FRANCESCO PAGANO

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RESEARCH AND ACADEMIC EXPERIENCE

Postdoctoral Research Fellow

University of Verona, Verona

April 2025 – Ongoing Verona, Italy

AI for software engineering and assurance: My postdoctoral research at Verona is supervised by Prof. Mariano Ceccato, and I run my projects within his group. I build AI-supported methods to test, repair, and assure connected software systems, validated through reproducible runtime evidence.

NEUROPULS: I contribute to NEUROPULS, an EU Horizon Europe project (Grant Agreement No. 101070238) on secure, energy-efficient neuromorphic accelerators. I work on security protocols for IoT-device attestation and integrity verification, studying how to turn a device's own hardware into a Physical Unclonable Function (PUF) that stays stable as temperature, voltage, and aging drift, and resists machine-learning modeling attacks.

AI-supported security testing and repair for Mobile-IoT systems: I built MITHRAS (FSE 2025), a dynamic-analysis framework that emulates IoT firmware and its mobile companion app to make their execution observable. On top of it, with Prof. Paolo Tonella (USI), I developed a multi-agent reinforcement-learning test generator grounded in execution traces rather than crashes (Journal of Systems and Software, 2026), and an LLM-based repair pipeline that validates candidate patches against the same infrastructure (under review at a top software engineering venue).

Research Fellow - CsecLab

University of Genoa, Genoa

January 2021 – October 2021 Genoa, Italy

I helped design and build the BIAS (Blockchain-enabled Intelligent Agricultural Services) platform at the University of Genoa, a POR-FESR project funded by Regione Piemonte (funding number 337-135/6). I set up and ran an IPFS node cluster, wrote Ethereum smart contracts in Solidity, and integrated the blockchain components into the platform.

EDUCATION

Ph.D. in Security, Risk, and Vulnerability

University of Genoa, Genoa

November 2021 – March 2025 Genoa, Italy

I earned my PhD at the University of Genoa in the Security, Risk, and Vulnerability program, on the Cybersecurity and Reliable AI curriculum. My doctoral thesis, "Dealing with Security and Privacy Challenges in Android Through App Code Analysis", focused on automated code analysis for mobile security. I designed SEBASTiAn, a modular static analyser that extracts control-flow graphs and performs inter-procedural taint analysis to identify vulnerability-enabling data flows in compiled Android and iOS apps across 77 vulnerability classes; it has been adopted by Fondazione Bruno Kessler (FBK), Trento, for mobile security vetting.
Doctoral thesis supervisors: Prof. Alessio Merlo, Prof. Mariano Ceccato, and Prof. Paolo Tonella.
External thesis reviewers and committee members: Dr.-Ing. Steven Arzt, Prof. Dr.-Ing. Riccardo Scandariato, and Prof. Dr. Thorsten Holz.

M.Sc. in Computer Engineering

University Of Genoa, Genoa

October 2018 – December 2020 Genoa, Italy

I followed the "Software and Computing Platforms" curriculum, focused on building distributed platforms.

- **Thesis title**: HideDroid - App-level Runtime Data Anonymization on Mobile;
- **Thesis description**: My thesis tackled data privacy on Android. I designed a way to anonymize the content of analytics requests on the user's own device, and built it as HideDroid, an app that lets users anonymize analytics traffic for the specific apps they choose.
- Final degree mark: 110/110 cum laude

B.Sc. in Computer Engineering

University Of Genoa, Genoa

September 2015 – September 2018 Genoa, Italy

PUBLICATIONS

Peer-Reviewed Journal Articles

Francesco Pagano, Luca Verderame, and Alessio Merlo.
"Understanding Fuchsia Security",
Published on Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), 12(3), 47–64.
DOI: https://doi.org/10.22667/JOWUA.2021.09.30.047
September 2021

Davide Caputo, **Francesco Pagano**, Giovanni Bottino, Luca Verderame, and Alessio Merlo.
"You Can't Always Get What You Want: Towards User-Controlled Privacy on Android",
Published on IEEE Transactions on Dependable and Secure Computing (TDSC), 20(2), 975–987.
DOI: https://doi.org/10.1109/TDSC.2022.3146020
January 2022

Francesco Pagano, Andrea Romdhana, Davide Caputo, Luca Verderame, and Alessio Merlo.
"SEBASTiAn: A Static and Extensible Black-box Application Security Testing Tool for iOS and Android Applications",
Published on SoftwareX, 23, 101448.
DOI: https://doi.org/10.1016/j.softx.2023.101448
July 2023

