Gianluca Aguzzi —
Postdoctoral Researcher

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Current Placement

Alma Mater Studiorum – University of Bologna **Cesena**
Postdoctoral Fellow (“assegno di ricerca”) *2023 November – 2025 November*
Currently appointed as a Postdoctoral Research Fellow in the COMMONS-WEARS project (funded as a PRIN), focusing on the engineering collective applications in complex, layered environments with multi-mobile edge computing architectures.

Research Profile

My research sits at the intersection of *collective adaptive systems engineering* (software engineering) and *machine learning* methodologies for distributed system. Particularly, my work contributes to several specific areas:

- **Software Engineering for Collective Behaviors:** In this research area, I focus on advancing the macroprogramming paradigm (programming systems from a global perspective) in the context of very large distributed systems (e.g., swarm robotics, smart cities). I propose novel solutions for managing groups of robots in a distributed way based on spatial computing principles [6], along with new programming approaches through frameworks like Macroswarm [1]. My work includes fundamental research on how to engineer such applications, leading to foundational publications on collective autonomy [36] and comprehensive roadmaps for future development [4]. This research covers several aspects of the programming pipeline, including runtime monitoring for system safety [11], programming frameworks like ScaFi [8] and Macroswarm [24] and others [12, 34], novel reactive models for swarm programming [27], and the development of novel architectural patterns for collective computation [7].
- **Hybrid Methodologies for Collective Intelligence:** In this research area, building on the advancements from my work on collective behaviors, I integrate machine learning solutions to improve currently manual design approaches. The goal is to both enhance system adaptability (through learning) and improve overall efficiency. This integration was first outlined through comprehensive roadmaps [30, 33], then implemented in several ways: leveraging Multi-Agent Reinforcement Learning (MARL) for program synthesis [31], improving macroprogramming execution with scheduling learned via MARL [29], and enhancing current MARL solutions for swarms by using macroprogramming as a way to represent agent state [25].
- **Advanced Methodologies for Cooperative and Scalable Learning:** Based on the insights gained from programming scalable systems with macroprogramming, I bring these advancements to *cooperative learning*, highlighting the need for scalable solutions. In this regard, I propose novel MARL approaches based on neighborhood policies [21] and explore new federated learning solutions that avoid central points of failure [16, 17] (work that led to a Marie Curie project with an associated Seal of Excellence award). In this area, I also proposed novel framework for cooperative many agent deep reinforcement learning in Scala [28] and novel simulation pipeline for large-scale systems [18].
- **Generative AI for Modern Applications:** This area represents a natural continuation of my previous work, particularly focusing on how to use generative AI for designing modern distributed applications. Initial work explores how to integrate small LLMs in chatbots for healthcare management [3, 2]. During this period, I’ve also supervised several theses on code generation with LLMs for domain-specific languages, with the aim of integrating these advancements with macroprogramming paradigms to further enhance collective system development.

Bibliometrics:

- **H-index:** 10 (Google Scholar), 8 (Scopus)
- **Citations:** 236 (Google Scholar), 155 (Scopus)

Education

Alma Mater Studiorum – University of Bologna **Cesena**
PhD in Computer Science and Software Engineering, with distinction *2020–2023*
My doctoral research centered on the design and engineering of large-scale systems, leveraging aggregate computing and advanced machine learning methods. Specifically, I investigated the integration of multi-agent reinforcement learning within cyber-pysical swarms–complex systems comprising numerous interacting agents operating in dynamic environments.

Thesis: *A language-based software engineering approach for cyber-physical swarms*

Supervisors: *Mirko Viroli*

Alma Mater Studiorum – University of Bologna **Cesena**
Master in Computer Science and Software Engineering, 110 cum Laude *2018–2020*
In this master I focused on the study of programming languages, software engineering, and distributed systems. I also explored the application of aggregate computing in the development of large-scale systems. Moreover, I developed a strong interest in the application of machine learning algorithms in the context of distributed systems, particularly in the field of multi-agent reinforcement learning.

Awards: *Best Master Thesis, Ca Foscari Award*

Thesis: *Scafi web: a Scala-JavaScript platform for executing, simulating, and controlling aggregate computing systems*

Supervisors: *Mirko Viroli, Roberto Casadei*

Alma Mater Studiorum – University of Bologna **Cesena**
Bachelor in Computer Science and Software Engineering, 110 cum Laude *2015–2018*

Awards: *Prize for Meritous Students*

Thesis: *Sviluppo di un front-end di simulazione per applicazioni aggregate nel framework Scafi*

Supervisors: *Mirko Viroli, Roberto Casadei*

ITIS E. Mattei. **Urbino**
High School on Computer Science, 100 *2015–2018*

Publications

Journals

[1] Gianluca Aguzzi and Mirko Viroli. Macroswarm: A scala framework for swarm programming. *Science of Computer Programming*, 239:103182, 2025. **Q2** (Scimago).

