

Michele Pasqua

Short Academic Curriculum Vitæ

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Assistant Professor

Department of Computer Science - University of Verona, Italy

Education

2015–2018 **PhD in Computer Science**, University of Verona, Italy.
Scholarship holder

2013–2015 **MSc in Computer Science and Engineering**, University of Verona, Italy, 110/110 *cum laude*.
Curriculum: Software Engineering and Security

PhD Thesis

Title “Hyper Static Analysis of Programs – An Abstract Interpretation-Based Framework for Hyperproperties Verification”

Supervisor Prof. Isabella Mastroeni

Referees Prof. Antoine Miné - Sorbonne Université (FR)
Prof. David A. Naumann - Stevens Institute of Technology (USA)

Teaching

2024/2025 **Professor (Coordinatore)**, University of Verona, Course: “Principles and Applications of Abstract Interpretation” (INF/01).
PhD Programme in Computer Science

2023/2024 **Professor**, University of Verona, Italy, Course: “Cyber-security for IoT” (INF/01).
MSc in Computer Engineering for Robotics and Smart Industry

2021/2022– Today **Professor (Course Coordinator)**, University of Verona, Course: “Informatics and multimedia production” (INF/01).
MSc in Publishing and Journalism

2020–Today **Lecturer and Instructor**, University of Verona, “Training program in cybersecurity”.
CyberChallenge.IT

2017/2018 **Teaching Assistant**, University of Verona, Course: “Logic” (INF/01).
BSc in Computer Science

2016/2017 **Teaching Assistant**, Univ. of Verona, Course: “Programming for Bioinformatics” (INF/01).
BSc in Bioinformatics

2015/2016 **Teaching Assistant**, Univ. of Padova, Course: “Automata and Formal Languages” (INF/01).
BSc in Computer Science

Supervisor and co-supervisor of multiple internships and BSc/Msc theses at University of Verona and University of Udine.

Past Positions

2021 **Postdoctoral Researcher**, University of Udine, Italy, Department of Mathematics, Computer Science and Physics.
Prof. Marino Miculan

2019–2020 **Postdoctoral Researcher**, University of Verona, Italy, Department of Computer Science.
Prof. Massimo Merro

Research Experience Abroad

2022–2023 **Università della Svizzera Italiana**, *SNSF project “Metamorphic Hyperproperty Testing” (2022–2023)*, Funded by: “Swiss National Science Foundation”, Coordinator: Prof. Paolo Tonella.

2018 **Sorbonne Université**, *ERC project “MOPSA: Modular Open Platform for Static Analysis” (2016–2021)*, Funded by: “European Research Council (Consolidator Grant Agreement 68139)”, Coordinator: Prof. Antoine Miné.

Research

My main research interests are in the field of formal methods for security and programming languages; with particular attention to program verification and semantics, code protection, malware detection, compilation, distributed systems and functional testing. Some keywords:

- abstract interpretation
- property and hyperproperty verification
- system semantics
- (modular) static analysis
- language-based security
- type systems
- process algebra
- bisimulation theory
- IoT and CPS security
- software watermarking and obfuscation
- metamorphic malware
- event-driven architecture
- attribute-based communication
- distributed systems
- REST APIs
- black-box testing
- security testing
- statistical model-checking

Actually, I am exploring new research topics, such as the security/correctness of blockchain-based programs (smart-contracts) and the verification of quantum programming languages.

Participation in Research Projects (selected)

2023–Today **Research Assistant**, *PRIN project “Smartitude: Automated Testing and Security Assessment to of Smart Contracts” (2023–2025)*, Funded by: “Ministry of Education, University and Research (Italy)”, Coordinator: Dr. Dario Di Nucci.

2023–2024 **Research Assistant**, *Project “Automated Testing of REST APIs” (2023)*, Funded by: “Muscoco Cybersecurity Srl”, Coordinator: Prof. Mariano Ceccato.

