

# 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](https://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](https://less-lab-uva.github.io))
- 2022 – 2022    Graduate Research Intern, Raytheon BBN, Boston ([www.rtx.com](https://www.rtx.com))
- 2017 – 2018    Research Assistant, Nimbus Lab, University of Nebraska ([nimbus.unl.edu](https://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,” 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. 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 (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

- 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