



Vincenzo Arceri

ASSISTANT PROFESSOR (NO-TENURE)

University of Parma, Parco Area delle Scienze, 53/A, 43124 - Parma (PR), Italy

✉ vincenzo.arceri@unipr.it | 🌐 <https://vincenzoarceri.github.io/> | 📄 VincenzoArceri | 📺 vincenzo-arceri-923b7582 |
🐦 @ArceriVincenzo | 📧 Vincenzo Arceri | 📁 Vincenzo Arceri

Career

Assistant Professor (no-tenure track)

Parma, Italy

UNIVERSITY OF PARMA

From Sep. 2021

- Research: static analysis of blockchain smart contract written in Go, relational string analysis, static analysis of unsafe Rust, design and implementation of LiSA, a Library for Static Analysis
- Teaching: Fundamentals of Programming within the Computer Science B.Sc. in University of Parma (15 CFU, 120 hours of lectures, 1st year)

Postdoctoral Researcher

Venice, Italy

CA' FOSCARI UNIVERSITY OF VENICE

Sep. 2020 - Sep. 2021

- Research project: Development of a generic static analyzer for Go
- Project coordinator: Prof. Agostino Cortesi
- The goal of this research project is the study and the development of a parametric static analyzer based on abstract interpretation for Golang, within the context of smart contracts and Cosmos SDK decentralized applications. Within the FSE research project "Progetto, sviluppo e validazione di sistemi blockchain per l'e-commerce" 2120-0002-1463-2019 in collaboration with Corvallis S.p.a., Commerc.io S.r.l. and Alpenite S.r.l..
- Teaching: Introduction to coding and data management - Practice (module 2) within the Digital Management B.Sc. in University Ca' Foscari of Venice (10 hours of lectures, 1st year, academic year 2021-2022)

Postdoctoral Researcher

Venice, Italy

CA' FOSCARI UNIVERSITY OF VENICE

Sep. 2019 - Sep. 2020

- Research project: Software integrated framework for IoT applications in Smart Cities scenarios
- Project coordinator: Prof. Agostino Cortesi
- The objective of this research project was to study new formal techniques for static analysis of strings. In particular, the research work done during this period can be split in three main topics: measure the precision increment of existing non-relational string analysis for dynamic languages, study of the precision/efficiency trade-off new string analyses and the development of a generic framework for the generation of relational string analyses.

Education

University of Verona

Verona, Italy

PHD IN COMPUTER SCIENCE

Oct. 2016 - May 2020

Thesis: "Taming Strings in Dynamic Languages - An Abstract Interpretation-based Static Analysis Approach".
Advisor: Prof. Isabella Mastroeni
External Reviewers: Prof. Sergio Maffei and Prof. Xavier Rival
Defence committee members: Prof. Roberto Bruni, Prof. Sergio Maffei, Prof. Isabella Mastroeni
Defended: 18 May 2020

University of Verona

Verona, Italy

MASTER DEGREE IN COMPUTER SCIENCE

Oct. 2014 - Jul. 2016

Grade: 110/110 cum laude
Subject: "PHP Type Static Analysis by Abstract Interpretation".
Advisor: Prof. Isabella Mastroeni

University of Verona

Verona, Italy

BACHELOR DEGREE IN COMPUTER SCIENCE

Oct. 2011 - Jul. 2014

Grade: 105/110
Thesis: Una tecnica di analisi semantica per JavaScript: la separation logic
Advisor: Prof. Isabella Mastroeni

Research Interests

My research interests are focused on the application of the abstract interpretation framework for improving the security, reliability and correctness of software by means of sound static program analysis.

Currently, my main research activities include the design and development of new static analyses for general-purpose

language blockchain applications, the formalization and development of new relational string analyses, with a focus on dynamic languages such as JavaScript, and the development of static analyzers of modern programming languages such as Go and Rust. Moreover, I am particularly interested in improving the classical approach adopted in static analysis via abstract interpretation, both from the precision and performance point of view.