[2] Matteo Magnini, Gianluca Aguzzi, Sara Montagna, et al. Open-source small language models for personal medical assistant chatbots. *INTELLIGENCE-BASED MEDICINE*, (100197), 2025. **Q2** Scimago.

[3] Sara Montagna, Gianluca Aguzzi, Stefano Ferretti, Martino Francesco Pengo, Lorenz Cuno Klopfenstein, Michelangelo Ungolo, and Matteo Magnini. Privacy-preserving llm-based chatbots for hypertensive patient self-management. *Smart Health*, 2025. **In press (accepted), Q2**.

[4] Roberto Casadei, Gianluca Aguzzi, Giorgio Audrito, Ferruccio Damiani, Danilo Pianini, Giordano Scarso, Gianluca Torta, and Mirko Viroli. Software engineering for collective cyber-physical ecosystems. *ACM Transactions on Software Engineering and Methodology*, 2024. **Q1** (Scimago).

[5] Davide Domini, Filippo Cavallari, Gianluca Aguzzi, and Mirko Viroli. Scarlib: Towards a hybrid toolchain for aggregate computing and many-agent reinforcement learning. *Science of Computer Programming*, 238:103176, 2024. **Q2** (Scimago).

[6] Gianluca Aguzzi, Giorgio Audrito, Roberto Casadei, Ferruccio Damiani, Gianluca Torta, and Mirko Viroli. A field-based computing approach to sensing-driven clustering in robot swarms. *Swarm Intelligence*, 17(1):27–62, 2023. **Q2** (Scimago).

[7] Gianluca Aguzzi, Roberto Casadei, Danilo Pianini, and Mirko Viroli. Dynamic decentralization domains for the internet of things. *IEEE Internet Computing*, 26(6):16–23, 2022. **Q1** (Scimago).

[8] Roberto Casadei, Mirko Viroli, Gianluca Aguzzi, and Danilo Pianini. Scafi: A scala dsl and toolkit for aggregate programming. *SoftwareX*, 20:101248, 2022. **Q2** (Scimago).

[9] Roberto Casadei, Gianluca Aguzzi, and Mirko Viroli. A programming approach to collective autonomy. *Journal of Sensor and Actuator Networks*, 10(2):27, 2021. **Q1** (Scimago).

Conference, Workshops, and Chapters

[10] Davide Domini, Gianluca Aguzzi, Lukas Esterle, and Mirko Viroli. Fbfl: A field-based coordination approach for data heterogeneity in federated learning. *Preprint, under review to LMCS*, 2025.

[11] Gianluca Aguzzi, Giorgio Audrito, and Mirko Viroli. Optimising aggregate monitors for spatial logic of closure spaces properties. In *Proceedings of the 7th ACM International Workshop on Verification and Monitoring at Runtime Execution*, pages 25–31, 2024.

[12] Gianluca Aguzzi, Roberto Casadei, Matteo Cerioni, and Mirko Viroli. Scafi-blocks: A visual aggregate programming environment for low-code swarm design. In *International Conference on Coordination Models and Languages*, pages 258–276. Springer Nature Switzerland Cham, 2024.

[13] Gianluca Aguzzi, Roberto Casadei, Stefano Mariani, Mirko Viroli, and Franco Zambonelli. Learning opportunities in collective adaptive systems. In *Fluidware: Novel Approaches for Large-Scale IoT Systems*, pages 179–199. Springer International Publishing Cham, 2024.

[14] Gianluca Aguzzi, Matteo Magnini, Giuseppe Pio Salcuni, Stefano Ferretti, Sara Montagna, et al. Applying retrieval-augmented generation on open llms for a medical chatbot supporting hypertensive patients. In *Proceedings of the 3rd AIxIA Workshop on Artificial Intelligence ForHealthcare (HC@ AIxIA 2024) co-located with the 23rd InternationalConference of the Italian Association for Artificial Intelligence (AIxIA 2024), Bolzano, Italy, 27-28 November 2024*, volume 3880, pages 189–201. CEUR-WS. org, 2024.

[15] Gianluca Aguzzi and Claudio Savaglio. Engineering distributed collective intelligence in cyber-physical swarms. In *2024 20th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT)*, pages 570–575. IEEE, 2024.