Francesco Pagano, Luca Verderame, Enrico Russo, and Alessio Merlo.
"MarvelHideDroid: Reliable on-the-fly Data Anonymization Based on Android Virtualization",
Published on Computers and Electrical Engineering, 121, 109882.
DOI: https://doi.org/10.1016/j.compeleceng.2024.109882
January 2025

Giacomo Longo, Francesco Lupia, Alessio Merlo, **Francesco Pagano**, and Enrico Russo.
"A Data Anonymization Methodology for Security Operations Centers: Balancing Data Protection and Security in Industrial Systems",
Published on Information Sciences, 690, 121534.
DOI: https://doi.org/10.1016/j.ins.2024.121534
February 2025

Francesco Pagano, Mariano Ceccato, Alessio Merlo, and Paolo Tonella.
"Multi-Agent Deep Reinforcement Learning for Penetration Testing of IoT Devices Through Their Mobile Companion App",
Published on Journal of Systems and Software (JSS), 239, 112918.
DOI: https://doi.org/10.1016/j.jss.2026.112918
April 2026

Peer-Reviewed Conference Papers

Francesco Pagano, Antonio Ruggia, Luca Verderame, and Alessio Merlo.
"VirtualHideDroid: User Data Anonymization Through Virtualization Techniques",
Published on the 7th International Conference on Mobile Internet Security (MobiSec 2023).

December 2023

Francesco Pagano, Luca Verderame, and Alessio Merlo.
"Obfuscating Code Vulnerabilities Against Static Analysis in Android Apps",
Published on ICT Systems Security and Privacy Protection, SEC 2024, IFIP Advances in Information and Communication Technology, 710, 381–395.
DOI: https://doi.org/10.1007/978-3-031-65175-5_27

July 2024

Francesco Pagano, Mariano Ceccato, Alessio Merlo, and Paolo Tonella.
"MITHRAS: A Dynamic Analysis Framework for the Mobile-IoT Ecosystem",
Published on FSE Companion '25: Proceedings of the 33rd ACM International Conference on the Foundations of Software Engineering, 1139–1142.
DOI: https://doi.org/10.1145/3696630.3728597

June 2025

Luca Ferrari, **Francesco Pagano**, Luca Verderame, and Alessio Merlo.
"The OWApp Benchmark: An OWASP-Compliant Vulnerable Android App Dataset",
Published on 2025 IEEE European Symposium on Security and Privacy Workshops (EuroS&PW), 569–580.
DOI: https://doi.org/10.1109/EuroSPW67616.2025.00072

July 2025

Manuscripts Under Review

Francesco Pagano, Lorenzo Pisu, Leonardo Regano, Davide Maiorca, Alessio Merlo, and Giorgio Giacinto.
"Obfuscating Code Vulnerabilities Against Static Analysis in JavaScript Code",
Under review at IEEE Transactions on Information Forensics and Security (TIFS). Preprint: arXiv:2604.01131.
arXiv: https://arxiv.org/abs/2604.01131

2026

First large-scale study of how semantics-preserving obfuscation suppresses vulnerability detection in JavaScript, spanning 16 ground-truth OWASP apps and 260 in-the-wild GitHub apps across 8 obfuscation techniques; even a single technique achieves near-complete suppression of high-severity findings across mainstream SAST tools, extending the Android obfuscation finding to the JavaScript supply-chain ecosystem.

Doctoral Thesis

Francesco Pagano.
"Dealing with Security and Privacy Challenges in Android Through App Code Analysis",
Ph.D. thesis, Università degli studi di Genova.
Supervisors: Alessio Merlo, Mariano Ceccato, and Paolo Tonella.
External reviewers/committee members: Steven Arzt, Riccardo Scandariato, and Thorsten Holz.
Handle: https://hdl.handle.net/11567/1242101

March 2025

TEACHING EXPERIENCE

Thesis Co-Supervision

Master's Thesis Co-Advisor

University of Verona, NEUROPULS research activities

April 2025 – Ongoing | Verona, Italy

I co-advise master's students on NEUROPULS topics: designing security protocols for IoT-device attestation and integrity verification, and finding device hardware that can serve as a PUF source.