Keywords: abstract interpretation, static analysis, dynamic languages, software engineering, program verification

Publications

JOURNALS

- [j4]** V. Arceri, M. Olliaro, A. Cortesi, I. Mastroeni: “*Completeness of String Analysis for Dynamic Languages*”, Information and Computation 104791, 2021
- [j3]** V. Arceri, I. Mastroeni: “*Analyzing Dynamic Code: A Sound Abstract Interpreter for evil eval*”, ACM Transactions on Privacy and Security (TOPS) Volume 24, Number 2, 2021
- [j2]** V. Arceri, I. Mastroeni, S. Xu: “*Static Analysis for ECMAScript String Manipulation Programs*”, Applied Science, 2020, 10(10), 3525, 2020
- [j1]** V. Arceri, S. Maffei: “*Abstract Domains for Type Juggling*”, Electronic Notes in Theoretical Computer Science, Volume 331, 41-55, 2017

INTERNATIONAL CONFERENCES AND WORKSHOPS

- [c7]** L. Olivieri, F. Tagliaferro, V. Arceri, M. Ruaro, L. Negrini, A. Cortesi, P. Ferrara, F. Spoto, E. Talin: “*Ensuring Determinism in Blockchain Software with GoLiSA: An Industrial Experience Report*”, 11th ACM SIGPLAN International Workshop on the State of the Art in Program Analysis (SOAP 2022)
- [c6]** V. Arceri, M. Olliaro, A. Cortesi, P. Ferrara: “*Relational String Abstract Domains*”, Proceedings of the 23th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2022)
- [c5]** P. Ferrara, L. Negrini, V. Arceri, A. Cortesi: “*Static Analysis for Dummies: Experiencing LiSA*”, 10th ACM SIGPLAN International Workshop on the State of the Art in Program Analysis (SOAP 2021)
- [c4]** I. Mastroeni, V. Arceri: “*Improving Dynamic Code Analysis by Code Abstraction*”, Proceedings of 9th International Workshop on Verification and Program Transformation (VPT 2021)
- [c5]** L. Negrini, V. Arceri, P. Ferrara, A. Cortesi: “*Twinning Automata and Regular Expressions for String Static Analysis*”, Proceedings of the 22th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2021)
- [c4]** V. Arceri, I. Mastroeni: “*A Sound Abstract Interpreter for Dynamic Code*”, Proceedings of 35th ACM/SIGAPP Symposium On Applied Computing (SAC 2020)
- [c3]** V. Arceri, M. Pasqua, I. Mastroeni: “*An Abstract Domain for Objects in Dynamic Programming Languages*”, Proceedings of 8th International Workshop on Numerical and Symbolic Abstract Domains (NSAD 2019)
- [c2]** V. Arceri, M. Olliaro, A. Cortesi, I. Mastroeni: “*Completeness of Abstract Domains for String Analysis of JavaScript Programs*”, Proceedings of 16th International Colloquium of Theoretical Aspects of Computing (ICTAC 2019)
- [c1]** V. Arceri, I. Mastroeni: “*Static Program Analysis for String Manipulation Languages*”, Proceedings of 6th International Workshop on Numerical and Symbolic Abstract Domains (NSAD 2016)

THESIS

- [Arc2020]** V. Arceri: “*Taming Strings in Dynamic Languages – An Abstract Interpretation-based Static Analysis Approach*”, PhD thesis defended at University of Verona on May 18nd, 2020

