Giacomo **Boldini**

PHD STUDENT

Visano (BS), Italy

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About Me

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

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
UNIVERSITY OF PARMA

Parma, Italy

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
UNIVERSITY OF PARMA

Parma, Italy

2016 - 2019

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

Industrial-Technical High School Diploma in Computer Science
M.R. PADRE GIOVANNI BONSIGNORI

Remedello, Italy

2011 - 2016

- Grade: 85/100.

Experience

Substitute Teacher
ISTITUTO OMNICOMPRENSIVO BONSIGNORI

Remedello, Italy

Mar. 2024 - Apr. 2024

- 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).

Curricular Internship
UNIVERSITY OF PARMA

Parma, Italy

Sep. 2022 - Mar. 2023

- 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 reimplementation 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.

Curricular Internship
Parma, Italy

UNIVERSITY OF PARMA
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
Various Locations, Italy

FREELANCE/SMALL GROUP OF PEOPLE
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

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

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

[2024]

Teaching

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

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)
Venice, Italy

ATTENDEE AND SESSION CHAIR
06/06/2024 – 07/06/2024

- CSV24 program link.

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