Dr. Alessandro Tundo

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I am a postdoctoral researcher with industrial experience in cloud-based software design and development. I received my Ph.D. in Computer Science with honors from the University of Milano-Bicocca in 2024.
My research focused on software engineering (SE) and distributed systems, with particular emphasis on the automation of self-adaptive monitoring systems (TSC 2024, ICSA-C 2024, TSC 2023, SEAMS 2022), fully decentralized edge computing solutions (CloudNet 2021), and energy-aware AI-based applications (ASE 2023).
During my experience, I have used various techniques, including but not limited to feature models, model-driven engineering, multi-objective optimization, and rule-based expert systems.
My future research will be directed towards integrating my research background in the emerging area of SE for AI-based systems, focusing on both the environmental and societal sustainability dimensions in the context of the software development life cycle (SDLC) of AI solutions.

RESEARCH EXPERIENCE

Postdoctoral Researcher June 2024–Present
TU Wien, supervisor: Prof. Ivona Brandic *Vienna, Austria*

- Research areas: energy-aware AI inference and training, data-driven synthesis of self-adaptive systems

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Visiting Ph.D. Student September 2022–May 2024
TU Wien, supervisor: Prof. Ivona Brandic in collaboration with Prof. Ezio Bartocci *Vienna, Austria*

- Research areas: energy-aware and self-adaptive AI systems for edge computing

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Ph.D. Candidate November 2020–May 2024
University of Milano-Bicocca, supervisor: Prof. Leonardo Mariani *Milan, Italy*

- Research areas: automation and self-adaptation of monitoring systems for cloud continuum

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Research Assistant January 2019–October 2020
University of Milano-Bicocca, supervisor: Prof. Leonardo Mariani *Milan, Italy*

- Research areas: application monitoring, anomaly detection, and self-healing in cloud systems
- The research was also carried out in the context of the "Learning from Failing and Passing Executions at the Speed of Internet" (LEARN) project and the "Governing Adaptive Unplanned Systems of Systems" (GAUSS) project.

Research Scholarship Holder January 2017–December 2018
Consortium GARR, supervisor: Prof. Daniela Micucci (University of Milano-Bicocca) and GARR Scientific and Technical Committee *Milan, Italy*

- Research areas: cloud-native architectures for Open Educational Resources (OER) and their integration with Learning Management Systems (LMS)
- Nominated by Consortium GARR for the “GÉANT's Future Talent Program” (Lighting Talk competition).

INDUSTRY EXPERIENCE

Cloud Architect & DevOps Engineer [freelance] May 2022–December 2023
Arcan *Italy*

- Advising and development of Arcan, a research-driven automatic tool for financial software quality assessment.
- Responsible for cloud and on-premises architecture design and DevOps engineering (i.e., CI/CD pipelines, deployment strategies, and configuration management).

Cloud Architect [freelance] January 2021–April 2022
2Program *Italy*

- Advising and designing cloud-based software services for the development of ad-hoc customer's software solutions.
- The majority of the work used Digital Ocean PaaS services and had been integrated with customers' software.

Independent Researcher [freelance] February 2020–November 2020
Quisque *Italy*

- R&D activities for the introduction of DevOps practices in the development process of a Mobility-as-a-Service platform offering parking and e-charge service.

Full-stack Developer [freelance] January 2016–February 2017
2Program *Italy*

- Design and development of web applications and CMS for food & retail industries (i.e., delivery & takeaway, interior design, fashion) using the Laravel framework ecosystem and Digital Ocean cloud provider.