Community Service

- 2022 **Program Chair**, CSV 2022, Challenges of Software Verification workshop, organized on the occasion of the award ceremony of the Doctorate Honoris Causa in Computer Science at Ca' Foscari University of Venice to Professor Patrick Cousot.
- 2022 **Reviewer**, SAS 2022, 29th Static Analysis Symposium
- 2022 **Artifact Evaluation Committee member**, SAS 2022, 29th Static Analysis Symposium
- 2022 **Reviewer**, CISIM 2022, 21th International Conference on Computer Information Systems and Industrial Management Applications
- 2022 **Program Committee member**, VALID 2022, 14th International Conference on Advances in System Testing and Validation Lifecycle
- 2022 **Session Chair**, VMCAI 2022, 23rd International Conference on Verification, Model Checking, and Abstract Interpretation (Privacy & Security track)
- 2021 **Program Committee member**, VALID 2021, 13th International Conference on Advances in System Testing and Validation Lifecycle
- 2019 **Reviewer**, VALID 2019, 11th International Conference on Advances in System Testing and Validation Lifecycle
- 2018 **Reviewer**, ESOP 2018, 27th European Symposium on Programming
- 2016 **Reviewer**, SSPREW 2016, 6th Software Security, Protection, and Reverse Engineering Workshop

Reviewer for the following journals: **JNCA**, Journal of Network and Computer Applications (2021).

Grants

Technical head, “BIOCHAIN-AI: a platform for securely sharing and analysing microbiological data”

Eur 12'000

UNIVERSITY OF PARMA

From Jul. 2022

Project leader: Prof. Vincenzo Bonnici. This project aims at providing a prototype platform for managing biological knowledge, in particular data regarding microbial species, to be used by a consortium of public and private entities having the need of sharing their data and integrating their knowledge for gaining advantages by federated machine learning analyses. Members of the consortium share data under specific law agreements that must be traced in the digital world. For this reason, the proposed system relies on a blockchain-based security layer, able to immutably store the transaction history by all the member of the consortium.

Institutional Responsibilities

- From Nov. 2021 **Responsible for students orientation**, Responsible for the prospective students' orientation and outgoing guidance for the Computer Science Bachelor and Master Degrees Programme in Computer Science *University of Parma*
- From Nov. 2021 **PLS Coordinator**, Coordinator of the PLS (Piano Lauree Scientifiche) programme for Computer Science *University of Parma*
- From Feb. 2022 **Ragazze Digitali Parma 2022 Scientific Head**, Scientific head of Ragazze Digitali Parma 2022, a three weeks summer camp on programming dedicated to women high school students, with the aim of facing the digital gender gaps *University of Parma*
- From Nov. 2021 **Member**, Teaching committee, Bachelor Degree Programme in Computer Science *University of Parma*
- From Nov. 2021 **Member**, Teaching committee, Master Degree Programme in Computer Science *University of Parma*

Internships

UROP Trainee

London, United Kingdom

IMPERIAL COLLEGE LONDON

Jun. 2016 - Sep. 2016

Undergraduate Research Opportunities Programme
Static analysis of PHP type juggling
Advisor: Prof. Sergio Maffei

Temporary Research Fellow

Verona, Italy

UNIVERSITY OF VERONA

Dec. 2015 - Feb. 2016

Static analysis by abstract for μ PHP, an imperative core of PHP, with \mathbb{K} framework
Advisor: Prof. Isabella Mastroeni

Tools and Software

LiSA: a Library for Static Analysis

From Sep. 2020

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 maintained by the Software and System Verification group @ Ca' Foscari University of Venice, Italy, and it is distributed under the MIT license, and it is available on GitHub (<https://github.com/UniVE-SSV/lisa>).

Tarsis: an improved finite-state automata-based string abstract domain

From Mar. 2020

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 (<https://github.com/UniVE-SSV/tarsis>).

