

# Gaia A. Bertolino

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## EDUCATION AND TRAINING

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### **Marie-Curie Research Assistant and PhD Candidate in Computer Science** Sep. 2025 – Present *University of Cambridge, UK*

Appointed as a doctoral researcher within the [Marie Skłodowska-Curie Doctoral Network ANT](#), focusing on **uncertainty quantification and continual learning for on-device health monitoring**. The project is hosted at the University of Cambridge (Department of Computer Science and Technology) under the supervision of Prof. Cecilia Mascolo, with co-supervision from Prof. Qiang Wang (TU Delft) and Dr. Milos Petković (Philips).

The research aims to develop next-generation uncertainty-aware machine learning models optimized for microcontroller units (MCUs) and streaming longitudinal health data, integrating continual learning techniques to mitigate catastrophic forgetting. These models will be validated on wearable datasets and real microcontroller boards, with the expected outcome of delivering efficient and trustworthy on-device solutions for adaptive health monitoring. Planned secondments include a three-month period at TU Delft (M16–M18) to advance uncertainty-aware models for embedded computing, and a three-month period at Philips Research (M28–M30) for proof-of-concept evaluation on real-world wearable datasets and microcontroller devices, each leading to joint publications.

This doctoral position is funded by the European Commission under the Marie Skłodowska-Curie Actions (MSCA-DN) programme.

### **MSc Thesis Research in Machine Learning for Advanced Clinical Consultation** Jan. - July 2025 *University of Cambridge, UK*

Conducted thesis research at the Department of Computer Science and Technology, University of Cambridge, under the supervision of Prof. Cecilia Mascolo (Head of the Mobile Systems Research Laboratory and Director of the Centre for Mobile, Wearable Systems and Augmented Intelligence, Computer Science and Technology Dept. University of Cambridge, UK) and Prof. Domenico Talia (leader of the Scalable Computing and Cloud Laboratory [scalab.dimes.unical.it](http://scalab.dimes.unical.it), DIMES Dept. University of Calabria, IT).

The dissertation focused on advancing machine learning models for the automation of clinical consultations and auscultation. This includes exploring multimodal approaches for the representation and integration of text and audio data, leveraging audio signals to extract novel insights, investigating explainable AI techniques for enhancing model transparency and interpretability, thus aiming at developing robust solutions for both training on and exploiting limited datasets effectively.

As part of this research, I have submitted a paper to the Machine Learning for Healthcare (MLHC) conference (August, USA), presenting RA-QA, the first open-source respiratory-audio question answering (QA) system. The system is designed to enable the training, fine-tuning and evaluation of models for patient-centric QA tasks using audio-based data, supporting the broader goal of developing multimodal tools for automated, explainable clinical consultation support.

This research period was fully funded through an Erasmus MOST (Overseas) scholarship.

Main exam modules: Cloud Computing, Artificial Intelligence, Computer Vision, Natural Language Processing, Information Retrieval, Distributed Systems, Knowledge Representation, Machine and Deep Learning, Data Mining, Social Network Analysis, Statistical Learning and Ethical and Legal Aspects of Computer Science.

Major research projects undertaken:

- Implementation of a Dynamic Graph Convolutional Neural Network for social network link prediction
- Emergency Service Logistics Optimization through Agent-Based Planning
- Bank fraud detection through anomaly detection techniques
- Power Cable and Tower Detection using Mask R-CNN
- Improving RAG indexing through specialized embeddings
- Analysis of the effects of tipping prompting strategies on the GPT-o model

Advanced programming skills in: Python, Prolog, Haskell, Docker, PyTorch, Plansys2, Pandas, Scikit-learn, Tensorflow, PDDL4j, Apache Spark, NetworkX, Streamlit, PyTorch Geometric, Langchain and NLTK.

Awarded a full scholarship each year covering tuition, accommodation and a personal income.

