

Federico Gavioli

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EXPERIENCE

PhD Student

01/11/2024 – Present

High Performance Real-Time Lab - University of Modena and Reggio Emilia

Modena, Italy

- PhD Student in the Computer and Data Science for Technological and Social Innovation course

Curricular internship

01/06/2024 – 18/09/2024

High Performance Real-Time Lab - University of Modena and Reggio Emilia

Modena, Italy

- Design and development of a 3D LiDAR odometry hardware accelerator on embedded FPGAs

Research collaborator

01/03/2021 – 31/08/2021

Hipert SRL, in collaboration with AMD/Xilinx

Modena, Italy

- Exploratory study on low-overhead PL-assisted inter-VM communication for hypervised Linux-based hosts

Junior Researcher

31/09/2020 – 31/05/2024

High Performance Real-Time Lab - University of Modena and Reggio Emilia

Modena, Italy

- Junior researcher on reconfigurable embedded systems, with a focus on autonomous driving applications
- Member of the HiPeRT Modena Roboracer team and maintainer of the Thundershot project

Tutor of Computer Architectures

01/03/2022 – 31/05/2022, 01/03/2025 – 31/05/2025

University of Modena and Reggio Emilia

Modena, Italy

- Tutor for the "Computer Architectures" class of the Bachelor's degree in Computer Science
- Practical lectures on laboratory exercises to consolidate the concepts learned during the course lectures.

Curricular internship

15/07/2019 – 07/04/2020

High Performance Real-Time Lab - University of Modena and Reggio Emilia

Modena, Italy

- Design and development of a scaled (1:10) autonomous vehicle based on reconfigurable plaforms (FPGA)

EDUCATION

Master of Sciences in Computer Science - Informatica [LM-18]

15/09/2020 – 18/09/2024

University of Modena and Reggio Emilia

Modena, Italy

Bachelor of Sciences in Computer Science

15/09/2016 – 07/04/2020

University of Modena and Reggio Emilia

Modena, Italy

PROJECTS

Thundershot – The Zynq-based autonomous racecar

C/C++, Autonomous Racing, FPGA, Linux

- Lead developer and maintainer for the Thundershot project: a scaled autonomous driving prototype leveraging heterogeneous FPGAs. Source Code: https://github.com/HiPeRT/unimore_roboracer

Dynamic Thread Adjustment Runtime

C/C++, Linux

- Development of a hyperparameter/thread count adjustment system
- Dynamically adapts application load based on a variable resource budget to maintain the best QoS given a set of operational conditions.
- Source Code: https://github.com/HiPeRT/particle_filter_dta

K-Nearest Neighbour search hardware architecture

C/C++, FPGA, HLS

- Development of a high performance hardware solver for the K-Nearest Neighbour problem
- Integration of the accelerator in a low-latency oriented system design, complete with Linux driver support
- Exploration of multiple hardware/software offloading strategies
- Deployment and test of the accelerator on a real vehicle localization use-case

PUBLICATIONS

- Lorenzo Farina, Federico Gavioli, Salvatore Iandolo, Francesco Moretti, Giuseppe Perrone, Matteo Piccoli, Francesco Raviglione, Marco Rapelli, Antonio Solida, Paolo Burgio, Carlo Augusto Grazia, Alessandro Bazzi
Open-Source Based and ETSI Compliant Cooperative, Connected, and Automated Mini-Cars
 Conference paper
 2026 IEEE Vehicular Technology Conference: VTC2026 Spring
<https://doi.org/10.23919/DATE69613.2026.11539649>
- Matthias Stammmler, Henrik Scheidt, Tanja Harbaum, Jürgen Becker, Konstantin Dudzik, Victor Pazmino, Federico Gavioli, Paolo Burgio, Arvind Easwaran, Andreas Eckel
Multi-Partner Project: Scheduling-Deployment Workflow for Autonomous RoboRacer Driving Stacks in the HAL4SDV Project
 Conference paper
 2026 Design, Automation & Test in Europe Conference (DATE)
<https://doi.org/10.23919/DATE69613.2026.11539649>
- Federico Gavioli, Francesco Moretti, Antonio Russo, Alessandro Capotondi and Paolo Burgio
Thundershot: an open-source autonomous vehicles research platform for embedded heterogeneous MPSoCs
 Conference paper
 Proceedings of the 22nd ACM International Conference on Computing Frontiers: Open Source Hardware and Software Workshop (2025)
<https://doi.org/10.1145/3706594.3726968>
- Donato Ferraro, Luca Palazzi, Federico Gavioli, Michele Guzzinati, Andrea Bernardi, Paolo Burgio and Marco Solieri
Time-sensitive autonomous architectures
 Journal article
 Real-Time Systems (2023)
<https://doi.org/10.1007/s11241-023-09404-2>
- Federico Gavioli, Gianluca Brilli, Paolo Burgio and Davide Bertozzi
Adaptive localization for autonomous racing vehicles with resource-constrained embedded platforms
 Conference paper
 2024 Design, Automation & Test in Europe Conference & Exhibition (DATE)
<https://doi.org/10.23919/DATE58400.2024.10546748>