Luca **Negrini**

Assistant Professor (non-tenure) @ Ca' Foscari University of Venice

Nationality: Italian · Date of birth: 01/10/1993

Email | Homepage | GitHub | Linkedin | Twitter | Scholar | DBLP

Experience

Assistant Professor (non-tenure)

Venice, Italy

Università Ca' Foscari Venezia

Nov 2023 - present

Research topics: static analysis, multi-language analysis, abstract interpretation, software engineering.
Member of the SSV research group.

Research Fellow

Venice, Italy

Università Ca' Foscari Venezia

Jul 2023 - Oct 2023

Supervisor: Prof. Pietro Ferrara.
Research project: static analysis of robotic software by abstract interpretation, with the goal of extending the LiSA library for the analysis of such software based on ROS.
Member of the SSV research group.

Software Engineer & Research Scientist

Verona, Italy

Corvallis Srl (ex JuliaSoft Srl)

Apr 2018 - Jun 2023

Developer of the Julia Static Analyzer (now part of CodeSonar by CodeSecure): software development and engeneering in Java and C#, with smallller involvments in C, C++ and Python projects.
R&D team member, extending the analyzer to new language versions, new frameworks and libraries ([C1]), and improving its semantic analyses.
Research topics: static analysis of object oriented software, tools for static analysis, abstract interpretation.
Pre-sales and customer support teams member.

Education

PhD in Computer Science

Venice, Italy

Università Ca' Foscari Venezia

Sept 2019 - Jan 2023

Research topics: multilanguage static analysis, string analysis
Thesis title: "A generic framework for multilanguage analysis - Design of an abstract interpretation-based static analyzer"
Advisor: Prof. Agostino Cortesi
External reviewers: Prof. Peter Müller, Prof. Antoine Miné
Defence committee: Prof. Peter Müller, Prof. Pavel Laskov, Sebastiano Vascon, Ph.D.
Defended on: January 27th, 2023
Awarded with Summa cum laude

Master Degree in Computer Science

Verona, Italy

Università degli Studi di Verona

Sept 2015 - Mar 2018

Grade: 110/110 cum laude
Thesis title: "Automatic application splitting - Allowing abstract interpretation-based static analyzers to scale up to industrial software"
Advisor: Prof. Fausto Spoto
Co-advisor: Prof. Pietro Ferrara

Bachelor Degree in Computer Science

Verona, Italy

Università degli Studi di Verona

Sept 2012 - Mar 2016

Grade: 90/110

High School Diploma in Computer Science

Verona, Italy

ITIS Guglielmo Marconi

Sept 2007 - Jun 2012

Grade: 93/100

Internships

PhD Internship *Paris, France*

INRIA Paris, Team ANTIQUE *Jan 2022 - Mar 2022*

Research topics: static analysis for Data Science: analyzing JuPyter notebooks.
Advisor: Caterina Urban, Ph.D.

Master Internship *Verona, Italy*

JuliaSoft Srl *Sept 2017 - Feb 2018*

Research topics: scaling static analysis to industrial software.
Advisor: Pietro Ferrara, Ph.D.

Research Interests

My research interests are focused on the application of static analysis techniques based on rigorous mathematical frameworks to software, with particular attention to their industrial usefulness. I mostly work with the abstract interpretation framework, that achieves computability by over-approximating all possible program executions, enabling the design of sound analyses at the cost of false alarms. My work is centered around developing novel static analyses that can have an impact on industrial software.

Keywords: static analysis, abstract interpretation, program analysis, software engineering.

Publications

Journals

[J4] L. Olivieri, V. Arceri, B. Chachar, L. Negrini, F. Tagliaferro, F. Spoto, P. Ferrara, A. Cortesi, *"General-Purpose Languages for Blockchain Smart Contracts Development: A Comprehensive Study"*, In IEEE Access
DOI: 10.1109/ACCESS.2024.3495535

[J3] L. Olivieri, L. Negrini, V. Arceri, B. Chachar, P. Ferrara, A. Cortesi, *"Detection of Phantom Reads in Hyperledger Fabric"*, In IEEE Access
DOI: 10.1109/ACCESS.2024.3410019

[J2] L. Negrini, V. Arceri, A. Cortesi, P. Ferrara, *"Tarsis: An effective automata-based abstract domain for string analysis"*, In Journal of Software: Evolution and Processes
DOI: 10.1002/smr.2647

[J1] L. Olivieri, L. Negrini, V. Arceri, T. Jensen, F. Spoto, *"Design and Implementation of Static Analyses for Tezos Smart Contracts"*, In Distributed Ledger Technologies: Research and Practice
DOI: 10.1145/3643567

Book Chapters

[B1] L. Negrini, V. Arceri, P. Ferrara, A. Cortesi, *"LiSA: A Generic Framework for Multilanguage Static Analysis"*, In Challenges of Software Verification - Intelligent Systems Reference Library
DOI: 10.1007/978-981-19-9601-6_2

