

Saverio Mattia Merenda

MASTER'S STUDENT

Reggio Emilia - Parma, Italy

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Education

University of Parma

M.S. IN COMPUTER SCIENCE, EXPECTED GRADUATION YEAR: JULY 2026

Parma, Italy

From Sep. 2024

- Topics: **Software Security, Quantum Computing, Machine Learning & AI, Compilers.**

University of Parma

B.S. IN COMPUTER SCIENCE, GRADE: 108/110

Parma, Italy

Sep. 2021 - Jul. 2024

- Thesis Title: *Construction of complete Control-Flow Graphs for bytecode EVM.*
- Best Marks: **Calculus, Programming, Algorithms & DS, Cloud Administration, Database, AI, HPC.**
- Got different ERGO scholarships which are given to promising students in Unipr.

Experience

University of Parma

RESEARCHER AND SOFTWARE DEVELOPER

Parma, Italy

From Jan. 2025

- **Development of xEVMLiSA:** Currently working on the early stages of xEVMLiSA, a project aimed at expanding EVMLiSA to analyze smart contracts across multiple blockchains (cross-chain).

University of Parma

TEACHING ASSISTANT AND TUTOR

Parma, Italy

From Sep. 2024

- Teaching Assistant and Tutor for the "Fondamenti di Programmazione A + B (15 CFU)" bachelor course in the Computer Science degree.

University of Parma - Internship

RESEARCHER AND SOFTWARE DEVELOPER

Parma, Italy

Sep. 2023 - Jan. 2025

- **Development of EVMLiSA:** Contributed significantly to the development of EVMLiSA, a static analyzer based on LiSA (Library for Static Analysis) that uses abstract interpretation to analyze Ethereum smart contracts. Its main goal is to build sound Control-Flow Graphs (CFGs) to support the creation of checkers for detecting vulnerabilities (such as reentrancy, randomness dependency, ecc.). Several checkers have been designed and implemented to enhance the analysis of potential security issues.
- **In-depth study of Static Analysis and Abstract Interpretation:** Gained in-depth knowledge of static analysis and abstract interpretation, providing the theoretical foundation necessary for contributing to EVMLiSA.
- **Thoroughly study of design patterns for software development:** Learned and applied key design patterns and software frameworks to develop reliable and scalable applications, later integrating them into EVMLiSA to enhance its architecture and maintainability.

HeliopsyLab

SOFTWARE DEVELOPER

Reggio Emilia, Italy

Jan. 2021 - Sep. 2021

- Developed and implemented cutting-edge management software for hospital facilities in the Lazio and Lombardia regions, streamlining operations and reducing administrative inefficiencies by 15%.
- Advanced new features within the Picasso and Mirth integration software, enhancing its capabilities and functionality.

Pico srl

SOFTWARE DEVELOPER

Reggio Emilia, Italy

May. 2019 - Jul. 2019

- Engineered a user-friendly application for efficient management of diverse user profiles within a database. Enhanced security measures and optimized the existing system for improved performance.
- Designed an algorithm to construct a wizard-style exam, streamlining the assessment process for a more user-friendly experience.

Publications

2024 **FTfJP@ISSTA/ECOOP 2024**, V. Arceri, S. M. Merenda, G. Dolcetti, L. Negrini, L. Olivieri, E. Zaffanella:
"Towards a Sound Construction of EVM Bytecode Control-flow Graphs". (doi: 10.1145/3678721.3686227)

Talks

INTERNATIONAL CONFERANCES AND WORKSHOP

2024 **Towards a Sound Construction of EVM Bytecode Control-flow Graphs**, 26th International Workshop on Formal Techniques for Java-like Programs, FTfJP 2024. [slides]

Vienna, Austria

Research Projects

Research Participant, "LLMs Meet Static Analysis: improving quality and reliability of AI-generated code"

Parma, Italy

ISCRA PROJECT (CLASS C), CINECA

2024

The goal of the project is to conduct an extensive quality and safety evaluation of the code generated with some of the most popular and open-source LLMs employing static analyzers, that can detect vulnerabilities and run-time errors statically, without executing the code. Once this information is available, it will be included in the code-generation task, to guide the LLM itself to produce a more precise and safe output, in which static analysis is somehow introduced in the pipeline of the code-generation task.

Tools and Software

EVMLiSA: an abstract interpretation-based static analyzer for EVM bytecode

JAVA, GRADLE

From Sep. 2023

EVMLiSA is a specific implementation of a static analyzer using the LiSA (Library for Static Analysis) library to conduct static analysis of Ethereum Virtual Machine (EVM) bytecode. In particular, it is dedicated to generate a sound Control-Flow Graph (CFG) of smart contracts deployed on the Ethereum blockchain. EVMLiSA's primary objective is to provide semantic information and valuable warnings for developers and security auditors. EVMLiSA is distributed under the MIT license, and it is available on GitHub (github.com/lisa-analyzer/evm-lisa).

Events

2024 **Student**, Lipari Summer School on Abstract Interpretation. [\[link\]](#)

Lipari, Italy

2024 **Conference participant**, CSV 2024, 3rd Challenges of Software Verification Symposium 2024. [\[link\]](#)

Venice, Italy

Academic Activity

Quantum Portfolio Optimization

PYTHON

2025

- Explored quantum computing approaches to portfolio optimization, leveraging QAOA and VQE to solve Quadratic Unconstrained Binary Optimization (QUBO) problems.
- Designed and implemented simulations using Qiskit to evaluate algorithm performance under noiseless and noisy conditions.
- Highlighted quantum computing's potential for finance and the limitations imposed by current hardware.
- Source Code: github.com/merendamattia/quantum-portfolio-optimization

Optimization of Academic Guarantors: a Declarative Approach

ASP, PYTHON

2024

- Designed an automated system for assigning academic guarantors to university courses, adhering to complex ministerial regulations.
- Developed a robust data preprocessing pipeline and implemented the solution using Answer Set Programming (ASP) to dynamically optimize resource allocation.
- Ensured scalability across various datasets, reducing reliance on external contracted staff while meeting institutional and regulatory requirements.
- Source Code: github.com/merendamattia/ottimizzazione-garanti-accademici

Deep Neural Network

C++, PYTHON

2024

- The DNN (Deep Neural Network) project is designed to create a neural network framework in C++ and it provides tools to define, train, and evaluate neural network models.
- This project enables training neural networks using backpropagation and gradient descent algorithms. Users can specify network architectures, activation functions, and training parameters. Additionally, it offers features for loading and saving trained models.
- Source Code: github.com/unipr-org/deep-neural-network

Extracurricular Activity

My-gpt4

PYTHON

2023

- Crafted a cutting-edge Python integration leveraging multiple reverse-engineered language-model APIs, contributing to the decentralization of the AI industry.
- Source Code: github.com/merendamattia/my-gpt4

Tracking Messages on Bitcoin Blockchain using OP-RETURN field

JS, HTML

2022

- Devised an innovative algorithm to securely trace immutably written messages within the Bitcoin blockchain, utilizing transaction hashes for enhanced transparency.
- Demo: merendamattia.com/dev/btc/tracking/
- Source Code: github.com/merendamattia/op-return-tracking-message-bitcoin

Development of Various Bots

PYTHON, JS

From 2021

- Developed a sophisticated bot designed to navigate financial markets, employing strategic approaches to optimize profits while minimizing potential losses.
- Customized Telegram bots designed for personal optimization, streamlining and enhancing my daily routine.