

FILIPPO CARLONI

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 HJH-7568-2023

CURRENT EMPLOYMENT

Postdoctoral Researcher

National Inter-University Consortium for Telecommunications (CNIT)

 March 2025 – Ongoing

 Italy

Research and development of network systems frameworks, including domain-specific compilers and customized offloading techniques exploiting hardware acceleration on specialized FPGA- and ASIC-based SmartNICs. Focus areas include network security applications such as DDoS mitigation, firewalling, and real-time traffic monitoring. Contributions span system design, implementation, experimental evaluation on cutting-edge platforms (e.g., Nvidia Bluefield-3 DPU), and dissemination of results through peer-reviewed publications and conference presentations.

EXPERIENCE

Visiting Student

Massachusetts Institute of Technology (MIT)

 April 2024 – Sep 2024

 Boston (MA), USA

During the semester as a visiting PhD student at MIT with the COMMIT group led by Prof. Saman Amarasinghe, I had the opportunity to focus on creating low-latency and high-throughput smartNIC processing logic, supporting completely custom protocols provided by the NetBlocks framework. This research project allowed me to expand my knowledge on smartNICs further by exploring open-source solutions such as AMD OpenNIC.

Teaching Assistant

Politecnico di Milano

 Feb 2022 – Ongoing

 Milano, Italy

- Sept 2022 - Ongoing: Computer Architecture and Operating Systems (085779) (Teaching Assistant, 40h/year)
- March 2022 - May 2022: Computer Science and Elements of Medical Information (085851) (Lab. Supervisor, 15h)
- Feb 2022 - May 2022: Final Examination - Software Engineering (085923) (Teaching Assistant, 12h)

CERTIFICATIONS

- Introduction to DOCA for DPUs - NVIDIA, 2021
- Fundamentals of Accelerated Computing with Cuda C/C++ - NVIDIA, 2021
- CCNA R&S: Connecting Networks - CISCO, 2018
- CCNA R&S: Scaling Networks - CISCO, 2017
- CCNA R&S: Routing and Switching Essentials - CISCO, 2017
- CCNA R&S: Introduction to Networks - CISCO, 2016
- Introduction to Cybersecurity - CISCO, 2016

EDUCATION

Ph.D. Information Technology

Politecnico di Milano

 Nov 2021 – Feb 2025

Thesis title: Exploiting Hardware and Software Specialization for Efficient Regular Expressions Processing

M.Sc. Computer Science and Engineering

Politecnico di Milano

 Sept 2018 – Oct 2021

Thesis title: Novel Mixed Hardware-Software Framework for Efficient Execution of Regular Expressions

B.Sc. Engineering of Computing Systems

Politecnico di Milano

 Sept 2015 – Sept 2018

HARD SKILLS

C++

C/C++

RISC-V assembly

JAVA

PHP

Python

JavaScript

OpenMP

MPI

MySQL

HTML

Verilog

VHDL

HLS

Vivado

Vivado HLS

Vitis

hardware design

Xilinx/AMD FPGA

Nvidia Bluefield DPU 2/3

Arduino

Raspberry Pi

LANGUAGES

English

Spanish

Italian

PROFESSIONAL SERVICE

Artifact Evaluation Committee

- ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS) - 2026, 2027
- ACM EuroSys: European Conference on Computer Systems (EuroSys) - 2026
- ACM Programming Language Design and Implementation (PLDI) - 2025
- IEEE International Symposium on High-Performance Computer Architecture (HPCA) - 2025, 2026
- IEEE/ACM International Symposium on Code Generation and Optimization (CGO) - 2025, 2026, 2027
- ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP) - 2025, 2026
- IEEE/ACM International Symposium on Microarchitecture (MICRO) - 2023, 2024, 2025
- IEEE International Symposium On Field-Programmable Custom Computing Machines (FCCM) - 2024
- IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPS - RAW) - 2023, 2024

Technical Program Committee

- IEEE Computer Society Annual Symposium on VLSI (ISVLSI) - 2025select
- HSTIEC: Hardware, Software, and Tools for the IoT-to-Edge-to-Cloud Continuum Special Session at 28/29th Euromicro Conference Series on Digital System Design (DSD) - 2025, 2026

Shadow Technical Program Committee

- ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS) 2026

Organizing Committee

- An AI-Orchestrated Architecture: Data Plane, Digital Twin, and Smart Marketplace for 6G Networks of Networks Special Session at IEEE Conference on Network Function Virtualization and Software Defined Networks - 2025