Master's Thesis Co-Advisor

University of Genoa, Ph.D. research activities

October 2021 – March 2025 | Genoa, Italy

I co-advised master's students on my PhD topics in mobile privacy: on-device anonymization algorithms, and Android virtualization and sandbox setups that scrub sensitive analytics data before it leaves the phone.

Bachelor's Thesis Co-Advisor

Mobile Programming course, University of Genoa

October 2021 – March 2025 | Genoa, Italy

I co-advised bachelor's students on the Mobile Programming thesis track for Computer Engineering, guiding several Android app projects from first idea to working implementation.

Teaching and Tutoring

CyberChallenge.IT Tutor

University of Verona node, CyberChallenge.IT

2026 | Verona, Italy

I tutor at the University of Verona node, giving lectures and helping students through hands-on cybersecurity challenges. CyberChallenge.IT is Italy's national cybersecurity training program for university and high-school students, run by the CINI Cybersecurity National Lab with the Italian National Cybersecurity Agency.

Course Lecturer (co-taught course)

Informatics and multimedia production (m), Master's Degree in Publishing and Journalism, University of Verona

Academic Year 2024/2025 | Verona, Italy

I co-taught this 12-credit INF/01 course with Michele Pasqua. It covers the theory and tools of multimedia and walks students through building one application that brings together images, video, sound, and 3D animation, with lab exercises, tutorials, and a final project.

Teaching Assistant

University of Genoa, Genoa

October 2021 – March 2025 | Genoa, Italy

I was a teaching assistant for the Data Protection & Privacy course, leading the practical sessions on its anonymization algorithms. I also taught in Mobile Programming, guiding students as they built a mobile app from scratch.

ACADEMIC SERVICE

Workshop Organization

Co-Initiator, Co-Organizer, and Program Co-Chair

RASE 2026: Reliable and trustworthy Automated Software Engineering, co-located with ASE 2026

2026 | Munich, Germany

I co-proposed RASE with Sebastiano Panichella (University of Bern and AI4I), helped define its scientific scope, and serve as Program Co-Chair with Gregorio Dalia, Leonardo Regano, Corrado Visaggio, Sebastiano Panichella (University of Bern and AI4I), and Andrea Di Sorbo. RASE runs at ASE 2026, the IEEE/ACM International Conference on Automated Software Engineering, in Munich. It is a forum on reliable, trustworthy automated software engineering, looking at how automation and AI-assisted tools affect transparency, reliability, and assurance across the software lifecycle.

Conference and Committee Service

Program Committee Member

European Symposium on Research in Computer Security (ESORICS 2026)

September 2026 — Rome, Italy

Program Committee Member

SAFER 2026: Workshop on Sustainable Security and Awareness For Next Generation Infrastructures, co-located with ARES 2026

August 2026 — Linköping, Sweden

Program Committee Member

SAFER 2025: Workshop on Sustainable Security and Awareness For Next Generation Infrastructures, co-located with ARES 2025

August 2025 — Ghent, Belgium

Paper Artifacts Evaluation Committee Member

Annual Computer Security Applications Conference (ACSAC 2024)

September 2024 – October 2024 — Honolulu, Hawaii, USA

Reviewed software artifacts submitted with accepted papers, helping decide artifact badges and the Best Artifact Evaluated Award.

Shadow Program Committee Member

European Conference on Computer Systems (EuroSys 2023)

October 2022 – January 2023 — Rome, Italy

Reviewed seven papers and took part in the shadow-PC discussions.

Journal Reviewing

- Ad hoc reviewer, Computer Standards & Interfaces
- Ad hoc reviewer, Computers & Security
- Ad hoc reviewer, IEEE Transactions on Dependable and Secure Computing (TDSC)
- Ad hoc reviewer, IEEE Transactions on Information Forensics and Security (TIFS)
- Ad hoc reviewer, IEEE Transactions on Software Engineering (TSE)
- Ad hoc reviewer, Information and Software Technology
- Ad hoc reviewer, Journal of Systems and Software
- Ad hoc reviewer, SoftwareX

Institutional Service

Student Representative

Computer Engineering Course, University of Genoa

January 2018 – December 2020 | Genoa, Italy

Elected student representative for the Computer Engineering course. I sat on the course advisory board, brought student feedback to it, and acted as a go-between for students and professors.

RESEARCH MOBILITY AND TRAINING

Visiting PhD Student

Software Institute, Università della Svizzera italiana (USI)

September 2023 – February 2024 | Lugano, Switzerland

I spent six months as a visiting PhD student at the USI Software Institute, working with Prof. Paolo Tonella, one of my doctoral supervisors.

