Rafael Gonçalves

GHC 9223, Carnegie Mellon University

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Profile & Research Interests

Broadly, I am interested in **software security** and **formal methods**. I am particularly interested in static and dynamic program analysis, and in developing tools that allow developers to efficiently analyze real-world software.

Education

Carnegie Mellon University & Instituto Superior Técnico, University of Lisbon   *Pittsburgh, PA & Lisbon, Portugal*

PHD IN COMPUTER SCIENCE   *Aug. 2024 - present*

- Advised by Prof. José Fragoso Santos, Prof. Limin Jia & Prof. Pedro Adão
- Supported by a CMU Portugal Dual Degree PhD fellowship

Instituto Superior Técnico, University of Lisbon   *Lisbon, Portugal*

MSc IN COMPUTER SCIENCE & ENGINEERING   *Sep. 2021 - Nov. 2023*

- GPA: 18/20
- Specializations: Cybersecurity · Distributed Systems
- Master Thesis: Specification-Driven Synthesis of Summaries for Symbolic Execution (advised by Prof. José Fragoso Santos & Prof. Pedro Adão)

Instituto Superior Técnico, University of Lisbon   *Lisbon, Portugal*

BSc IN COMPUTER SCIENCE & ENGINEERING   *Sep. 2018 - Jul. 2021*

- GPA: 17/20

Experience

INESC-ID   *Lisbon, Portugal*

RESEARCH ASSISTANT   *Jan. 2024 - Oct. 2024*

- Group: Automated Reasoning and Software Reliability (ARSR)
- Project: "RIGA: Reasoning Over Indirect Discrimination" (DOI: 10.54499/2022.03537.PTDC)
- Supervisor: Prof. José Fragoso Santos

Carnegie Mellon University   *Pittsburgh, PA*

VISITING SCHOLAR   *Oct. 2023 - Dec. 2023*

- Worked on extending NODEMEDIC, a dynamic taint analysis tool, to detect prototype pollution vulnerabilities
- Host: Prof. Limin Jia

Publications

R. Gonçalves, F. Gouveia, I. Lynce, J. Fragoso Santos. Proxy Attribute Discovery in Machine Learning Datasets via Inductive Logic Programming. To appear in: TACAS 2025, Hamilton, Canada, 2025.

R. Gonçalves, F. Ramos, P. Adão, J. Fragoso Santos. Poster: Specification-Driven Synthesis of Summaries for Symbolic Execution. Presented at: ISSTA/ECOOP 2023, Seattle, WA, USA, 2023.

IN REVIEW

R. Gonçalves, F. Ramos, P. Adão, J. Fragoso Santos. Specification-Driven Generation of Summaries for Symbolic Execution. In Review. Submitted in: November 2024.

Teaching

Spring 2023	**Highly Dependable Systems (MSc)**, Teaching Assistant
Spring 2024	**Highly Dependable Systems (MSc)**, Teaching Assistant
Summer 2024	**Compilers (BSc)**, Teaching Assistant

Courses

Instituto Superior Técnico, University of Lisbon　　　　　　　　　　　　　*Lisbon, Portugal*
BINARY ANALYSIS WITH APPLICATIONS TO MACHINE AND DEEP LEARNING　　*Feb. 2023 - Mar. 2023*
- Taught by: Prof. Michele Ianni (University of Calabria)

Honors & Awards

2022/2023	**Academic Merit Diploma**, Instituto Superior Técnico, University of Lisbon
2020/2021	**Academic Excellence Diploma**, Instituto Superior Técnico, University of Lisbon
2019/2020	**Academic Merit Diploma**, Instituto Superior Técnico, University of Lisbon
2018/2019	**Academic Merit Diploma**, Instituto Superior Técnico, University of Lisbon

Skills

Programming	C · Python · Haskell · Java · Rust
Frameworks	Spring · gRPC · PyTorch · Flask
Cybersecurity	Binary Exploitation · Reverse Engineering
Languages	Portuguese (native) · English (fluent) · French (basic)