Average grade: 26.46/30 - GPA: 3.615

Thesis: API Development for IoT Applications using the Mulesoft Suite, Supervisor Prof. G. Fortino (Highly Cited Researcher in Computer Science by Clarivate for five consecutive years)

Main exam modules: Object-Oriented Programming, Data Structures & Algorithms, Operating Systems, Robotics, Automation, Telecommunications, Control Engineering, Digital Electronics, Design Patterns, Parallel Computing, Database Systems, Linear Algebra, Phisics, Calculus and Advanced Math.

Major projects undertaken:

- VHDL-Based Design and Testing of a 16-Bit Carry Select Adder
- Implementation and Verification of a Pipelined Adder-Subtractor in VHDL
- Design and Simulation of Industrial Robotic Arms: Kinematics, Trajectory Planning and Control Implementation
- Path Planning and Control Strategies for Mobile Robotics: Development and Implementation
- Analysis and Design of Linear Control Systems: Transfer Functions, Stability and Frequency Response

Advanced programming skills in: Java, Matlab, VHDL, Assembly, XML, SQL and Maple.

Awarded a full scholarship each year covering tuition, accommodation and a personal income.

Average grade: 26.25/30 GPA: 3.4

## **Scientific High School Diploma**

*Scientific High School "L. Siciliani", Catanzaro, Italy*

2014 - 2019

*Grade: 100/100 with honours*

Selected in 2015, 2017 and 2018 as a national finalist for the National Individual Mathematical Modeling Competition, organized under the patronage of the Italian Ministry of Education, Universities and Research (MIUR) at the Department of Mathematics and Computer Science, University of Perugia, which recognize excellence in mathematical modeling and problem-solving.

Delivered a presentation on fractal mathematics in mural art at the National Mathematical Communication Competition held at the University of Perugia (2018) and developed a dedicated app for allowing participants to explore the concepts interactively. The project received a Special Mention for Creativity and Innovation.

## **QUALIFICATIONS**

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### **National Qualification for the Profession of Junior Engineer**

2023

*University of Calabria, Italy*

*Grade: 56/60*

Gained the official Italian qualification required to practice as a licensed professional engineer, recognized by national standards.

The certification process involved in-depth training on the role of an engineer, ethical principles, and professional regulations, including licensing requirements, public procurement laws, and workplace safety.

Since January 2024, I have been enrolled in the Provincial Order of Engineers of Catanzaro (Italy) where I am a member of the Young Engineers Committee, actively engaging in professional events and discussions, both as a participant and as a speaker.

## **WORK EXPERIENCE**

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### **Technical IT Staff | University of Calabria, Italy**

Sept. 2024 - Current

Engaged in the IT and cloud systems sector, I provide technical support and drive the maintenance and enhancement of the University of Calabria's computing and telecommunications infrastructure, while overseeing the efficient management and automation of service provisioning.

Advanced programming skills in: Perl, Powershell

### **API Development Internship | Cap4Lab, Luxembourg**

Oct. 2021 - Dec. 2021

Developed a multi-layer API using Mulesoft services to optimize a billing management processes. I have gained hands-on experience in a dynamic and international corporate environment, collaborating within a team to engage with clients, managing project workflows and coordinating tasks. This experience further deepened my understanding of a developer role in a professional setting.

Advanced programming skills in: API development, RAML, Dataweave.

The traineeship contributed to my thesis research, enhancing my knowledge in API development and integration, and was fully funded through an Erasmus traineeship scholarship

### **Research Internship in Nuclear Physics | INFN-LABEC, Italy**

May 2018

Selected for one out of 15 available positions, ranking fourth. Conducted research on the application of nuclear physics techniques for the preservation of cultural heritage and the study of urban pollution. Focused on cutting-edge, non-invasive methods such as ion beam analysis and X-ray fluorescence spectroscopy to analyse atmospheric particulate matter (samples collected in Nigeria) and assess the conservation state of cultural artifacts. This involved designing and performing measurements using the TANDEM accelerator, followed by data analysis with specialized software to generate characteristic elemental spectra. Additionally, XRF was used to study the ink composition of a 12th-century papyrus manuscript, contributing to the understanding of historical preservation techniques.