Session Chair

- Session: "Memory is the scribe of the soul" be it volatile or not - 61st ACM/IEEE Design Automation Conference (ACM/IEEE DAC 2024)
- Special Session: "Sensors for a smarter world" - IEEE 7th International Forum on Research and Technology for Society and Industry - (RTSI 2022)

Conference Reviewer

- IEEE 35th International Conference on Field-Programmable Logic and Applications (FPL 2025)
- 32nd IEEE International Symposium On Field-Programmable Custom Computing Machines (FCCM 2024)
- ACM/IEEE International Conference on Hardware/Software Codesign and System Synthesis (Embedded Systems Week) (CODES+ISSS)
- IEEE/ACM International Conference on Computer-Aided Design Systems (ICCAD 2023)

ACHIEVEMENTS AND AWARDS



Distinguished Artifact Evaluator Award

ACM European Conference on Computer Systems (EuroSys - 2026)



ACM SIGCOMM Travel Grant Recipient 2025

ACM Special Interest Group on Data Communication (SIGCOMM)



HiPEAC Paper Award 2024

<https://www.hipeac.net/awards/#/paper-awards/2024/>



IEEE International Parallel & Distributed Processing Symposium

IPDPS 2024 - PhD Forum



Ph.D. Rocca Project Fellow 2024

<https://www.progettorocca.com/>



Selected Participant at the 2023 ACM Europe Summer School

on HPC Computer Architectures for AI and Dedicated Applications



Selected Participant at the 2023 HiPEAC 19th International Summer School

on Advanced Computer Architecture and Compilation for High-performance Embedded Systems - ACACES Summer School



IEEE CAS Student Travel Grant Recipient 2023

for Flagship Conference Participation



ACM ASPLOS Travel Grant Recipient 2022

ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)



ACM/IEEE Design Automation Conference DAC - Young Fellow Program 2022, 2024

<https://www.dac.com/>



Finalist of Xilinx Open Hardware 2018

<https://www.openhw.eu/2018>



Finalist of Switch2Product Contest 2017

<https://s2p.it/>



Finalist of Xilinx Open Hardware 2017

<https://www.openhw.eu/2017>



Selected Exhibitor Maker Faire Rome 2014

<https://makerfairerome.eu/it/edizioni/2014-it/>

MEMBERSHIPS

- IEEE International Symposium on Circuits and System (ISCAS 2024, 2025, 2026)
- IEEE 20th International Conference on Smart Technologies (EU-ROCON 2023)

Journal Reviewer

- **TCAD** - IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems - 17 Reviews - From 2022
- **TVLSI** - IEEE Transactions on Very Large Scale Integration Systems - 11 Reviews - From 2023
- **TRETS** - ACM Transactions on Reconfigurable Technology and Systems - 6 Reviews - From 2023
- **JPDC** - Journal of Parallel and Distributed Computing - 8 Reviews - From 2023
- **IT Professional** - IEEE IT Professional - 1 Review - From 2023

PUBLICATIONS

Journal Articles

- D. Conficconi, E. Del Sozzo, F. Carloni, A. Comodi, A. Scolari, and M. D. Santambrogio, "An energy-efficient domain-specific architecture for regular expressions," *IEEE Transactions on Emerging Topics in Computing*, vol. 11, no. 1, 2022.
- L. Stornaiuolo, F. Carloni, R. Pressiani, G. Natale, M. Santambrogio, and D. Sciuto, "Enabling transparent hardware acceleration on zynq soc for scientific computing," *ACM SIGBED Review*, vol. 17, no. 1, 2020.

Selected Conference Proceedings

- A. Somaini, F. Carloni, G. Agosta, M. D. Santambrogio, and D. Conficconi, "Combining mlir dialects with domain-specific architecture for efficient regular expression matching," in *Proceedings of the 23rd ACM/IEEE International Symposium on Code Generation and Optimization*, 2025.
- F. Carloni, D. Conficconi, and M. D. Santambrogio, "Alveare: A domain-specific framework for regular expressions," in *Proceedings of the 61st ACM/IEEE Design Automation Conference*, 2024.
- L. Cicolini, F. Carloni, M. D. Santambrogio, and D. Conficconi, "One automaton to rule them all: Beyond multiple regular expressions execution," in *2024 IEEE/ACM International Symposium on Code Generation and Optimization (CGO)*, IEEE, 2024.
- F. Carloni, D. Conficconi, I. Moschetto, and M. D. Santambrogio, "Yarb: A methodology to characterize regular expression matching on heterogeneous systems," in *2023 IEEE International Symposium on Circuits and Systems (ISCAS)*, IEEE, 2023.
- F. Carloni, L. Panseri, D. Conficconi, M. Sironi, and M. D. Santambrogio, "Enabling efficient regular expression matching at the edge through domain-specific architectures," in *2023 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, IEEE, 2023.
- F. Carloni, G. Casagrande, V. Corbetta, et al., "Speeding up resting state networks recognition via a hardware accelerator," in *2019 IEEE EMBS International Conference on Biomedical & Health Informatics (BHI)*, IEEE, 2019.

