards
- 2021 **Best Poster Design**
The University of Virginia - Computer Science Research Symposium
- 2020 **Best Presentation**
The University of Virginia - Computer Science Virtual Research Symposium

Publications

- NA **Carl Hildebrandt**, Trey Woodlief, and Sebastian Elbaum, “ODD-diLLMma: Making ODD Compliance Checking Tractable with LLM-Driven Sensor Data Analysis,” NA (**Under Submission**)
- NA **Carl Hildebrandt**, and Sebastian Elbaum, “Are Autonomous Systems Safe: A Continuous Differential Testing Framework using Large Language Models and Unlimited Real Data,” NA (**Under Development**)
- NA Mira Khan, **Carl Hildebrandt**, and Sebastian Elbaum, “From Simulation to Reality: Streamlining Training AI-Based Drone Navigation Software using Mixed-Reality Environments,” NA (**Under Development**)
- NA **Carl Hildebrandt**, Brendan Teich, Dylan Callahan, and Borislava I. Simidchieva, “A Framework for Benchmarking Collaborative-Autonomy Behaviors in Robots,” NA (**Under Development**)
- 2023 **Carl Hildebrandt**, Meriel von Stein, and Sebastian Elbaum, “PhysCov: Physical Test Coverage for Autonomous Vehicles,” in *Proceedings of the 32nd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)*, ACM, 2023
- 2023 **Carl Hildebrandt**, Wen Ying, Seongkook Heo, and Sebastian Elbaum, “Mimicking Real Forces on a UAV Through a Haptic Suit,” in *2023 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2023
- 2022 **Carl Hildebrandt**, Meriel von Stein, Trey Woodlief, and Sebastian Elbaum, “Preparing Software Engineers to Develop Robot Systems,” in *2022 IEEE/ACM 44th International Conference on Software Engineering: Software Engineering Education and Training (ICSE-SEET)*, IEEE, 2022
- 2021 **Carl Hildebrandt**, and Sebastian Elbaum, “World-in-the-Loop Simulation for Autonomous Systems Validation,” in *2021 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2021, pp. 10912–10919
- 2020 **Carl Hildebrandt**, Sebastian Elbaum, Nicola Bezzo, and Matthew B Dwyer, “Feasible and stressful trajectory generation for mobile robots,” in *Proceedings of the 29th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)*, 2020, pp. 349–362 (**Distinguished Artifact Award**)
- 2020 **Carl Hildebrandt**, Sebastian Elbaum, and Nicola Bezzo, “Blending kinematic and software models for tighter reachability analysis,” in *2020 IEEE/ACM 42nd International Conference on Software Engineering: New Ideas and Emerging Results (ICSE-NIER)*, IEEE, 2020, pp. 33–36
- 2018 Evan Beachly, Carrick Detweiler, Sebastian Elbaum, Brittany Duncan, **Carl Hildebrandt**, Dirac Twidwell, and Craig Allen, “Fire-aware planning of aerial trajectories and ignitions,” in *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2018, pp. 685–692 (**Best Paper Award**)

Patents

- 2020 **Carl Hildebrandt**, Jefferson Griscavage, Victor Aquino, Melony Bennis, and Tien Comlekoglu, Vuetech Health Innovations LLC, “Systems and Methods for Safety, Security and Well-Being of Individuals”, Patent No. 11282367

Talks

- 2023 **Carl Hildebrandt** “PhysCov: Physical Test Coverage for Autonomous Vehicles”, International Symposium on Software Testing and Analysis, July 19th
- 2022 **Carl Hildebrandt** “Preparing Software Engineers to Develop Robot Systems”, International Conference on Software Engineering: Software Engineering Education and Training, May 25th
- 2021 **Carl Hildebrandt** “World-in-the-Loop Simulation for Autonomous Systems Validation”, International Conference on Robotics and Automation, May 30th
- 2020 **Carl Hildebrandt** “Feasible and Stressful Trajectory Generation for Mobile Robots”, International Conference on Software Engineering, July 7th
- 2020 **Carl Hildebrandt** “Blending Kinematic and Software Models for Tighter Reachability Analysis”, International Symposium on Software Testing and Analysis, July 21st

Community Service

- 2022 **Artifact Reviewer**, IEEE/ACM International Conference on Automated Software Engineering (ASE).
- 2022 **Graduate Student Council**, The University of Virginia, Computer Science Department (CSGSG).
- 2022 **Paper Reviewer**, IEEE International Conference on Robotics and Automation Society (ICRA)
- 2021 **Student Volunteer**, IEEE/ACM International Conference on Software Engineering (ICSE)

Teaching

- 2022 Supporting instructor, **Robotics for Software Engineers**, The University of Virginia
- 2021 Lab Designer and Guest Lecturer, **Robotics for Software Engineers**, The University of Virginia
- 2020 Lab Designer and Teaching Assistant, **Robotics for Software Engineers**, The University of Virginia
- 2016 Head Teaching Assistant, **Data Structures and Algorithms in Java**, The University of Pretoria
- 2015 Head Teaching Assistant, **Program Design in C++**, The University of Pretoria
- 2015 Teaching Assistant, **Data Structures and Algorithms in Java**, The University of Pretoria
- 2014 Teaching Assistant, **Introduction to Programming in C**, The University of Pretoria

Skills

- Licences: Commercial drone license for small unmanned aircraft systems
- Advanced: Python, C++, ROS, Shell Scripting, LaTeX, Quadrotors, Ubuntu, Windows, MacOS, Unity
- Experienced: C, Java, Solidworks, Keras, Tensorflow, Control Theory, Arduino, Raspberry Pi, Odroid
- Proficient: Lua, C#, Assembly, HTML, CSS, Javascript, ONNX, FPGA, Soldering, Digital Logic

Achievements

- 2019 National Club Field Hockey Champions - The University of Virginia
- 2017 Half Iron Man - South Africa
- 2017 Comrades Ultra Marathon - South Africa
- 2016 Summited Kilimanjaro - Tanzania
- 2012 National u18B Field Hockey Team - South Africa