CyberChallenge

Genoa, Italy

March 2020 – November 2020 | Genoa, Italy

I took part in this national cybersecurity training program for high-school and university students, with both lectures and hands-on sessions. I was selected for the 20-student team representing the University of Genoa, and then one of six chosen to represent it in the national CTF Attack/Defense competition.

ZenHackAdemy

Genoa, Italy

September 2018 – December 2018 | Genoa, Italy

I attended cybersecurity seminars run by the ZenHack team to prepare for the Boeing CTF 2018, covering web security, networking, and binary analysis.

PROFESSIONAL AND TECHNICAL EXPERIENCE

Cybersecurity Risk Assessment Consultant

SIPRO S.r.l., in collaboration with the University of Verona

June – July 2026 | Verona, Italy

I carried out a cybersecurity risk assessment of the industrial automation products and infrastructure of SIPRO S.r.l., a Verona-based manufacturer of embedded control systems and automation solutions for industrial machinery with over 40 years in the sector. I conducted security analyses of their products to verify their compliance and identify the requirements needed to meet the EU Cyber Resilience Act (CRA).

CTF Player

ZenHack, Genoa

December 2020 – Ongoing | Genoa, Italy

I play for the University of Genoa's official CTF team in high-level competitions, both Jeopardy and Attack/Defense, sharpening my binary-analysis and teamwork skills.

Internship

Untold Games, Genoa

March 2019 – November 2019 | Genoa, Italy

A Software Engineering course internship in the first year of my master's. I built an automatic city-plan generator for a video game the company was developing, working with Piero Molino and Lawrence M. Murray, then researchers at Uber AI Labs; Murray is a principal author of Birch, the probabilistic programming language we used.

Acquired Skills

- Hands-on use of the Birch probabilistic programming language
- Experience with project management and agile development

TECHNICAL SKILLS

- Research and Security Areas

AI for Software Engineering | Automated Software Testing | Test Generation | Verification and Validation | Software Quality Assurance | Android Security | Mobile App Security | IoT Security | Mobile-IoT Ecosystems | Software Security | Privacy-Preserving Systems | Data Anonymization | Runtime Data Anonymization | Vulnerability Detection | AI-Assisted Patching | Software Integrity Verification | IoT Device Attestation | PUF-Based Integrity | Penetration Testing | CTF Attack/Defense

- Program Analysis and Reverse Engineering

Static Analysis | Dynamic Analysis | Binary Analysis | Code Obfuscation | Evidence-Based Validation | Reproducible Evaluation | Firmware Emulation | Firmware Instrumentation | Execution Tracing | Trace-Based Regression | Android Virtualization | Android Sandboxing | Frida | Ghidra | Radare2

- Programming Languages

Python | Java | Kotlin | C | C++ | Rust | JavaScript | PHP | MATLAB | Birch | LaTeX

- Mobile and Embedded Development

Android Development | Android SDK | Firmware Development | ESP32 | ESP-IDF | Concurrent Programming

- AI, Automation, and Data

PyTorch | Stable-Baselines3 | Reinforcement Learning | Multi-Agent Reinforcement Learning | Search-Based Software Engineering | Automated Test Generation | Test Oracles | LLM-Based Program Repair | AI-Assisted Testing | LLM-Assisted Security Analysis | Probabilistic Programming

- Web, Backend, and Deployment

Node.js | Flask | JSP | HTML/CSS | MySQL | Moodle Plugins | Docker | Docker Compose | Docker Swarm

LANGUAGES

Italian ●●●●●

English ●●●●○

ACADEMIC REFERENCES

Prof. Paolo Tonella

Director of the Software Institute and Head of TAU, Università della Svizzera italiana (USI), Lugano, Switzerland

Ph.D. thesis supervisor and research collaborator. Contact: paolo.tonella@usi.ch.

Prof. Alessio Merlo
Director, CASD, School for Advanced Defense Studies, Rome, Italy
Ph.D. thesis supervisor. Contact: alessio.merlo@unicasd.it.

Prof. Mariano Ceccato
Associate Professor, Department of Computer Science, University of Verona, Verona, Italy
Ph.D. thesis supervisor and current postdoctoral scientific supervisor. Contact: mariano.ceccato@univr.it.