Talks

INTERNATIONAL CONFERENCES AND WORKSHOPS

- Jan. 2022** Relational String Abstract Domains, 23th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI 2022, Philadelphia, US
- Jun. 2021** Static Analysis for Dummies: Experiencing LiSA, 10th ACM SIGPLAN International Workshop on the State of the Art in Program Analysis, online
- May 2020** Taming Strings in Dynamic Languages – An Abstract Interpretation-based Static Analysis Approach, PhD Defence, University of Verona, Verona, Italy
- Mar. 2020** A Sound Abstract Interpreter for Dynamic Code, 35th ACM/SIGAPP Symposium on Applied Computing, SAC 2020, Brno, Czech Republic (online)
- Nov. 2019** Completeness of Abstract Domains for String Analysis of JavaScript Programs, 16th International Colloquium on Theoretical Aspects of Computing, ICTAC 2019, Hammamet, Tunisia
- Mar. 2019** Static Program Analysis for String Manipulation Languages, 7th International Workshop on Verification and Program Transformation, VPT 2019, Genova, Italy
- Sep. 2016** Abstract Domains for Type Juggling, 6th Numerical and Symbolic Abstract Domains Workshop, NSAD 2016, Edinburgh, Scotland

OTHERS

- Feb. 2021** Applicazioni di blockchain e smart contract per i settori produttivi, Pallades (Palestre e laboratori avanzati per la digitalizzazione dell'economia e della società) course - POR FESR Regione Veneto (online)

Teaching

- Sep. 2022 **Lecturer**, Fundamentals of Programming within the Computer Science B.Sc. in University of Parma (academic year 2022-2023). 120 hours of lectures. *University of Parma*
- April 2022 **Lecturer**, Introduction to LiSA (Library for Static Analysis) and implementation of non-relation abstract domains. Within the PhD course "A Guided Tour to Static Program Analysis: State-of-the-Art Tools and Techniques", promoted by the Indian Education Ministry, Global Initiative of Academic Networks (GIAN - <https://gian.iitkgp.ac.in/>). Online. 2 hours of lectures. *Patna, India*

Jan. 2022	Lectures , Big data analytics e predictive maintenance. Training course for ACMI S.p.A.. 24 hours of lectures.	<i>University of Parma</i>
Sep. 2021	Lecturer , Fundamentals of Programming within the Computer Science B.Sc. in University of Parma (academic year 2021-2022). 112 hours of lectures.	<i>University of Parma</i>
Dec. 2021	Lectures , Introduction to LiSA (Library for Static Analysis) and implementation of non-relation abstract domains. Within the "Foundations of software analysis and verification" Master course, University of Verona, Prof. Isabella Mastroeni. 4 hours of lectures.	<i>University of Verona</i>
Mar. 2021	Lecturer , Introduction to coding and data management - Practice (module 2) within the Digital Management B.Sc. in University Ca' Foscari of Venice (academic year 2020-2021). 10 hours of lectures.	<i>Ca' Foscari University of Venice</i>
Feb. 2021	Lectures , Introduction to LiSA (Library for Static Analysis). Within the "Software correctness, security, and reliability" Master course in the Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University of Venice, Prof. Agostino Cortesi. 2 hours of lectures.	<i>Ca' Foscari University of Venice</i>
Gen. 2021	Lectures , Introduction to LiSA (Library for Static Analysis) and implementation of non-relation abstract domains. Within the "Foundations of software analysis and verification" Master course, University of Verona, Prof. Isabella Mastroeni. 2 hours of lectures	<i>University of Verona</i>
Oct. 2018	Teaching Assistant , Teaching assistant for the "Logics" Bachelor course in the Computer Science B.Sc. in Department of Computer Science, University of Verona, Italy	<i>University of Verona</i>
Oct. 2017	Teaching Assistant , Teaching assistant for the "Programming Languages" and "Logics" Bachelor courses in the Computer Science B.Sc. in Department of Computer Science, University of Verona, Italy	<i>University of Verona</i>
Oct. 2016	Teaching Assistant , Teaching assistant for the "Foundations of Computing" and "Logics" Bachelor courses in the Computer Science B.Sc. in Department of Computer Science, University of Verona, Italy	<i>University of Verona</i>
Gen. 2016	Lectures , Introduction to \mathbb{K} Framework and implementation of an imperative, functional and concurrent language. Within the "Foundations of Computing (Module: Languages)" Master course in the Department of Computer Science, University of Verona, Prof. Massimo Merro. 6 hours of lectures.	<i>University of Verona</i>
Oct. 2015	Teaching Assistant , Teaching assistant for the "Foundations of Computing" Bachelor course in the Computer Science B.Sc. in Department of Computer Science, University of Verona, Italy	<i>University of Verona</i>
Oct. 2014	Teaching Assistant , Teaching assistant for the "Foundations of Computing" Bachelor course in the Computer Science B.Sc. in Department of Computer Science, University of Verona, Italy	<i>University of Verona</i>

