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Sofia Montebugnoli

Date of birth: 01/16/1999 | **Nationality:** Italian | **Sex:** Female | **Phone:** (+39) 3663023259 (Mobile) | **Email:** sofimontebugnoli@hotmail.it

ABOUT MYSELF

I am a computer engineer with a strong interest in Green IT, particularly as it applies to cloud computing and operating systems. Currently, I am pursuing my PhD, focusing on the latest developments in O-RAN for 5G networks. Through internships, I have gained experience in catalog design and system administration, developing skills valuable for organization and teamwork.

WORK EXPERIENCE

09/01/2023 – CURRENT Bologna, Italy

UNIVERSITY TEACHING ASSISTANT UNIVERSITÀ DEGLI STUDI DI BOLOGNA - ALMA MATER STUDIORUM

Teaching assistant for the course "Distributed Systems M," where I led practical lessons on topics including DevOps, Containerization, EJB 3.0, WildFly, Spring, Spring Boot, and FaaS.

11/01/2023 – CURRENT Imola, Italy

ICT RESEARCH CONSULTANT IMOLA INFORMATICA S.P.A

Research assistant at the Imola Informatica S.p.A. research lab, where I conducted research and evaluations of cloud products available on the market, as well as emerging technologies relevant to the company's internal projects and academic research.

02/01/2023 – 06/2023 Bologna, Italy

ENGINEERING LECTURER ECIPAR REGIONALE SOC. CONS. A R.L, FOR CNA

I taught classes on front-end development to high-school graduate students, focusing on HTML, CSS, JavaScript, and React. The goal of the course was to equip students with the skills needed to become full-stack developers.

01/09/2023 – 02/28/2023 Bologna

UNIVERSITY RESEARCH ASSISTANT UNIVERSITÀ DEGLI STUDI DI BOLOGNA - ALMA MATER STUDIORUM

I participated in a consulting project focused on text detection, with a specific emphasis on technologies such as Terraform, Kubernetes, and ElasticSearch. The project involved developing a solution to enable multicloud observability.

10/01/2018 – 12/31/2018 Castel San Pietro Terme, Italy

MARKETING ASSISTANT OFFICINE VOLTA S.P.A.

Project-based work for updating the 2019 price list, specifically focusing on price revisions and graphic redesign. Tools used: Adobe InDesign, Adobe Illustrator, and Microsoft Excel.

06/01/2016 – 07/31/2016 Castel San Pietro Terme, Italy

MARKETING ASSISTANT OFFICINE VOLTA S.P.A.

Researched and developed a new price list format. Analyzed new requirements for the offer proposal and created a customized price list accordingly. Tools used: Adobe InDesign, Adobe Illustrator, and Adobe Photoshop.

06/01/2015 – 07/31/2015 Castel Guelfo, Italy

ICT SYSTEM ADMINISTRATOR EMERSON NETWORK POWER

Installed and configured Ubuntu operating systems on company computers. Set up the company VPN on mobile devices. Conducted daily and weekly maintenance of cloud computing systems for long-term data storage. Provided digital support to company employees.

EDUCATION AND TRAINING

03/01/2023 – CURRENT Bologna, Italy

PHD CANDIDATE ALMA MATER STUDIORUM Università di Bologna

Website https://disi.unibo.it/it/didattica/dottorati-di-ricerca/computer-science-and-engineering

09/01/2020 – 12/06/2022 Bologna, Italy

MASTER DEGREE ALMA MATER STUDIORUM Università di Bologna

Address Via Zamboni, 33, 40126, Bologna, Italy | **Website** https://corsi.unibo.it/magistrale/ingegneriainformatica |

Field of study Engineering, manufacturing and construction | **Final grade** 110 e lode | **National classification** LM-32 |

Type of credits CFU | **Number of credits** 120 |

Thesis Energy consumption of parallel linear systems solver algorithms above HPC architecture

09/01/2017 – 10/09/2020 Bologna, Italy

BACHELOR DEGREE ALMA MATER STUDIORUM Università di Bologna

Address Via Zamboni, 33, 40126, Bologna, Italy | **Website** https://corsi.unibo.it/laurea/IngegneriaInformatica |

Field of study Engineering, manufacturing and construction | **Final grade** 94 | **National classification** L-8 |

Type of credits CFU | **Number of credits** 180 |

Thesis Progetto e implementazione dell'interfaccia utente per la piattaforma tuProlog