Conferences and Workshops

[C13] L. Negrini, S. Presotto, P. Ferrara, E. Zaffanella, A. Cortesi, *"Stability: an Abstract Domain for the Trend of Variation of Numerical Variables"*, In Proceedings of the 10^{th} ACM SIGPLAN International Workshop on Numerical and Symbolic Abstract Domains (NSAD 2024)
DOI: 10.1145/3689609.3689995

[C12] G. Zanatta, G. Caiazza, P. Ferrara, L. Negrini, R. White, *"Automating ROS2 Security Policies Extraction through Static Analysis"*, To appear in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2024)

[C11] V. Arceri, S. M. Merenda, G. Dolcetti, L. Negrini, L. Olivieri, E. Zaffanella, *"Towards a Sound Construction of EVM Bytecode Control-Flow Graphs"*, In Proceedings of the 26^{th} ACM International Workshop on Formal Techniques for Java-like Programs (FTfJP 2024)
DOI: 10.1145/3678721.3686227

[C10] G. Zanatta, P. Ferrara, T. Lisovenko, L. Negrini, G. Caiazza, R. White, *"Sound Static Analysis for Microservices: Utopia? A Preliminary Experience with LiSA"*, In Proceedings of the 26^{th} ACM International Workshop on Formal Techniques for Java-like Programs (FTfJP 2024)
DOI: 10.1145/3678721.3686229

[C9] L. Negrini, V. Arceri, L. Olivieri, A. Cortesi, P. Ferrara, *"Teaching Through Practice: Advanced Static Analysis with LiSA"*, In Formal Methods Teaching (FMTea 2024)
DOI: 10.1007/978-3-031-71379-8_3

[C8] L. Olivieri, L. Pasetto, L. Negrini, P. Ferrara, *"European Union Data Act and Blockchain Technology: Challenges and New Directions"*, In The 6th Distributed Ledger Technologies Workshop (DLT2024)
CEUR VOLUME: 3791

[C7] L. Negrini, G. Shabadi, C. Urban, *"Static Analysis of Data Transformations in Jupyter Notebooks"*, In Proceedings of the 12^{th} ACM SIGPLAN International Workshop on the State Of the Art in Program Analysis (SOAP 2023)
DOI: 10.1145/3589250.3596145

[C6] L. Olivieri, L. Negrini, V. Arceri, F. Tagliaferro, P. Ferrara, A. Cortesi, F. Spoto, *"Information Flow Analysis for Detecting Non-Determinism in Blockchain"*, In Proceedings of the 37^{th} European Conference on Object-Oriented Programming (ECOOP 2023)
DOI: 10.4230/LIPIcs.ECOOP.2023.23

[C5] L. Olivieri, T. Jensen, L. Negrini, F. Spoto, *"MichelsonLiSA: A Static Analyzer for Tezos"*, In 2023 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops) (BRAIN 2023)
DOI: 10.1109/PerComWorkshops56833.2023.10150247

[C4] L. Olivieri, F. Tagliaferro, V. Arceri, M. Ruaro, L. Negrini, A. Cortesi, P. Ferrara, F. Spoto, E. Tallin, *"Ensuring Determinism in Blockchain Software with GoLiSA: An Industrial Experience Report"*, In Proceedings of the 11^{th} ACM SIGPLAN International Workshop on the State Of the Art in Program Analysis (SOAP 2022)
DOI: 10.1145/3520313.3534658

[C3] P. Ferrara, L. Negrini, V. Arceri, A. Cortesi, *"Static analysis for dummies: experiencing LiSA"*, In Proceedings of the 10^{th} ACM SIGPLAN International Workshop on the State Of the Art in Program Analysis (SOAP 2021)
DOI: 10.1145/3460946.3464316

[C2] L.Negrini, V. Arceri, P. Ferrara, A. Cortesi, *"Twinning Automata and Regular Expressions for String Static Analysis"*, In Verification, Model Checking, and Abstract Interpretation (VMCAI 2021)
DOI: 10.1007/978-3-030-67067-2_13

[C1] P. Ferrara and L. Negrini, *"SARL: OO Framework Specification for Static Analysis"*, In Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE 2020)
DOI: 10.1007/978-3-030-63618-0_1

Extended Abstracts

[A1] L. Negrini, P. Ferrara, *"SARL: Framework Modeling for Static Analysis"*, In The 9^{th} Workshop on Tools for Automatic Program Analysis (TAPAS 2018)

PhD Thesis

[T1] L. Negrini, *"A generic framework for multilanguage analysis"*, In Ph.D. thesis, Università Ca' Foscari Venezia, January 27^{th}, 2023

Talks

Conferences and Workshops

22/10/2024 *"Stability: an Abstract Domain for the Trend of Variation of Numerical Variables"*, NSAD 2024, Pasadena, California, USA