From 2023 - now: High Performance, Edge And Cloud Computing (**HiPEAC**)
 From 2023 - now: IEEE Circuits and Systems Society (**CAS**)
 From 2019 - now: Institute of Electrical and Electronics Engineers (**IEEE**)
 From 2019 - now: Institute of Electrical and Electronics Engineers (**IEEE**) **Computer Society**
 From 2022 - now: Association for Computing Machinery (**ACM**)
 From 2025 - now: **ACM SIGMCOMM**
 From 2024 - now: **ACM SIGPLAN**
 From 2024 - now: **ACM SIGARCH**
 From 2024 - now: **ACM SIGDA**
 From 2024 - now: **ACM SIGMICRO**

PRESENTATIONS AND TALKS

2025 Invited Poster - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - Boston University, Boston, MA (USA)
2025 Invited Talk - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - Northeastern University, Boston, MA (USA)
2025 Invited Talk - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - MIT, Boston, MA (USA)
2025 Invited Talk - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - Nokia Bell Labs, New Providence, NJ (USA)
2025 Invited Talk - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - New York University, New York, NY (USA)
2024 Conference Talk - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - DAC 2024, San Francisco, CA (USA)
2024 Conference Poster - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - DAC 2024, San Francisco, CA (USA)
2024 Young Fellow Program Poster - "Unleashing the Power of Regular Expressions Through Hardware and Software Integration" - DAC 2024, San Francisco, CA (USA)
2024 Invited Talk - "One Automaton to Rule Them All: Beyond Multiple Regular Expressions Execution" - AMD, San Josè, CA (USA)
2024 Invited Talk - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - AMD, San Josè, CA (USA)
2024 Invited Talk - "ALVEARE: a Domain-Specific Framework for Regular Expressions" - Microsoft, Mountain View, CA (USA)
2024 PhD Forum Poster - "Unleashing the Power of Regular Expressions Through Hardware and Software Integration" - IPDPS 2024, San Francisco, CA (USA)
2024 Workshop Poster - "POCA: A PYNQ Offloaded Cryptographic Accelerator on Em-

bedded FPGA-Based Systems" - IPDPSW - RAW 2024, San Francisco, CA (USA)

2024 Conference Talk - "One Automaton to Rule Them All: Beyond Multiple Regular Expressions Execution" - CGO 2024, Edinburgh (UK)

2023 Summer School Poster - "An Advanced HW/SW Framework for Efficient Regular Expression Execution" - ACACES Summer School 2023, Fiuggi (IT)

2023 Conference Talk - "YARB: a Methodology to Characterize Regular Expression Matching on Heterogeneous Systems" - ISCAS 2023, Monterey, CA (USA)

2023 Invited Poster - "Hardware/Software Frameworks for efficient REs execution" - Boston University, Boston, MA (USA)

2023 Invited Talk - "Hardware/Software Frameworks for efficient REs execution" - Northeastern University, Boston, MA (USA)

2022 Young Fellow Program Poster - "An Advanced HW/SW Framework for Efficient Regular Expression Execution" - DAC 2022, San Francisco, CA (USA)

2022 Invited Talk - "Domain-Specific Architectures for Efficient execution of Regular Expressions" - Northwestern University, Chicago, IL (USA)

2022 Invited Talk - "Domain-Specific Architectures for Efficient Execution of Regular Expressions" - University of Illinois Chicago, Chicago, IL (USA)

2019 Invited Talk - "TiReX: Tiled Regular eXpression matching architecture" - University of California, Berkeley, CA (USA)

2019 Invited Talk - "Speeding Up Resting State Networks Recognition via a Hardware Accelerator" - Xilinx, San Josè, CA (USA)

2019 Invited Talk - "TiReX: Tiled Regular eXpression matching architecture" - Intel, San Josè, CA (USA)