



# Giacomo Boldini

PHD STUDENT

Visano (BS), Italy

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## About Me

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I am a PhD student in Computer Science focusing on static analysis, abstract interpretation, and program verification, with applications to low-level languages (in particular, LLVM-IR). My works (academic/personal/small-team) span topics such as parallel computing, GPU programming, AI applied to source code analysis, and web development for small to mid-sized websites. As an Arduino/ESP32/self-hosting enthusiast, I enjoy working on DIY projects, exploring embedded systems, and delving into network systems.

## Education

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### PhD in Computer Science

CA' FOSCARI UNIVERSITY OF VENICE

Venice, Italy

2023 - On Going

- Research theme: Static Analysis approaches for improving critical Software Engineering.
- Supervisor: Pietro Ferrara.
- Member of the Software and System Verification (SSV) research group.

### M.Sc. in Computer Science

Parma, Italy

UNIVERSITY OF PARMA

2020 - 2023

- Grade: 110/110 cum laude.
- Thesis: Source code clustering via explainable code similarity based on control flow graph features.

### B.Sc. in Computer Science

Parma, Italy

UNIVERSITY OF PARMA

2016 - 2019

- Grade: 105/110.
- Thesis: DualSPHysics code profiling with Intel Compiler.

### Industrial-Technical High School Diploma in Computer Science

Remedello, Italy

M.R. PADRE GIOVANNI BONSIGNORI

2011 - 2016

- Grade: 85/100.

## Experience

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### Software Engineer Intern

Saarbrücken, Germany

Sep. 2025 - Nov. 2025

ABSINT ANGEWANDTE INFORMATIK GMBH

- Designed and implemented a pre-analysis module in RuleChecker to detect persistent side effects in C++ code.
- Developed a top-down Clang AST visitor in C++ to extract semantic information from program syntax, supporting MISRA C++ rule checking.
- Integrated the analyses with unit tests and small benchmarks to validate detection accuracy.
- Collaborated with the development team (approximately 20 people) through weekly meetings and technical discussions.

### Substitute Teacher

Remedello, Italy

Mar. 2024 - Apr. 2024

ISTITUTO OMNICOMPENSIVO BONSIGNORI

- Substitute teacher for a full position (18 hours) in Computer Science and Technology Laboratories at a technical high school (secondary level).
- Taught the following subjects: Tecnologie Informatiche (first biennium), Sistemi e Reti, Gestione di progetto e organizzazione di impresa, Tecnologie e Progettazione di Sistemi Informatici e Telecomunicazioni (second triennium).

### Intern (Curricular)

Parma, Italy

Sep. 2022 - Mar. 2023

UNIVERSITY OF PARMA

- Designed and implemented explainable machine learning methodologies in the context of source code similarity.
- Developed a graph representation based on Control-flow Graph and LLVM-IR generated by Clang, with subsequent feature generation through graph indexing tools.
- Performed similarity search using artificial intelligence techniques, including clustering and classification.
- Worked in a team of 4, and presented results at the 9th International Conference on Machine Learning, Optimization, and Data Science (LOD 2023).

## Research Fellow

UNIVERSITY OF PARMA

Parma, Italy

Jan. 2022 - Jul. 2023

- Research theme: Implementation of parallel algorithms on GPU (transl.)
- Researched and implemented a new algorithm for NVIDIA GPUs (CUDA/C++) for computing eigenvalues and eigenvectors of small symmetric, positive semidefinite matrices.
- Studied and utilized Tensor Core architecture of NVIDIA GPUs for reimplementations of proprietary numerical computation algorithms.
- Implemented two ad-hoc solutions with CUDA/C++ to improve performance, achieving a speedup of x2N in execution time for matrix diagonalization.

## Intern (Curricular)

UNIVERSITY OF PARMA

Parma, Italy

Jul. 2019 - Dec. 2019

- Studied and profiled C++ code for hydrodynamic simulation (dualSPHysics) using Intel® compiler and Intel® Parallel Studio suite.
- Optimized and parallelized part of the code with OpenMP API to leverage SIMD vector architecture of Intel® processors.
- Achieved a 3x improvement in execution time for the parallelized solution.

## Web Developer

FREELANCE/SMALL GROUP OF PEOPLE

Various Locations, Italy

2016 - 2021

- Designed and implemented websites (showcase sites and small e-commerce) for acquaintances and local small businesses.
- Used technologies such as HTML, CSS, Javascript, PHP, SQL, Bootstrap framework, and Wordpress CMS.
- Managed web domains and hosting, and designed website structure and graphical interfaces.
- Created and managed small databases for the websites.

## Skills

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**Software Dev** C++, C, Java, HTML, CUDA, SQL, Python, Prolog (base), MATLAB (base), LLVM-IR

**Web Dev** HTML, CSS, JavaScript, PHP

**Systems and Tools** Windows, Linux/Ubuntu, Arduino, FPGA (base), NVIDIA GPU, LaTeX, Microsoft Office, LLVM, Git (base), LLVM/Clang

**Driving Licences** Motorbikes: AM (EU/IT), Cars: B (EU/IT)

**Languages** Italian (Mother Tongue), English (B2)

## Publications

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**G. Boldini, A. Diana, V. Arceri, V. Bonnici, and R. Bagnara,** "A Machine Learning Approach for Source Code

[2024] *Similarity via Graph-Focused Features*, in Machine Learning, Optimization, and Data Science, 2024, pp.

53–67. DOI: 10.1007/978-3-031-53969-5\_5

## Teaching

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### Teaching Assistant

Ca' Foscari University of Venice

COMPUTER NETWORKS (CT0373) COURSE IN COMPUTER SCIENCE B.Sc.

Nov. 2024 - Feb. 2025

- 30 hours of work.
- Assisted professor in documentation setup and building a network simulator.

## Research Community Activities

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### Artifact Evaluation for the International Conference on Software Language Engineering (SLE 2025)

Remote - Event in Koblenz, Germany

COMMITTEE MEMBER

2025

- Artifact evaluation details link.

### Artifact Evaluation for the Static Analysis Symposium (SAS 2025)

Remote - Event in Singapore

COMMITTEE MEMBER

2025

- Committee details link.

### Lipari Summer School on Abstract Interpretation (ABSINT24)

Lipari, Italy

ATTENDEE

01/09/2024 - 07/09/2024

- ABSINT24 program link.

### PLDI24 + Programming Languages Mentoring Workshop (PLMW)

Copenhagen, Denmark

ATTENDEE

24/06/2024 - 28/06/2024

- PLMW program link and PLDI24 program link.

# Challenges of Software Verification Symposium 2024 (CSV24)

ATTENDEE AND SESSION CHAIR

- CSV24 program link.

Venice, Italy

06/06/2024 – 07/06/2024

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