

Ricardo Diniz Caldas

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PROFESSIONAL SUMMARY

Software Engineering researcher specializing in autonomous systems and cyber-physical system resilience, with expertise spanning formal verification, runtime monitoring, field-based testing, and self-adaptation. Develops methods and research tools for detecting behavioral violations and enabling recovery during system operation, with applications across space robotics, autonomous vehicles, and healthcare. Background combines international research, open-source software development, scientific publishing, and collaboration on large-scale European research projects.

PROFESSIONAL EXPERIENCE

Postdoctoral Researcher Feb 2025 – Present
Gran Sasso Science Institute Italy

- Conduct research on Verification and Validation (V&V) of autonomous robotic systems within the Horizon Europe MATISSE project, with a focus on runtime verification, field-based testing, and formal requirements specification.
- Coordinate contributions from 14+ MATISSE consortium partners within WP3, supporting the development and delivery of the project's V&V service portfolio.
- Develop SpaceTry, an open-source scenario-based testing framework for autonomous space robotics, integrated with Space ROS and FRETish/FRET requirements.
- Develop RiTMOS for automated runtime monitor generation and Diagnosis, a research tool that applies evolutionary search to trace diagnosis in cyber-physical systems.
- Contribute to the international research community through 6+ publications since joining GSSI, with an overall research record of 20 publications, 355+ citations, and an h-index of 8.
- Organize and co-organize international scientific events, including RSE 2026, the RoSE Workshop, and RoME 2026, while also contributing to the research community as a keynote and invited speaker.
- Supervise and mentor researchers at PhD, Master's, and undergraduate levels, supporting research development across different stages of academic training.
- Collaborate with researchers across 8+ countries and maintain research repositories, academic websites, and replication packages supporting scientific dissemination and reproducibility.

EDUCATION

Bachelor's Degree in Control and Automation Engineering Feb 2012 – Dec 2017
University of Brasília Brazil

Master's Degree in Software Engineering and Dependability Feb 2018 – Dec 2019
University of Brasília Brazil

PhD Jan 2020 – Dec 2024
Chalmers University of Technology Sweden

LANGUAGES

English C2	Italian A2
Swedish A2	Portuguese Native

KEY PROJECTS & ACHIEVEMENTS

MATISSE Project | Horizon Europe / KDT JU
Funded researcher since 2025 on a large-scale European project focused on Verification and Validation (V&V) of autonomous systems, contributing to the coordination of activities and deliverables involving 14+ consortium partners.

WASP Fellowship | Wallenberg AI, Autonomous Systems and Software Program
Awarded full PhD funding from 2020 to 2024 through one of Sweden's major research programs in artificial intelligence, autonomous systems, and software.

PhD Thesis | Resilience in Cyber-Physical Systems
Authored and defended the doctoral thesis *From Chance to Choice: Strategies to Attaining Resilience in Cyber-Physical Systems*, investigating runtime verification, field-based testing, and self-adaptation as strategies for improving the resilience of cyber-physical systems.

Scientific Research & Impact
Research track record comprising 20 publications, 355+ citations, and an h-index of 8, alongside the development of open-source tools and research artifacts in Robotics Software Engineering, cyber-physical systems, and Verification and Validation.

Doctoral Researcher

Chalmers University of Technology

Feb 2020 – Dec 2024

Sweden

- Investigated software engineering approaches for robotics and cyber-physical systems, focusing on runtime verification, field-based testing, and self-adaptation to improve system resilience.
- Produced 10+ peer-reviewed publications in journals and conference venues including IEEE TSE, IEEE TITS, IEEE Software, JSS, SEAMS, and ACSOS.
- Designed, developed, and maintained 5+ open-source research tools and artifacts, including BSN, RoboMAX, EzSkiROS, Driver-Vehicle Model, and ROS-RVFT.
- Created ROS-RVFT, a set of 20 guidelines for runtime verification and field-based testing, validated through responses from 55 practitioners.
- Contributed approximately 1,480 hours to teaching and departmental activities, including instruction and assessment for undergraduate and Master's-level courses.
- Supervised Bachelor's and Master's thesis projects, providing guidance throughout research and project development.
- Served as WASP Cluster Leader from 2021 to 2022, coordinating activities within an interdisciplinary research group.
- Reviewed research papers for venues including ICSE, FSE, ASE, SEAMS, ICRA, FASE, and TAAS.
- Participated in international conferences, workshops, summer schools, and research visits, including a six-month research stay at the Gran Sasso Science Institute (GSSI) in Italy.

Visiting Researcher

Gran Sasso Science Institute

Jan 2022 – Jun 2022

Italy

- Conducted doctoral research in Software Engineering for Robotics during a six-month research stay at GSSI in Italy.
- Worked closely with GSSI researchers, expanding international research collaboration within the scope of the PhD project.
- Explored topics in Robotics Software Engineering and empirical software engineering as part of the ongoing doctoral research.
- Participated in the institute's academic and scientific activities, strengthening international research exchange and collaboration.

Technology & Telecommunications Intern

Telemikro

Aug 2015 – Jul 2017

Brazil

- Supported day-to-day team activities within a technology and telecommunications environment, assisting with operational requests and routine tasks.
- Developed hands-on experience in organization, analytical work, and internal support, building an early foundation for working in technology-driven environments.

CORE SKILLS & COMPETENCIES

- Robotics Software Engineering
- Cyber-Physical Systems
- Autonomous Systems Verification & Validation
- Runtime Verification & Monitoring
- Formal Methods
- Requirements Engineering
- Goal Modeling
- Behavior Trees
- Scenario-Based Testing
- Field-Based Testing
- Self-Adaptation & System Resilience
- Empirical Software Engineering
- Open-Source Research Software Development
- Research Project Coordination
- Academic Supervision & Mentoring
- Scientific Writing & Peer Review
- International Research Collaboration

TOOLS & TECHNOLOGIES

Python | C | C++ | ROS | ROS 2 | Space ROS | Java
| MATLAB | Simulink | Docker | Linux | Bash |
Git | GitHub | LaTeX | FRET | FRETish | UPPAAL
| PRISM | Gazebo | OpenDaVINCI | SkiROS2 |
Jekyll | Haskell | GitHub Copilot | Claude |
ChatGPT | LLM-Based Multi-Agent Workflows