EDUCATION

Ph.D. in Computer Science (cum laude) 2020–2024
University of Milano-Bicocca *Milan, Italy*

- Thesis: "Adapt and Automate: Efficiently Monitoring in the Cloud Continuum" (Available at: https://hdl.handle.net/10281/476763)
- Advisor: Prof. Leonardo Mariani

M.Sc. in Computer Science (cum laude) 2016–2018
University of Milano-Bicocca *Milan, Italy*

- Thesis: "Model-driven Monitoring-as-a-Service in a Next Generation Platform-as-a-Service (NGPaaS)"
- Advisor: Prof. Leonardo Mariani; Co-advisors: Dr. Oliviero Riganelli and Dr. Marco Mobilio

B.Sc. in Computer Science (cum laude) 2013–2016
University of Milano-Bicocca *Milan, Italy*

- Thesis: "EasyLink: Annotazione Semantica in WikiToLearn"
- Advisor: Prof. Matteo Luigi Palmonari; Co-advisor: Dr. Elisabetta Fersini

TRAINING

MSCA Postdoctoral Fellowships 2024 - Basics on the Application: Formal Criteria and Proposal Writing Aspects	3 hours webinar offered by the department for Funding Support and Industry Relations of TU Wien.	2024 *Vienna, Austria*
Essentials in National Research Funding	12 hours course offered by the department for Funding Support and Industry Relations of TU Wien.	2024 *Vienna, Austria*
16th Symposium and Summer School On Service-Oriented Computing	SummerSoC is a well-established summer school and symposium focusing on service-oriented computing. I attended the summer school and presented a poster about my ongoing doctoral research.	2022 *Crete, Grece*
27th Bertinoro International Spring School (BISS)	One week spring school organized by Italian Computer Science PhD granting institutions under the auspices of GRIN, offering three graduate-level courses aimed at PhD students in Computer Science.	2019 *Bertinoro, Italy*
Cloud Management with Docker and Kubernetes	8 hours course offered by Consortium GARR and University of Milano-Bicocca.	2019 *Milan, Italy*
Public Speaking Course	Multiple online sessions over 2 months with Barbara Rogoski (TEDx Ambassador for Europe) in the context of the GÉANT's Future Talent Programme.	2018 *online*
Techniques and Training about Public Speaking	16 hours course offered by Consortium GARR, manager of the Italian National Research and Education Network.	2018 *Rome, Italy*
Cloud Management with OpenStack and Juju	8 hours course offered by Consortium GARR and University of Milano-Bicocca.	2018 *Milan, Italy*

TEACHING EXPERIENCE

I have been involved in teaching activities since I was a Master student at the University of Milano-Bicocca. I have worked in various roles, including laboratory instructor, tutor, tutor for students with specific learning disorders (SLD), and lecturer in undergraduate and graduate programs. I have been responsible for designing teaching materials and assignments, providing support and feedback both in live sessions and through online platforms, and grading students' assignments, written and oral exams.

Data-Intensive Computing Role: full lecturer	Programs: M.Sc. Data Science and Computational Science and Engineering	2025 *TU Wien*
AI/ML in the Era of Climate Change Role: full lecturer	Program: M.Sc. Data Science	2024 *TU Wien*
Software Development Process Role: lab instructor and tutor	Program: M.Sc. Computer Science	2019-2024 *University of Milano-Bicocca*
Cloud Computing Role: lab instructor	Program: M.Sc. Computer Science	2019-2021 *University of Milano-Bicocca*

Software Analysis & Design Role: SLD personal tutor	Program: B.Sc. Computer Science	2019 *University of Milano-Bicocca*
Data Management & Visualization Role: lab instructor	Program: M.Sc. Data Science	2019 *University of Milano-Bicocca*
Computer Science Laboratory I Role: lab instructor	Program: B.Sc. Physics	2019 *University of Milano-Bicocca*
Distributed Systems Role: lab instructor	Program: B.Sc. Computer Science	2017-2019 *University of Milano-Bicocca*

SUPERVISION & MENTORING

In 2016 and 2017 I mentored on behalf of the KDE Community at the Google Summer of Code (GSoC) for two projects related to WikiToLearn, an open-source project for collaborative textbook writing that I was involved in at that time.
In my academic journey, I have been actively involved in co-supervision of several B.Sc. and M.Sc. students both at the University of Milano-Bicocca and TU Wien.