09/01/2012 – 07/07/2017 Imola, Italy

HIGH SCHOOL DIPLOMA LICEO SCIENTIFICO DELLE SIENZE APPLICATE "F. ALBERGHETTI"

Address Via San Benedetto 10, 40026 , Imola, Italy | **Website** https://www.alberghetti.it/

LANGUAGE SKILLS

Mother tongue(s): **ITALIAN**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C1	C1	C1	C1
SPANISH	A1	A1	A1	A1	A1

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user

DRIVING LICENCE

Driving Licence: A1

Driving Licence: B

PROJECTS

03/01/2022 – 12/06/2022

Master Thesis in ENERGY CONSUMPTION OF HPC SYSTEMS

Study of the energy consumption of linear systems solver algorithms above the HPC architecture of Cineca's MARCONI A3. The linear systems solver are the Inibition Method and the Gaussian Elimination from ScaLAPACK library

05/01/2022 – 10/17/2022

SKIN ANALYSIS AND SKIN CARE

Identification through a classifaction model of the different levels of acne. Implementation of an Android app capable of monitoring the course of acne, and of giving assistance in the product choice.

04/01/2022 – 07/31/2022

PREDICTIVE MAINTAINANCE ON BEARINGS OF THE CERAMIC PRODUCTION IMPLANTS

Vibration analysis of the rotary components on automatic machines to create a system able to warn the operator about the rotary component degradation (before its failure), and to predict the date of failure of a component (before its failure)

02/01/2022 – 04/01/2022

AI TO PLAY WORDLE GAME

Agent capable of playing Wordle game with Constraint Satisfactions Prolem techniques and letters probability. Implementation of the GUI to play offline on PC.

PUBLICATIONS

2023

Energy consumption comparison of parallel linear systems solver algorithms on HPC infrastructure

High-Performance Computing (HPC) systems today are gradually increasing in size and complexity due to the correspondent demand for ever-increasing computing needs, requiring more complicated tasks and higher accuracy. The growing energy needs of HPC systems require the urgent adoption of green HPC approaches to mitigate environmental impact and promote energy-efficient computing.
This paper proposes a monitoring solution for the energy consumption during the execution of parallel software focusing in particular on the solution of linear systems in HPC systems: the Inhibition Method and Gaussian Elimination from ScaLAPACK library. The main goal is to profile their execution from the energy consumption perspective. The approach follows a white-box paradigm, injecting the monitoring component into specific ranks. Despite a slight overhead compromise due to synchronization, this design permits accurate measurements.

Montebugnoli, Sofia, and Anna Ciampolini. Proceedings of the SC'23.

2023

A Multicloud Observability Support Based on ElasticSearch for Cloud-native Smart Cities Services

Effective communication and information sharing among different districts and cities are crucial for the management of utility flows, traffic, and emergencies in smart cities. In this scenario, a smart city requires cloud-native solutions to collect and analyze data from various sources, including traffic sensors and public transport vehicles. Thus, a multicloud observability approach is proposed to aggregate data from different localities. The solution aims to provide a complete suite for observability capable of collecting data across layers of a multicloud and integrating already existing open-source projects.

Montebugnoli, Sofia, and Foschini. 2023 IEEE Symposium on Computers and Communications (ISCC)

2024

xSTART: xApp Simulated Evaluation Environment for Developers

The advent of the Open Radio Access Network (O-RAN), as delineated by the standards set forth by the O□RAN Alliance, heralds a pivotal shift poised to revolutionize the telecommunications landscape. Central to this transformation is the O-RAN Alliance's architectural blueprint, which advocates for hierarchical frameworks, encompassing both non-Real-Time (no-RT) and near-Real-Time (near-RT) configurations, fortified by a multitude of interfaces. In particular, near-RT applica□tions, named xApps, are served at the edge of the network as common cloud-native applications to control and optimize O-RAN elements. Gaining a thorough understanding of the entire development process for these applications becomes an essential prerequisite to providing support for next-generation networks. However, the lack of ready-to-use tools that allow developers to test and evaluate their applications in simulated and real environments makes it difficult to study and experiment with xApps. In this work, we propose xSTART, a ready-to□deploy environment based on Docker technology that allows xApp developers to quickly deploy and incorporate their xApps in a simulated ns-3 environment to test and evaluate their functionalities. Then, we evaluate an IIoT Network use-case scenario showing a machine learning (ML)-based xApp applied to the O-RAN environment. The results compare the use of different ML techniques and show the correct behavior of the simulation. Finally, we make xSTART available to the community to ease the development and evaluation of future xApps.

