

Ricardo Andrés Calvo Méndez

Ph.D student

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RESEARCH INTERESTS

My research focuses on the design and analysis of methods and tools that provide rigorous guarantees of software correctness. I am particularly interested in formal verification techniques, theoretical and practical foundations for reasoning about program behavior, and advanced approaches to code analysis.

My research interests include:

- **Formal verification:** Foundations and tools for establishing provably correct behavior in complex software systems.
- **Program analysis and testing:** Static, dynamic, and hybrid methods for understanding, validating, and rigorously evaluating code.
- **Optimization and efficiency:** Techniques for improving performance, reducing resource consumption, and identifying near-optimal implementations.

EDUCATION

Ph.D, Electrical and Computer Engineering
Purdue University, West Lafayette, IN

Fall 2025 – Fall 2030

B.Sc. Systems and Computer Engineering
Universidad Nacional de Colombia, Bogotá D.C, Colombia

Spring 2018 – Fall 2023

RESEARCH EXPERIENCE

Graduate Research Assistant

Aug 2025 – Present

Purdue University — Advised by James Davis

- Serving as a researcher on *AutoUP*, an automatic unit-proof generation system for formal verification, contributing to its design and development.

Undergraduate visiting scholar (UREP-C)

Feb 2023 – Jul 2023

Purdue University — Advised by James Davis

- Contributed to the design and implementation of *EmNetTest*, a framework for testing embedded network stacks.

PROFESSIONAL EXPERIENCE

Test engineer & QA Analyst

Sep 2024 – Jul 2025

Kravata SAS, Bogotá D.C, Colombia

- Led the testing area, advancing automation across end-to-end, integration, and unit testing while implementing CI/CD pipelines within a DevOps environment.

Fullstack software developer

Aug 2023 – Aug 2024

Fit Ideas SAS, Bogotá D.C, Colombia

- Led the development team in the strategic planning, management, and deployment of mobile and web applications.

- Supported the implementation of custom functionalities as a developer, and contributed to the design and management of relational database systems.

REFEREED CONFERENCE PUBLICATIONS

[C-1] P. Amusuo, R.A.C. Méndez, Z. Xu, A. Machiry, and J.C. Davis. *Systematically Detecting Packet Validation Vulnerabilities in Embedded Network Stacks*. Proceedings of the 38th IEEE/ACM International Conference on Automated Software Engineering (ASE'23). 21% acceptance rate (134/629). 13 pages.

TECHNICAL REPORTS

[T-1] P. Amusuo, D. Liu, R.A.C. Méndez, J. Metzman, O. Chang, and J.C. Davis. *FalseCrashReducer: Mitigating False Positive Crashes in OSS-Fuzz-Gen Using Agentic AI*. <https://arxiv.org/pdf/2510.02185.2025.pdf>

TECHNICAL COURSE PROJECTS

ECE 60852 Holistic Software Security — Design and develop an automatic unit proof debugger to iteratively identify and fix errors in a bounded model checker, enabling the generation of formally correct unit proofs

CERTIFICATIONS

Ayuda y aprende — Spanish Service Learning <i>Purdue University</i>	2023
Algorithmic Toolbox <i>University of California San Diego (Coursera)</i>	2021
Advanced course on Django <i>Platzi</i>	2021
Introduction to Git and GitHub <i>Google (Coursera)</i>	2020
Crash course on Python <i>Google (Coursera)</i>	2020