Philipp Rettig	Adaptive Federated Zeroth-Order Fine-Tuning of Large Language Models on Resource-Constrained Devices	Master Thesis TU Wien	ongoing
Victor Emmanuel Olusesi	Data-Driven Synthesis of Finite-State Machines for AI-Based Self-Adaptive Applications	Master Thesis TU Wien	ongoing
Marko Gugleta	Towards Livestock Location Prediction in Rural Areas using Federated Learning and Edge Computation	Master Thesis TU Wien	ongoing
Julia Oberauner	Dynamic Power Management in Edge AI: A Sustainable Self-Adaptive Approach	Master Thesis TU Wien	ongoing
Gabriele Sparacino	Achieving Prediction-Based Self-Adaptive Monitoring Wireless Sensor Networks	Master Thesis University of Milano-Bicocca	ongoing
Alexander Stefitz	Anomaly Detection in Redundant Sensor Systems: A Comparative Study Using Photovoltaic Power Plant Data	Master Thesis TU Wien	2024
Bryan Ivan Zhigui Guerrero	Model-driven Automatic Dashboard Generation	Master Thesis University of Milano-Bicocca	2024
Luigi Avenoso	Un Approccio per il Mantenimento dello Stato in Sistemi FaaS Decentralizzati	Master Thesis University of Milano-Bicocca	2024
Michel Benedetti	Scheduling Energy-Aware per Piattaforme a Container: Un Caso di Studio per Kubernetes	Master Thesis University of Milano-Bicocca	2023
Francesco Lenti	Profilazione, modellazione e previsione dello stato di un sistema in ambiente FaaS utilizzando tecniche di Machine Learning	Master Thesis University of Milano-Bicocca	2023
Vera Colombo	Peer-to-Peer monitoring in ambienti Fog: realizzazione e sperimentazione di un prototipo adattivo	Master Thesis University of Milano-Bicocca	2022

Mattia Vicenzi	Un'euristica distribuita per il controllo dei flussi di richieste in ambiente FaaS: un approccio basato su simulazione	Master Thesis University of Milano-Bicocca	2022
Omar Ghetti	Dynamic Dashboard Generator For Continuous Monitoring	Master Thesis University of Milano-Bicocca	2021
Davide Motterlini	Studio e realizzazione di un'architettura peer-to-peer per l'esecuzione decentralizzata di funzioni FaaS	Master Thesis University of Milano-Bicocca	2021
Federico Alessi	Smart Probes for Cloud Systems	Master Thesis University of Milano-Bicocca	2021
Lorenzo Di Vito	A Dynamic Dashboard Generator for Cloud Monitoring	Master Thesis University of Milano-Bicocca	2019
Chiara Castelnovo	Generazione Dichiarativa di Dashboard	Bachelor Thesis University of Milano-Bicocca	2019

SERVICES

Organizing Committee

- 1st International Workshop on Systems and Methods for Sustainable Large-Scale AI (GreenSys) 2025 [co-located with EuroSys]

Program Committee

- IEEE/ACM International Conference on Software Engineering (ICSE) 2025 [Artifact Evaluation Track]
- International Web Information Systems Engineering Conference (WISE) 2024 [Main Track, PhD Symposium]

Journal Reviewer

- ACM Transactions on Software Engineering and Methodology (TOSEM)
- Elsevier Information and Software Technology (IST)

External Reviewer

- IEEE International Parallel & Distributed Processing Symposium (IPDPS) 2025
- IEEE International Conference on Cloud Computing (CLOUD) 2024
- IEEE International Conference on Edge Computing & Communications (EDGE) 2024

HONORS & AWARDS

Best Short Paper Award	"Towards Model-Driven Dashboard Generation for Systems-of-Systems", 12th IEEE/ACM International Workshop on Software Engineering for Systems-of-Systems and Software Ecosystems	2024

Research Scholarship	I twice received the "O. Carlini" research scholarship, funded by the Consortium GARR, the Italian National Computer Network for Universities and Research (NREN).	2017 & 2018
Hackathon winner (People's choice prize)	Winner team (People's choice prize), HackTheCloud 2019: Developed a cloud-native application to enable and increase farm-to-table products through a certified and monitored supply chain.	2019
Hackathon winner (2nd prize)	Winner team (2nd prize), HackTheCloud 2018: Developed a cloud-native application to implement a car sharing companies aggregator with car pooling functionality.	2018
Hackathon winner	Winner team, Hack.Developers 2017: Developed a microservice to ingest data from Km4City/Replicate Smart City platform into the Data Analytics Framework (DAF).	2017