2022–2023 **Principal Investigator**, *SNSF project “Metamorphic Hyperproperty Testing” (2022–2023)*, Funded by: “Swiss National Science Foundation (Switzerland)”, Coordinator: Prof. Paolo Tonella.

2021 **Research Assistant**, *Joint project “Build Trust Proof of Concept” (2021)*, Funded by: University of Verona and Build Trust Srl, Coordinator: Prof. Franco Fummi.

2019–2022 **Research Assistant**, *PRIN project “ASPRA - Analysis of Program Analyses” (2019–2022)*, Funded by: “Ministry of Education, University and Research (Italy)”, Coordinator: Prof. Roberto Giacobazzi.

2018 **Visiting Researcher**, *ERC project “MOPSA - Modular Open Platform for Static Analysis” (2016–2021)*, Funded by: “European Research Council (Consolidator Grant Agreement 68139)”, Coordinator: Prof. Antoine Miné.

2016–2017 **Research Assistant**, *FIRB project “FACE - Formal Avenue for Chasing malwarE” (2014–2018)*, Funded by: “Ministry of Education, University and Research (Italy)”, Coordinator: Prof. Mila Dalla Preda.

Conference Talks (selected)

Apr 17, 2024 **Hypertesting of Programs: Theoretical Foundation and Automated Test Generation**, *46th International Conference on Software Engineering*, Lisbon, PT.

Oct 22, 2023 **Domain Precision in Galois Connection-less Abstract Interpretation**, *30th Static Analysis International Symposium*, Cascais, PT.

May 25, 2023 **Static Analysis Properties as Program Hyperproperties**, *2nd Symposium on Challenges of Software Verification*, Venice, IT, (invited).

Dec. 8, 2021 **On the Security and Safety of AbU Systems**, *19th International Conference on Software Engineering and Formal Methods*, (virtual).

Sep. 10, 2021 **A Calculus for Attribute-based Memory Updates**, *18th International Colloquium on Theoretical Aspects of Computing*, Nur-Sultan, KZ (virtual).

Jun. 27, 2019 **Securing Cross-App Interactions in IoT Platforms**, *32th IEEE Computer Security Foundations Symposium*, Hoboken, USA.

Apr. 10, 2019 **Abstract Interpretation of Information Flows: A Sound Static Analyzer for Non-Interference**, *34th ACM/SIGAPP Symposium On Applied Computing*, Limassol, CY.

Aug. 30, 2018 **Verifying Bounded Subset-Closed Hyperproperties**, *25th Static Analysis International Symposium*, Freiburg im Breisgau, DE.

Sep. 1, 2017 **Hyperhierarchy of Semantics: A Formal Framework for Hyperproperties Verification**, *24th Static Analysis International Symposium*, New York, USA.

Publications (selected)

Articles in International Journals with Referee

TCS24 Behavioral Equivalences for AbU: Verifying Security and Safety in Distributed IoT Systems – *Pasqua M. and Miculan, M.* – In: *Theoretical Computer Science* (pp. 1–23), Elsevier, 2024

TCS23 AbU: A Calculus for Distributed Event-driven Programming with Attribute-based Interaction – *Pasqua M. and Miculan, M.* – In: *Theoretical Computer Science* (pp. 1–40), Elsevier, 2023

JSS23 Enhancing Ethereum smart-contracts static analysis by computing a precise Control-Flow Graph of Ethereum bytecode – *Pasqua M., Benini A., Contro F., Crosara M., Dalla Preda M. and Ceccato M.* – In: *Journal of Systems and Software* (pp. 1–18), Elsevier, 2023

STVR22 Automated Black-Box Testing of Nominal and Error Scenarios in RESTful APIs – *Corradini, D., Zampieri, A., Pasqua M., Viglianisi, E., Dallago, M. and Ceccato, M.* – In: *Software Testing, Verification and Reliability* (pp. 1–27), John Wiley & Sons, 2022 (to appear)

