

Carl Hildebrandt

Ph.D. Candidate, University of Virginia

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I am interested in the intersection of software analysis and autonomous systems. My primary work focuses on the safety of autonomous systems through the validation and verification of their software.

Education

- 2018 – **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, Boston (www.rtx.com)
- 2017 – 2018 Research Assistant, Nimbus Lab, University of Nebraska (nimbus.unl.edu)
- 2016 – 2017 Software Engineer, Cheesecake Trails, South Africa

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

- 2023 **Carl Hildebrandt**, Meriel von Stein, and Sebastian Elbaum, “PhysCov: Physical Test Coverage for Autonomous Vehicles,” 2023
- 2023 **Carl Hildebrandt**, Wen Ying, Seongkook Heo, and Sebastian Elbaum, “Mimicking Real Forces on a UAV Through a Haptic Suit,” 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. 10 912–10 919
- 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*, 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

- 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).
2021	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
Experienced:	C, Java, Solidworks, Keras, Tensorflow, Unity, 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