FUNDING (*under revision*)

Scientist-in-Charge	"AGENDA: Advancing Green Edge Networks and Datacenters for Sustainable European Industries" Marie Skłodowska-Curie Actions (MSCA) - Doctoral Network (HORIZON-MSCA-2024-DN-01-01) *European Union*	2024
Scientist in Consortium Partner	"Sustainable Adaptive Model Selector (SAMOS)" AI Ökosysteme 2024: AI for Tech & AI for Green - Cooperative R&D Project *Austrian Research Promotion Agency (FFG)*	2024

TALKS & PRESENTATIONS

Presentation	ReProbe: An Architecture for Reconfigurable and Adaptive Probes, **ICSA 2024**	June 2024 *Hyderabad, India*
Presentation	An Energy-Aware Approach to Design Self-Adaptive AI-based Applications on the Edge, **ASE 2023**	September 2023 *Luxembourg City, Luxembourg*
Guest lecture	Guest lecture for the course AI/ML in the Era of Climate Change	November 2023 *Vienna, Austria*
Presentation	Towards Self-Adaptive Peer-To-Peer Monitoring for Fog Environments, **SEAMS 2022**	May 2022 *Pittsburgh, USA (online)*
Presentation	DFaaS: Decentralized Function-as-a-Service for Federated Edge Computing, **CloudNet 2021**	November 2021 *Cookeville, USA (online)*
Presentation	Declarative Dashboard Generation, **GAUSS workshop (co-located with ISSRE 2020)**	October 2020 *Coimbra, Portugal (online)*
Presentation	VARYS - A Technology Agnostic Model-Driven Monitoring-as-a-Service Framework for the Cloud, **ESEC/FSE 2019**	August 2019 *Tallinn, Estonia*
Invited talk	Automazione e monitoring: la cultura DevOps attraverso due casi di studio, **GARR Workshop 2018**	May 2018 *Rome, Italy*

PUBLICATIONS

Preprints & under revision

Alessandro Tundo, Federica Filippini, Francesco Regonesi, Michele Ciavotta, and Marco Savi. "Decentralized Edge Workload Forecasting with Gossip Learning". *IEEE Transactions on Network and Service Management*. (1st round of revision).

Shashikant Ilager, Jakob Fahringer, Alessandro Tundo, and Ivona Brandic. "A Decentralized and Self-Adaptive Approach for Monitoring Volatile Edge Environments". *ACM Transactions on Autonomous and Adaptive Systems.* (2nd round of revision).

Daniel May, Alessandro Tundo, Shashikant Ilager, and Ivona Brandic 2024. "DynaSplit: A Hardware-Software Co-Design Framework for Energy-Aware Inference on Edge". *arXiv preprint arXiv:2410.23881.* (pre-print)

Maria Teresa Rossi, Alessandro Tundo, and Leonardo Mariani 2024. "What You Model is What You Get: A Model-Driven Dashboard Generation Approach". *Available at SSRN: https://ssrn.com/abstract=4971814 or http://dx.doi.org/10.2139/ssrn.4971814* (pre-print)

Journal articles

Alessandro Tundo, Marco Mobilio, Oliviero Riganelli, and Leonardo Mariani 2024. "Monitoring Probe Deployment Patterns for Cloud-Native Applications: Definition and Empirical Assessment". *IEEE Transactions on Services Computing, 17*(4), p.1636–1654.

Luca Gazzola, Maayan Goldstein, Leonardo Mariani, Marco Mobilio, Itai Segall, Alessandro Tundo, and Luca Ussi 2023. "ExVivoMicroTest: ExVivo Testing of Microservices". *Journal of Software Evolution and Process., 35*(4).

Alessandro Tundo, Marco Mobilio, Oliviero Riganelli, and Leonardo Mariani 2022. "Automated Probe Life-Cycle Management for Monitoring-As-a-Service". *IEEE Transactions on Services Computing, 16*(2), p.969–982.