Herrera J. L., Montebugnoli S., Scotece D., Foschini L. IEEE Metrology for Industry 4.0 & IoT

2024

Enabling Reusable and Comparable xApps in the Machine Learning-Driven Open RAN

The advent of the Open Radio Access Network (O-RAN) specifications for 5G and 6G Radio Access Networks (RANs) has brought forth a great interest in the use of machine learning to perform control and management tasks. The integration of machine learning in the O-RAN architecture is initially envisioned to be implemented through xApps,

applications that act in a near-real timescale and that have machine learning models meant for specific tasks. However, the development of machine learning-based xApps presents challenges, as although the xApp architecture facilitates component reusability for the RAN, the state-of-the-art architectures for xApps themselves require the implementation of an ad-hoc xApp for each machine learning model. Therefore, these architectures limit the reusability of the components of xApps as applications, even for xApps meant for the same purpose. To address these issues, we propose the Intelligent xApp Architecture (IxAA), a software architecture to simplify the implementation of machine learning-based xApps with a focus on reuse, easing the comparison of machine learning models. As a proof of concept, we developed xAssessment, an xApp to evaluate the performance of data prediction models. Our evaluation shows the performance results of five machine learning models predicting three different RAN metrics through xAssessment in a simulated O-RAN testbed.

Juan Luis Herrera, Sofia Montebugnoli, Paolo Bellavista, Luca Foschini. 2024 IEEE 25th HPSR

NETWORKS & MEMBERSHIPS

2023 – CURRENT
IEEE Graduate Student Member

I am a graduate student member of IEEE and subscribe to the Communication Society, Computer Society, and Young Professionals. I participate in the IEEE ComSoc student branch at the University of Bologna, to which I contribute as treasurer in organizing IEEE events at our University.

2023 – CURRENT
ACM Student member

HONOURS AND AWARDS

07/06/2023
Best Paper Award – Rilasciato da IEEE ISCC 13th Workshop on Management of Cloud and Smart City Systems

Best Paper Award. This certificate is awarder to Sofia Montebugnoli and Luca Foschini in recognition of the quality of their paper “A Multi-Cloud Observability Support Based on ElasticSearch for Cloud-Native Smart Cities Services”

CONFERENCES & SEMINARS

07/09/2023 – 07/12/2023 Tunis, Tunisia
28th IEEE Symposium on Computers and Communications (ISCC) IEEE ISCC 2023

Link https://2023.ieee-iscc.org/

07/10/2023 – 07/14/2023 Bressanone, Italia
Summer School of Information Engineering (SSIE) 2023

Link https://ssie.dei.unipd.it/

09/13/2023 – 09/15/2023 Roma, Italia
RESTART Tech Camp su 5G e Open RAN

Link https://5g-tech-camp.fondazione-restart.it/

11/12/2023 – 11/17/2023 Denver, Colorado, Stati Uniti
The International Conference for High Performance Computing, Networking, Storage, and Analysis. SC'23

Link https://sc23.supercomputing.org/

04/16/2024 – 04/17/2024 Roma, Italia
5G&CO, 5G&Beyond Conference

Link https://www.5gitaly.eu/it/5gbeyond/

05/29/2024 – 05/31/2024 Firenze, Italia

2024 IEEE INTERNATIONAL WORKSHOP ON Metrology for Industry 4.0 & IoT

Link https://metroind40iot.org/

07/04/2024 – 07/05/2024 Catania, Sicily, Italy

RESTART Plenary Dissemination Workshop

Link https://www.fondazione-restart.it/it/2024/06/04/restart-plenary-dissemination-workshop-4-5-luglio-catania/

07/07/2024 – 07/13/2024 Lipari, Sicily, Italy

Lipari School on Advanced Networking Systems

Open and programmable 6G networks in the cloud/edge continuum: research challenges and experimentation tools in SLICES Research Infrastructures

Link https://netprog22.liparischool.it/

07/22/2024 – 07/24/2024 Pisa, Tuscany, Italy

IEEE International Conference on High Performance Switching and Routing

Link https://hpsr2024.ieee-hpsr.org/