**Research Internship in Nanotechnology and Cosmic Ray Studies | INFN-LNF, Italy**

May 2018

Selected for one out of 15 available positions, ranking fourth. I have conducted research at the NEXT Laboratory for Bio-nanotechnology where I synthesized nanocomposite materials, carbon nano-plates, carbon nanotubes and graphite sheets. I then characterized these nanomaterials using Raman spectroscopy and scanning electron microscopy (SEM) to study their physico-chemical properties. Additionally, in the Cosmic Ray Laboratory, I participated in muon detection experiments, combining theoretical insights into high-energy physics with hands-on data collection using scintillation detectors. The program also provided an in-depth exploration of experimental research design, with a particular focus on the OPERA neutrino experiment conducted between CERN in Geneva, CH, and the INFN Gran Sasso Laboratories, IT.

**LANGUAGE COMPETENCE**

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**Italian** | Mother tongue**English** | *Cambridge Advanced* Lev. C1 (CAE) – Score: 194, *IELTS* – Score: 8.0 Lev. C1**French** | Lev. B1**ENGLISH COURSES ABROAD**

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**New City College, London, UK**

2019

Awarded a full scholarship covering both tuition and accommodation to attend an intensive two-week English program aimed at achieving C1 proficiency level

**Dublin City University, Dublin, Republic of Ireland**

2018

Awarded a full scholarship covering both tuition and accommodation to attend an intensive two-week English program aimed at achieving C1 proficiency level

**King's College, London, UK**

2016

Awarded a full scholarship covering both tuition and accommodation to attend an intensive two-week English program aimed at achieving B2 proficiency level

**VOLUNTEERING**

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**Rotaract - Active Volunteer**

2021 – Current

Actively involved in coordinating service and charity events benefiting the local community.

Appointed District Executive Advisor (2024-2025).

District councillor and President of the Environment and Territory Committee (2023 – 2024).

Served as board member and secretary of the local club (2022 – 2023).

**FAI (the National Trust for Italy) - Active volunteer and past Local Group Leader**

2018 – Current

Volunteered in organizing events and activities focused on environmental and cultural preservation. Led the local youth group from 2021 to 2024, overseeing awareness projects and managing fundraising.

**MANAGEMENT AND LEADERSHIP SKILLS**

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**Co-founder and President of Leonardo engineering student association**

2023 – Current

Co-founded in 2023 and currently preside since 2024 over Leonardo, the largest engineering student association at the University of Calabria, with approximately 500 enrolled members.

Organized orientation events and hosted both formative and professional seminars featuring distinguished speakers and professors, some of which held in collaboration with city-based companies, the Department of Civil Engineering and the Department of Computer Engineering, Modeling, Electronics and System, University of Calabria

**Student Representative, Technical-Scientific Library Committee, University of Calabria** 2024 – 2025

Elected in 2024 with 1,775 votes across 8 university departments, becoming the highest-voted candidate in the university's history for this position, I contribute to the BATS Scientific Committee, which oversees the management of academic resources

**Regional Ambassador for SheTech (Non-Profit)** 2024 – 2025

SheTech is an organization committed to advancing gender equality in the tech and digital sectors. As a local ambassador since 2024, I actively contribute to these efforts by helping to foster an engaged community and providing real opportunities to support and empower women in technology

**Student Representative, Department DIMES Council, University of Calabria** 2022 – 2024

Elected in 2022 as the highest-voted with 174 votes, I played an active role in departmental meetings over my tenure until 2024, working closely with faculty members and institutional stakeholders to address key academic and student life issues

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**OTHER MENTORING EXPERIENCE****Student Support and Guidance, University of Calabria** 2019 – Current

Dedicated to supporting junior colleagues by managing a public repository for academic course resources and creating, as well as regularly updating, communication channels focused on university news, events and deadlines

**Mentor, MyFutureBuddy Project – Ortigia Foundation** 2023 – 2024

Mentored students from technical high schools in Southern Italy, with the goal of inspiring and motivating them to pursue higher education.

**Student's Tutor, University of Calabria** 2023 – 2024

Formally employed by the University of Calabria to provide academic support and guidance to students, assisting with admissions, academic advising and the graduation process.