Nicola Ruaro

PhD Candidate - University of California, Santa Barbara
Email: ruaronicola@ucsb.edu | **Phone:** +1 (805) 280 8609 | **Location:** Santa Barbara, CA

Fourth-year Ph.D. student from UC Santa Barbara passionate about designing and improving program analysis systems. Worked in UC Santa Barbara (SecLab) and Politecnico di Milano (NECSTLab) researching symbolic execution on binaries, malware, and smart contracts. Loves playing electric guitar and organizing/participating in CTFs with the Shellphish hacking team. **Graduation:** 2025. **Programming:** Python, C

EDUCATION

2020 - Present — **Doctor of Philosophy - PhD Candidate in Computer Science**
University of California, Santa Barbara, CA | **Advisors:** Christopher Kruegel, Giovanni Vigna | **GPA:** 4.0
Research Area: Advancements in symbolic execution for binary analysis, malware analysis, and smart contract analysis.

2016 - 2019 — **Master of Science - MSc in Computer Science and Engineering**
Politecnico di Milano, Italy | **Advisors:** Stefano Zanero, Mario Polino | **Final Mark:** 104/110
Dissertation: Towards Advanced Path Prioritization In Symbolic Execution.

TEACHING & RESEARCH

2022 (Sept - Dec) — **Teaching Assistant - CS177, Computer Security**
University of California, Santa Barbara, CA | **Advisors:** Christopher Kruegel
Hosted a CTF and weekly discussions covering network security, binary reverse engineering/exploitation, and cryptanalysis.

2019 (Jan - July) — **Research Scholar - Intern**
University of California, Santa Barbara, CA | **Advisors:** Christopher Kruegel, Giovanni Vigna
Designed novel techniques to direct and scale the angr Dynamic Symbolic Execution engine.

2016 - 2018 — **Student Researcher**
Politecnico di Milano, Italy | **Advisors:** Stefano Zanero, Franca Garzotto
Competed in international CTFs such as DEF CON with the hacking teams mhackeroni and ToH. Worked with the Interactive Interfaces lab (I3Lab) to build "Jazzy," a VR application for treating visual disorders published in ACM CHI.

INDUSTRY EXPERIENCE

2017 (May - Aug) — **Privacy and Security Consultant**
Vodafone Italia, Milano, Italy | **Advisors:** Claudio Cantatore
Designed a framework for managing access to external APIs and improving GDPR compliance.

PROJECTS (selected)

2023 - Present — **DARPA AI Cyber Challenge** (Team: Shellphish Support Syndicate)
Cyber Reasoning System for detecting, understanding, and patching vulnerabilities in large software repositories.

2023 — **ucsb_seclab/greed**
State-of-the-art symbolic execution and analysis framework for smart contracts, strong focus on usability and scalability.

2021 — **ruaronicola/python-jvm-visualizer**
JVM state visualizer and timeless (forward and backward) debugger.

PUBLICATIONS (selected)

2024 — **Not Your Type! Detecting Storage Collision Vulnerabilities in Ethereum Smart Contracts**
N. Ruaro, F. Gritti, R. McLaughlin, I. Grishchenko, C. Kruegel, G. Vigna
NDSS 2024

2023 — **Confusum Contractum: Confused Deputy Vulnerabilities in Ethereum Smart Contracts**
F. Gritti, N. Ruaro, R. McLaughlin, P. Bose, D. Das, I. Grishchenko, C. Kruegel, G. Vigna
USENIX Security 23

2022 — **Understanding Security Issues in the NFT Ecosystem**
D. Das, P. Bose, N. Ruaro, C. Kruegel, G. Vigna
ACM CCS 2022

2022 — **SYMBEXCEL: Automated Analysis and Understanding of Malicious Excel 4.0 Macros**
N. Ruaro, F. Pagani, S. Ortolani, C. Kruegel, G. Vigna
IEEE SP 2022 | BlackHat USA 2021

2021 — **SyML: Guiding Symbolic Execution Toward Vulnerable States Through Pattern Learning**
N. Ruaro, K. Zeng, L. Dresel, M. Polino, T. Bao, A. Continella, S. Zanero, C. Kruegel, G. Vigna
ACM RAID 2021