[16] Davide Domini, Gianluca Aguzzi, Lukas Esterle, and Mirko Viroli. Field-based coordination for federated learning. In *International Conference on Coordination Models and Languages*, pages 56–74. Springer Nature Switzerland Cham, 2024.

[17] Davide Domini, Gianluca Aguzzi, Nicolas Farabegoli, Mirko Viroli, and Lukas Esterle. Proximity-based self-federated learning. In *2024 IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS)*, pages 139–144. IEEE, 2024.

[18] Davide Domini, Gianluca Aguzzi, Danilo Pianini, and Mirko Viroli. A reusable simulation pipeline for many-agent reinforcement learning. In *28th IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications, DS-RT 2024, Urbino, October 5-9, 2024*. IEEE, 2024.

[19] Davide Domini, Nicolas Farabegoli, Gianluca Aguzzi, Mirko Viroli, M Alderighi, M Baldoni, C Baroglio, R Micalizio, and S Tedeschi. Towards intelligent pulverized systems: a modern approach for edge-cloud services. In *Proceedings of the 25th Workshop "From Objects to Agents", Bard (Aosta), Italy, July 8–10, 2024, ser. CEUR Workshop Proceedings*, volume 3735, pages 233–251, 2024.

[20] Denys Grushchak, Jenna Kline, Danilo Pianini, Nicolas Farabegoli, Gianluca Aguzzi, Martina Baiardi, and Christopher Stewart. Decentralized multi-drone coordination for wildlife video acquisition.

In *2024 IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS)*, pages 31–40. IEEE, 2024.

[21] Nicolo Malucelli, Davide Domini, Gianluca Aguzzi, and Mirko Viroli. Neighbor-based decentralized training strategies for multi-agent reinforcement learning. In *Proceedings of the 40th ACM/SIGAPP Symposium on Applied Computing, SAC 2025, Catania, Italy, March 31-April 4, 2025*, pages 3–10. ACM, 2024.

[22] Sara Montagna, Gianluca Aguzzi, Stefano Ferretti, Martino Francesco Pengo, Lorenz Cuno Klopfenstein, Michelangelo Ungolo, and Matteo Magnini. Llm-based solutions for healthcare chatbots: a comparative analysis. In *2024 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops)*, pages 346–351. IEEE, 2024.

[23] Danilo Pianini, Roberto Casadei, Stefano Mariani, Gianluca Aguzzi, Mirko Viroli, and Franco Zambonelli. Space-fluid and time-fluid programming. In *Fluidware: Novel Approaches for Large-Scale IoT Systems*, pages 107–134. Springer International Publishing Cham, 2024.

[24] Gianluca Aguzzi, Roberto Casadei, and Mirko Viroli. Macroswarm: a field-based compositional framework for swarm programming. In *International Conference on Coordination Languages and Models*, pages 31–51. Springer Nature Switzerland Cham, 2023.

[25] Gianluca Aguzzi, Mirko Viroli, and Lukas Esterle. Field-informed reinforcement learning of collective tasks with graph neural networks. In *2023 IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS)*, pages 37–46. IEEE, 2023.

[26] Roberto Casadei, Gianluca Aguzzi, Danilo Pianini, and Mirko Viroli. Programming (and learning) self-adaptive & self-organising behaviour with scafi: for swarms, edge-cloud ecosystems, and more. In *2023 IEEE International Conference on Autonomic Computing and Self-Organizing Systems Companion (ACSOS-C)*, pages 33–34. IEEE, 2023.

[27] Roberto Casadei, Francesco Dente, Gianluca Aguzzi, Danilo Pianini, and Mirko Viroli. Self-organisation programming: a functional reactive macro approach. In *2023 IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS)*, pages 87–96. IEEE, 2023.

[28] Davide Domini, Filippo Cavallari, Gianluca Aguzzi, and Mirko Viroli. Scarlib: A framework for cooperative many agent deep reinforcement learning in scala. In *International Conference on Coordination Languages and Models*, pages 52–70. Springer Nature Switzerland Cham, 2023.

[29] Gianluca Aguzzi, Roberto Casadei, and Mirko Viroli. Addressing collective computations efficiency: Towards a platform-level reinforcement learning approach. In *2022 IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS)*, pages 11–20. IEEE, 2022.

[30] Gianluca Aguzzi, Roberto Casadei, and Mirko Viroli. Machine learning for aggregate computing: a research roadmap. In *2022 IEEE 42nd International Conference on Distributed Computing Systems Workshops (ICDCSW)*, pages 119–124. IEEE, 2022.

[31] Gianluca Aguzzi, Roberto Casadei, and Mirko Viroli. Towards reinforcement learning-based aggregate computing. In *International Conference on Coordination Languages and Models*, pages 72–91. Springer Nature Switzerland Cham, 2022.