Student Supervision

Jun. 2022	Supervisor , Bachelor thesis of Lisandro Covanti ("Design and development of API for the integration and usage of a vending machine"), 89/110	<i>University of Parma, Italy</i>
Mar. 2021	Co-supervisor , Bachelor thesis of Marco Tubia on the development of a Java frontend for LiSA. Supervisor: Prof. Agostino Cortesi	<i>Ca' Foscari University of Venice, Italy</i>
Mar. 2021	Co-supervisor , Bachelor thesis of Nicolò Barbato on the development of a Python frontend for LiSA. Supervisor: Prof. Agostino Cortesi	<i>Ca' Foscari University of Venice, Italy</i>
Mar. 2021	Co-supervisor , Master thesis of Sunyi Xu ("Static analysis of ECMAScript string manipulation operations"), 110/110 cum laude. Supervisor: Prof. Isabella Mastroeni	<i>University of Verona, Italy</i>
Mar. 2020	Co-supervisor , Master thesis of Gabriele Centurino on existing static analyzers of Solidity smart contracts, 103/110. Supervisor: Prof. Isabella Mastroeni	<i>University of Verona, Italy</i>
Mar. 2020	Co-supervisor , Master thesis of Diego Comencini ("JOE, a complete toolchain for the detection and classification of obfuscated JavaScript malware"), 110/110 cum laude. Supervisor: Prof. Isabella Mastroeni	<i>University of Verona, Italy</i>

Jul. 2019	Co-supervisor , Bachelor thesis of Marco Crosara (“Analyzing string operations for dynamic languages”, 110/110 cum laude) Supervisor: Prof. Isabella Mastroeni	<i>University of Verona, Italy</i>
Jul. 2019	Co-supervisor , Bachelor thesis of Sunyi Xu (“Analyzing string operations for dynamic languages”, 110/110 cum laude) Supervisor: Prof. Isabella Mastroeni	<i>University of Verona, Italy</i>
Jul. 2019	Co-supervisor , Bachelor thesis of Massimiliano Incudini (“Implementazione di un tool di analisi statica tramite interpretazione astratta per Javascript”, 110/110 cum laude) Supervisor: Prof. Isabella Mastroeni	<i>University of Verona, Italy</i>
Jul. 2016	Co-supervisor , Bachelor thesis of Matteo Bonafini (“Implicit Taint analysis nella rilevazione di off-path packet injection”, 110/110 cum laude) Supervisor: Prof. Isabella Mastroeni	<i>University of Verona, Italy</i>

References

Agostino Cortesi (cortesi@unive.it) , Full Professor at the Department of Environmental Sciences, Informatics and Statistics	<i>Ca' Foscari University, Italy</i>
Isabella Mastroeni (isabella.mastroeni@univr.it) , Associate Professor at the Department of Computer Science	<i>University of Verona, Italy</i>
Sergio Maffei (sergio.maffei@doc.ic.ac.uk) , Associate Professor at the Department of Computing	<i>Imperial College, London, UK</i>
Pietro Ferrara (pietro.ferrara@unive.it) , Assistant Professor at the Department of Environmental Sciences, Informatics and Statistics	<i>Ca' Foscari University, Italy</i>