TOPS21 Friendly Fire: Cross-App Interactions in IoT Platforms – *Balliu, M., Merro, M., Pasqua M. and Shcherbakov, M.* – In: *ACM Trans. on Privacy and Security* (pp. 1–40), ACM Press, 2021

MSCS19 Semantics-based Software Watermarking by Abstract Interpretation – *Dalla Preda, M. and Pasqua, M.* – In: *Mathematical Structures in Computer Science* (pp. 339–388), Cambridge University Press, 2019

Articles in International Conferences with Referee

ICSE24 Hypertesting of Programs: Theoretical Foundation and Automated Test Generation – *Pasqua, M., Ceccato, M. and Tonella, P.* – In: *Proceedings of the 46th International Conference on Software Engineering* (pp. 1409–1420), ACM, 2024

ISSTA23 Enhancing REST API Testing with NLP Techniques – *Kim, M., Corradini, D., Pasqua, M., Ceccato, M., Orso, A., Sinha, S. and Tzoref-Brill, R.* – In: *Proceedings of the 32nd International Symposium on Software Testing and Analysis* (pp. 1232–1243), ACM, 2023

ICSE23 Automated Black-box Testing of Mass Assignment Vulnerabilities – *Corradini, D., Pasqua, M. and Ceccato, M.* – In: *Proceedings of the 45th International Conference on Software Engineering* (pp. 2553–2564), IEEE, 2023

SAC21 Verifying Opacity by Abstract Interpretation – *Mastroeni, I. and Pasqua, M.* – In: *Proceedings of the 36th SIGAPP Symposium On Applied Computing* (pp. 1–9), ACM, 2022 (to appear)

SEFM21 On the Security and Safety of AbU Systems – *Pasqua, M. and Marino, M.* – In: *Proceedings of the 19th International Conference on Software Engineering and Formal Methods* (pp. 178–198), Springer, 2021

ICSME21 Restats: A Test Coverage Tool for RESTful APIs – *Corradini, D., Zampieri, A., Pasqua, M. and Ceccato, M.* – In: *Proceedings of the 37th International Conference on Software Maintenance and Evolution* (pp. 594–598), IEEE, 2021

ICTAC21 A Calculus for Attribute-based Memory Updates – *Miculan, M. and Pasqua, M.* – In: *Proceedings of the 18th International Colloquium on Theoretical Aspects of Computing* (pp. 366–385), Springer, 2021

FormalISE20 Impact Analysis of Cyber-Physical Attacks on a Water Tank System via Statistical Model Checking – *Munteanu, A., Merro, M. and Pasqua, M.* – In: Proceedings of the 8th International Conference on Formal Methods in Software Engineering (pp. 34–43), ACM, 2020

CSF19 Securing Cross-App Interactions in IoT Platforms – *Balliu, M., Merro, M. and Pasqua, M.* – In: Proc. of the 32th Computer Security Foundations Symposium (pp. 319–334), IEEE, 2019

SAS18 Verifying Bounded Subset-Closed Hyperproperties – *Mastroeni, I. and Pasqua, M.* – In: Proc. of the 25th Static Analysis International Symposium (pp. 263–283), Springer, 2018

SAS17 Hyperhierarchy of Semantics: A Formal Framework for Hyperproperties Verification – *Mastroeni, I. and Pasqua, M.* – In: Proceedings of the 24th Static Analysis International Symposium (pp. 232–252), Springer, 2017

Other

2022–Today **Member of GRIN**, *Gruppo di Informatica*.

2019–Today **Member of ACM**, *Association for Computing Machinery*.

2019–2022 **Member of IEEE**, *Institute of Electrical and Electronic Engineers*.

2017–Today **Member of EATCS**, *European Association for Theoretical Computer Science*, Italian Chapter.

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Verona September 25, 2024

 Pasqua Michele