[32] Roberto Casadei, Danilo Pianini, Gianluca Aguzzi, Giorgio Audrito, Gianluca Torta, Marco Ottina, Ferruccio Damiani, and Mirko Viroli. Towards automated engineering for collective adaptive systems: Vision and research directions. In *2022 IEEE Intl Conf on Dependable, Autonomic and Secure Computing, Intl Conf on Pervasive Intelligence and Computing, Intl Conf on Cloud and Big Data Computing, Intl Conf on Cyber Science and Technology Congress (DASC/PiCom/CBDCom/CyberSciTech)*, pages 1–6. IEEE, 2022.

[33] Gianluca Aguzzi. Research directions for aggregate computing with machine learning. In *2021 IEEE International Conference on Autonomic Computing and Self-Organizing Systems Companion (ACSOS-C)*, pages 310–312. IEEE, 2021.

[34] Gianluca Aguzzi, Roberto Casadei, Niccolò Maltoni, Danilo Pianini, and Mirko Viroli. Scafi-web: a web-based application for field-based coordination programming. In *International Conference on Coordination Languages and Models*, pages 285–299. Springer International Publishing Cham, 2021.

[35] Gianluca Aguzzi, Roberto Casadei, Danilo Pianini, Guido Salvaneschi, and Mirko Viroli. Towards pulverised architectures for collective adaptive systems through multi-tier programming. In *2021 IEEE International Conference on Autonomic Computing and Self-Organizing Systems Companion (ACSOS-C)*, pages 99–104. IEEE, 2021.

[36] Roberto Casadei, Gianluca Aguzzi, and Mirko Viroli. A programming approach to collective autonomy. *Journal of Sensor and Actuator Networks*, 10(2):27, 2021.

[37] Giovanni Delnevo, Gianluca Aguzzi, Simone Letizi, Marta Luffarelli, Andrea Petreti, and Silvia Mirri. Encouraging users in waste sorting using deep neural networks and gamification. In *Proceedings of the Conference on Information Technology for Social Good*, pages 230–235, 2021.

Scientific Activities

Organisation in International Conferences

Poster and Demo Session Organiser
Autonomic Computing and Self-Organizing Systems – ACSOS *2025*

Program Chair Committe
Workshop on DTs ecosystems and Application – Digita *2025*

Program Chair Committe
Workshop on Neuro-Symbolic Software Engineering – NSE *2024*

Artifact Evaluation Committee
International Conference on Software Language Engineering – SLE *2024*

Demo and Poster Committee
Autonomic Computing and Self-Organizing Systems – ACSOS *2024*

Organising Chair Committe
Workshop on DIStributed COLlective Intelligence – DISCOLI *2024*

Program Chair Committe
Workshop on Medical Applications with DTs and Edge-cloud Continuum – MADTECC *2024*

Artifact Evaluation Committee
International Conference on Pervasive Computing and Communications – PerCom *2023*

Program Chair Committe
Workshop on DIStributed COLlective Intelligence – DISCOLI *2023*

Artifact Evaluation Committee
International Conference on Coordination Models and Languages – DisCoTec *2022*

Artifact Evaluation Committee
International Conference on Autonomic Computing and Self-Organizing Systems – ACSOS *2021*

Presentations in International Conferences

COORDINATION 2024
Scafi-blocks: A visual aggregate programming environment for low-code swarm design [12]

DISCOLI 2024
Engineering distributed collective intelligence in cyber- physical swarms [15]

ACSOS 2023
Field-informed Reinforcement Learning of Collective Tasks with Graph Neural Networks [25]

COORDINATION 2023
Macroswarm: A field-based compositional framework for swarm programming [24]

COORDINATION 2023
Scarlib: A framework for cooperative many agent deep reinforcement learning in Scala [28]

ACSOS 2022
Addressing Collective Computations Efficiency: Towards a Platform-level Reinforcement Learning Approach [29]

DISCOLI 2023
Machine learning for aggregate computing: a research roadmap [30]

COORDINATION 2022
Towards reinforcement learning-based aggregate computing [31]

Doctoral Symposium International @ ACSOS 2021
Research directions for aggregate computing with machine learning [33]

COORDINATION 2021
ScaFi-Web: A Web-Based Application for Field-Based Coordination Programming [34]

Awards

European Commission
Seal of Excellence (Marie Curie) *2025*

ACSOS 2024
Best Poster Award *2024*
https://github.com/DanySK/poster-2024-acsos-imageonomics-drones