10/09/2024 *"Teaching Through Practice: Advanced Static Analysis with LiSA"*, FMTea 2024, Milan, Italy

17/06/2023 *"Static Analysis of Data Transformations in Jupyter Notebooks"*, SOAP 2023, Orlando, FL, USA & Virtual conference

18/01/2021 *"Twinning Automata and Regular Expressions for String Static Analysis"*, VMCAI 2021, Virtual conference

20/07/2020 *"SARL: OO Framework Specification for Static Analysis"*, VSTTE 2020, Virtual conference

28/08/2018 *"SARL: Framework Modeling for Static Analysis"*, TAPAS 2018, Freiburg im Breisgau, Germany

Seminars

13/01/2025 *"Practical Abstract Interpretation with LiSA"*, Università degli Studi di Verona, Verona, Italy

15/06/2022 *"Using LiSA for analyzing an IoT network"*, Università Ca' Foscari Venezia, Online seminar

19/01/2022 *"Multi-language analysis with LiSA"*, INRIA Paris, Team ANTIQUE internal seminar

30/06/2021 *"Modular Multi-language analysis in LiSA"*, Università Ca' Foscari Venezia, Online seminar

Tutorial

06/09/2024 *"Getting started with LiSA"*, Lipari Summer School 2024, Lipari, Sicily, Italy
24/06/2024 *"Quick and dirty development of static analyses with LiSA"*, PLDI 2024, Copenhagen, Denmark

Teaching

2025 **Lecturer (48 hrs)**, Università Ca' Foscari Venezia, *"Informatica I - Mod. 2 (Laurea in Ingegneria Fisica)"*
2024 **Lecturer (10 hrs)**, Università Ca' Foscari Venezia, *"Static Analysis by Abstract Interpretation"*
2024 **Lecturer (48 hrs)**, Università Ca' Foscari Venezia, *"Informatica I - Mod. 2 (Laurea in Ingegneria Fisica)"*
2024 **Lectures (8 hrs), Online tutor**, Università Ca' Foscari Venezia, *"Software Correctness, Security and Reliability"*
2023 **Lectures (4 hrs), Online tutor**, Università Ca' Foscari Venezia, *"Software Correctness, Security and Reliability"*
2022 **Lectures (4 hrs), Online tutor**, Università Ca' Foscari Venezia, *"Software Correctness, Security and Reliability"*
2021/2022 **Lab tutor**, Università Ca' Foscari Venezia, *"Programmazione ad Oggetti - Mod. 1"*
2021 **Lectures (4 hrs), Online tutor**, Università Ca' Foscari Venezia, *"Software Correctness, Security and Reliability"*
2020 **Online tutor**, Università Ca' Foscari Venezia, *"Software Correctness, Security and Reliability"*

Community Service

PC Chair SOAP 2025
Guest Editor STTT Journal 2024
PC member NSAD 2024, VALID 2024, SOAP 2024, KSEM 2024, VALID 2023, VALID 2022, VALID 2021
AEC member OOPSLA 2025, PLDI 2024, SAS 2023, SAS 2022
Publicity chair Euro S& P 2025, Euro S& P 2024
Web chair CSV 2024, CSV 2023
Reviewer SCP Journal 2024, FTfJP 2024, CSV 2024, SCAM 2024, CSV 2023, SOAP 2023, ICCCI 2023

Projects

LiSA

As part of my PhD research project, I started the development of LiSA, together with the Software and System Verification group @ Ca' Foscari University of Venice, Italy. LiSA (Library for Static Analysis) eases the creation and implementation of static analyzers based on the Abstract Interpretation theory. LiSA provides an analysis engine that works on a generic and extensible control flow graph representation of the program to analyze. Abstract interpreters in LiSA are built for analyzing such representation, providing a unique analysis infrastructure for all the analyzers that will rely on it.

Building an analyzer upon LiSA boils down to writing a parser for the language that one aims to analyze, translating the source code or the compiled code towards the control flow graph representation of LiSA. Then, simple checks iterating over the results provided by the semantic analyses of LiSA can be easily defined to translate semantic information into warnings that can be of value for the final user.

LiSA is distributed under the MIT license, and is available on GitHub.

Tarsis

Tarsis is a new abstract domain for string values based on finite state automata. Standard finite state automata abstract domain has been shown to provide precise abstractions of string values when all the components of such strings are known, but with high computational cost. Instead of considering standard finite automata built over an alphabet of single characters, Tarsis considers automata that are built over an alphabet of strings, comprising a special value to represent statically unknown strings. Tarsis is maintained by the Software and System Verification group @ Ca' Foscari University of Venice, Italy, and it is available on GitHub.

Languages

Italian	Mother language
English	Intermediate spoken and written

Interests

Scientific	Program Verification, Static Analysis, Abstract Interpretation, Cybersecurity
Professional	Software Engineering, Software Development