Conference papers

Federico Alessi, Alessandro Tundo, Marco Mobilio, Oliviero Riganelli, and Leonardo Mariani 2024. "ReProbe: An Architecture for Reconfigurable and Adaptive Probes". In *21st IEEE International Conference on Software Architecture, ICSA 2024 - Companion, Hyderabad, India, June 4-8, 2024* (pp. 175–178). IEEE.

Maria Teresa Rossi, Alessandro Tundo, and Leonardo Mariani 2024. "Towards Model-Driven Dashboard Generation for Systems-of-Systems". In *Proceedings of the 12th ACM/IEEE International Workshop on Software Engineering for Systems-of-Systems and Software Ecosystems, SESoS 2024, Lisbon, Portugal, 14 April 2024* (pp. 9–12). ACM.

Alessandro Tundo, Marco Mobilio, Shashikant Ilager, Ivona Brandic, Ezio Bartocci, and Leonardo Mariani 2023. "An Energy-Aware Approach to Design Self-Adaptive AI-based Applications on the Edge". In *38th IEEE/ACM International Conference on Automated Software Engineering, ASE 2023, Luxembourg, September 11-15, 2023* (pp. 281–293). IEEE.

Marco Savi, Alessandro Banfi, Alessandro Tundo, and Michele Ciavotta 2022. “Serverless Computing for NFV: Is it Worth it? A Performance Comparison Analysis”. In *2022 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events, PerCom 2022 Workshops, Pisa, Italy, March 21-25, 2022* (pp. 680–685). IEEE.

Vera Colombo, Alessandro Tundo, Michele Ciavotta, and Leonardo Mariani 2022. “Towards Self-Adaptive Peer-to-Peer Monitoring for Fog Environments”. In *International Symposium on Software Engineering for Adaptive and Self-Managing Systems, SEAMS 2022, Pittsburgh, PA, USA, May 22-24, 2022* (pp. 156–166). ACM/IEEE.

Michele Ciavotta, Davide Motterlini, Marco Savi, and Alessandro Tundo 2021. “DFaaS: Decentralized Function-as-a-Service for Federated Edge Computing”. In *10th IEEE International Conference on Cloud Networking, CloudNet 2021, Cookeville, TN, USA, November 8-10, 2021* (pp. 1–4). IEEE.

Oliviero Riganelli, Paolo Saltarel, Alessandro Tundo, Marco Mobilio, and Leonardo Mariani 2021. “Cloud Failure Prediction with Hierarchical Temporal Memory: An Empirical Assessment”. In *20th IEEE International Conference on Machine Learning and Applications, ICMLA 2021, Pasadena, CA, USA, December 13-16, 2021* (pp. 785–790). IEEE.

Alessandro Tundo, Chiara Castelnovo, Marco Mobilio, Oliviero Riganelli, and Leonardo Mariani 2020. “Declarative Dashboard Generation”. In *2020 IEEE International Symposium on Software Reliability Engineering Workshops, ISSRE Workshops, Coimbra, Portugal, October 12-15, 2020* (pp. 215–218). IEEE.

Paul Veitch, Adam Broadbent, Angelos Mimidis, José Soler, Marco Mobilio, Alessandro Tundo, Michell Guzman, and Steven van Rossem 2019. “NGPaaS Framework for Enriched and Customized Virtual Network Functions-as-a-Service”. In *European Conference on Networks and Communications, EuCNC 2019, Valencia, Spain, June 18-21, 2019* (pp. 42–46). IEEE.

Marco Mobilio, Matteo Orrù, Oliviero Riganelli, Alessandro Tundo, and Leonardo Mariani 2019. “Anomaly Detection As-a-Service”. In *IEEE International Symposium on Software Reliability Engineering Workshops, ISSRE Workshops 2019, Berlin, Germany, October 27-30, 2019* (pp. 193–199). IEEE.

Alessandro Tundo, Marco Mobilio, Matteo Orru, Oliviero Riganelli, Michell Guzmán, and Leonardo Mariani 2019. “VARYS: an agnostic model-driven monitoring-as-a-service framework for the cloud”. In *Proceedings of the ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering, ESEC/SIGSOFT FSE 2019, Tallinn, Estonia, August 26-30, 2019* (pp. 1085–1089). ACM.