CARL HILDEBRANDT

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PROFILE

Ph.D. in Autonomous System Safety, building technology for a new standard of trust in mobility. My experience spans developing novel testing methods for complex autonomous systems to leading safety-critical validation for commercial AVs. An experienced entrepreneur with 2 patents and 8 first-author publications in top-tier robotics and software engineering conferences. Proficient in AI, autonomous vehicles, quadrotors, and robots.

EDUCATION

Ph.D. Computer Science, University of Virginia 2018 - 2024
Title: Autonomous System Testing - Methods for Incorporating Real-World Environments and Physical Semantics.

Bachelor of Engineering in Computer Engineering, University of Pretoria 2013 - 2016

EXPERIENCE

Founder & CEO Oct 2025 - Present
Stealth Startup *San Francisco, California, United States*

- Developing a universal translation layer for mobility safety, turning complex data from any vehicle into a clear, objective, and verifiable picture of on-road performance.
- Our mission is to create a single source of truth for safety that bridges the critical gap between technology developers, fleet operators, and insurance providers.

Software System Engineer, Autonomy Verification and Test Engineering June 2024 - Sep 2025
Nuro *Mountain View, California, United States*

- Nuro is a leading autonomous vehicle company. Our mission is to better everyday life through robotics and strengthen local communities with our electric, zero-occupant autonomous delivery vehicles

Graduate Research Assistant Aug 2018 - June 2024
University of Virginia *Charlottesville, Virginia, United States*

- Authored 8 papers in leading conferences for robotics and software systems, including ICRA (top-ranked in robotics), IROS (second highest-rated in robotics), ISSTA (top-ranked in software testing), and contributions to ICSE's alternative tracks (top-rated in software systems), demonstrating broad impact in these fields.
- Designed the "Robotics for Software Engineers" lab at UVA, including a custom quadrotor simulator with diverse sensor suite, optimized for minimal resource use across multiple OS. This course, imparting key robotics principles, attracts up to 45 students per semester. My contributions led to a publication at ICSE-SEET, a top-ranked conference, and earned me the All-University Graduate Teaching Award.

Graduate Research Intern May 2022 - Aug 2022
Raytheon Technologies - BBN *Cambridge, Massachusetts, United States*

- Contributed to the MACE project, enhancing the Joint Services Academies' Combat Search & Rescue Challenge.
- Developed 4 swarm behaviors for aerial & ground vehicles in simulations for search and rescue operations.
- Developed a real-time analytics server for data visualization, enhancing monitoring and decision-making.

Head of Technology Nov 2019 - Jul 2022
Vuetech Health Innovations *Charlottesville, Virginia, United States*

- Co-founded Vuetech Health and led its technology division, securing over $100k in awards and investments for developing unintrusive, privacy-preserving fall detection technology.

- Led the creation and deployment of EVA, a patented AI monitoring system designed to assist caregivers and nurses in preventing patient falls. Oversaw a feasibility study at the University of Virginia School of Nursing with EVA's prototype, successfully detecting 82% of falls.
- Managed the full-stack architecture, from development and testing to maintenance, ensuring the system's robustness, high performance, and seamless operation.

Graduate Research Assistant Jul 2017 - Jul 2018
University of Nebraska-Lincoln *Lincoln, Nebraska, United States*

- Contributed to testing of a fire ignition system for drones, which later (after my departure) turned into IGNIS Unmanned Aerial System (UAS) for fire management at the startup Drones Amplified.
- Developed a drone capable of catching balls, through a highly optimized trajectory prediction and intersection algorithm. This system predicts the ball's movement and plans an intersecting trajectory within milliseconds of the ball being thrown, showcasing advanced precision and real-time analysis.

Software Engineer Jan 2017 - Jul 2017
Cheesecake Trails *Johannesburg, Gauteng, South Africa*

- Core developer in a startup for custom POS systems, led web platform integration with backend.
- Unified user experience across web/mobile, focusing on functional design.

PUBLICATIONS

2025: Trey Woodlief, **Carl Hildebrandt**, and Sebastian Elbaum, "A Differential Testing Framework to Identify Critical AV Failures Leveraging Arbitrary Inputs," in *2025 IEEE/ACM International Conference on Software Engineering (ICSE)*, IEEE, 2025

2024: **Carl Hildebrandt**, Trey Woodlief, and Sebastian Elbaum, "ODD-diLLMma: Driving Automation System ODD Compliance Checking using LLMs," in *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2024

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

2023: Victor Aquino, Melony Bennis, Tien Comlekoglu, Jefferson Griscavage, and **Carl Hildebrandt**, Vuetech Health Innovations LLC, "Systems and Methods for Safety, Security and Well-Being of Individuals", Patent No. US11688265B1

2022: Victor Aquino, Melony Bennis, Tien Comlekoglu, Jefferson Griscavage, and **Carl Hildebrandt**, Vuetech Health Innovations LLC, "Systems and Methods for Safety, Security and Well-Being of Individuals", Patent No. US11282367B1

SERVICE

2024: **Paper Reviewer**, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

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)

HONORS & AWARDS

2023: **All-University Graduate Teaching Award**, The University of Virginia - Graduate and Postdoctoral Affairs

2022: **Graduate Teaching Award**, The University of Virginia - 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

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)

TEACHING

2025: Guest Lecturer, **Robotics**, William and Mary

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