

# Michele Pasqua

## Short Academic Curriculum Vitæ

Via Cartiera 4  
S. G. Lupatoto (VR), 37057, Italy  
☎ (+39) 333 2450770  
✉ [michele.pasqua@univr.it](mailto:michele.pasqua@univr.it)  
🌐 <http://michelepasqua.github.io>  
📞 0000-0002-9475-4836



### 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

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## 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.

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## 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: “Muscope 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 “ASPR - 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.

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## Conference Talks (selected)

- Apr 17, 2024 **Hypertesting of Programs: Theoretical Foundation and Automated Test Generation**, *46<sup>th</sup> International Conference on Software Engineering*, Lisbon, PT.
- Oct 22, 2023 **Domain Precision in Galois Connection-less Abstract Interpretation**, *30<sup>th</sup> Static Analysis International Symposium*, Cascais, PT.
- May 25, 2023 **Static Analysis Properties as Program Hyperproperties**, *2<sup>nd</sup> Symposium on Challenges of Software Verification*, Venice, IT, (invited).

- Dec. 8, 2021 **On the Security and Safety of AbU Systems**, 19<sup>th</sup> International Conference on Software Engineering and Formal Methods, (virtual).
- Sep. 10, 2021 **A Calculus for Attribute-based Memory Updates**, 18<sup>th</sup> International Colloquium on Theoretical Aspects of Computing, Nur-Sultan, KZ (virtual).
- Jun. 27, 2019 **Securing Cross-App Interactions in IoT Platforms**, 32<sup>th</sup> IEEE Computer Security Foundations Symposium, Hoboken, USA.
- Apr. 10, 2019 **Abstract Interpretation of Information Flows: A Sound Static Analyzer for Non-Interference**, 34<sup>th</sup> ACM/SIGAPP Symposium On Applied Computing, Limassol, CY.
- Aug. 30, 2018 **Verifying Bounded Subset-Closed Hyperproperties**, 25<sup>th</sup> Static Analysis International Symposium, Freiburg im Breisgau, DE.
- Sep. 1, 2017 **Hyperhierarchy of Semantics: A Formal Framework for Hyperproperties Verification**, 24<sup>th</sup> 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 46<sup>th</sup> 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 32<sup>nd</sup> 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 45<sup>th</sup> 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 36<sup>th</sup> 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 19<sup>th</sup> 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 37<sup>th</sup> 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 18<sup>th</sup> 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 8<sup>th</sup> 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 32<sup>th</sup> Computer Security Foundations Symposium (pp. 319–334), IEEE, 2019
- SAS18 Verifying Bounded Subset-Closed Hyperproperties – *Mastroeni, I. and Pasqua, M.* – In: Proc. of the 25<sup>th</sup> 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 24<sup>th</sup> Static Analysis International Symposium (pp. 232–252), Springer, 2017

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## Other

- 2022–Today **Member of GRIN**, *Gruppo di Informatica*.
- 2019–Today **Member of ACM**, *Association for Computing Machinery*.
- 2019–2022 **Member di 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