Sergio Focardi Awards **Thesis:**
Best Master Thesis *2023*
Scafi web: a Scala-JavaScript platform for executing, simulating, and controlling aggregate computing systems*https://www.serinar.unibo.it/gianluca-aguzzi-si-aggiudica-la-ii-edizione-del-premio-di-laurea-sergio-focardi/*

Visiting

Aarhus University – Lukas Esterle **Aarhus, Denmark**
Visiting PhD *August 2023 - November 2023 (3 months)*
During my visit abroad, I focused on applying graph neural networks to develop distributed controllers. This research culminated in the publication of the paper entitled "Field-informed reinforcement learning of collective tasks with graph neural network". Furthermore, I continued collaboration on federated learning for large-scale systems, an effort that also led to the Marie Curie Seal of Excellence.

Volunteering

Student Volunteer
International Conference on Distributed Computing Systems - ICDCS *2022*

Student Volunteer
Internation Conference on Autonomic Computing and Self-Organising Systems - ACSOS *2022*

Review Activity

Reviewer for several scientific journals
Science of Computer Programming, Scientific Programming, Frontiers in Robotics and AI, Hindawi, Autonomous Agents and Multi-Agent Systems, Transactions on Autonomous and Adaptive Systems, PeerJ Computer Science, Journal of Medical Systems

Reviewer for international conferences and Workshop
COORDINATION, ACSOS, AAMAS, PerCom, SAC, ICAART

Reviewer for international workshops
ASE NIER, MADTECC, Digita, DISCOLI, AIxIA, NSE

Research Group Collaboration

Prof. Mirko Viroli
University of Bologna *2021 -*
In Prof. Viroli's research group, my activities have mainly focused on the topics of aggregate computing and multi-agent reinforcement learning applied to cyber swarms systems.

Prof. Ferruccio Damiani
University of Turin *2021 -*
In Ferruccio Damini's group, our primary focus was on the application of aggregate computing in swarm robotics. This fruitful collaboration resulted in the publication of the paper titled "A field-based computing approach for sensing-driven clustering in robot swarms."

Prof. Guido Salvaneschi
St. Gallen University, Switzerland *2021*
In collaboration with Guido Salvaneschi, we endeavoured to expand the concepts of pulverized architecture through multitier programming languages. Our joint efforts culminated in the publication of the paper titled "Towards Pulverized Architectures for Collective Adaptive Systems through Multi-tier Programming"

Prof. Lukas Esterle
Aarhus Universitat, Denmark *2022 -*
Throughout my time abroad, our research was centred around exploring distributed collective intelligence within the realm of large-scale systems. Our primary emphasis was on the application of graph neural networks for developing distributed controllers.

PhD Schools

Bertinoro Summer School
PhD Summer School *2023*

10^{th} DeepLearn Summer School
PhD Summer School *2023*

22^{nd} European Agent Systems Summer School
PhD Summer School *2021*

Software Projects

Designer of Macroswarm [1]
It is a field-based compositional framework for swarm programming. *2023 – today*
`https://github.com/scafi/macro-swarm`

CO-designer of FRASP [27]
It is a framework for reactive self-organizing programming *2023 – todat*
`https://github.com/cric96/distributed-frp`

Designer of Scarlib [5]
It is a framework for cooperative many agent deep reinforcement learning in Scala *2023 – today*
`https://github.com/ScaRLib-group/ScaRLib`

Co-designer and main contributor of ScaFi-Web [34]
It is a web-based application allowing in-browser editing and execution of ScaFi programs. *2021 – today*
`https://github.com/scafi/scafi-web`

Designer of scalapy-gym
It is a Scala facade that enable the usage of open ai gyms in the JVM! *2021 – today*
`https://github.com/cric96/scalapy-gym`

Open Source Contributions

Development of GUI & simulator for ScaFi *2018 – today*
`https://github.com/scafi/scafi`

Contributions to ScaFi incarnations in Alchemist *2021 – today*
`https://github.com/AlchemistSimulator/Alchemist`

Teaching

Courses

Advanced Software Design and Modelling – 20 hours (teaching module) **University of Bologna**
Laurea Magistrale in Ingegneria e Scienze Informatiche *2024 - 2025*
In this advanced course, I lead modules on integrating generative AI into software engineering practices, with particular emphasis on leveraging large language models for automated code generation, design pattern implementation, and technical documentation. Additionally, I teach cutting-edge reinforcement learning concepts with focus on multi-agent systems and distributed intelligence architectures, preparing students for applying these technologies in complex software environments.

Software Design and Development – 60 hours (in charge) **University of Bologna**
Laurea Professionalizzante in Tecnologie dei Sistemi Informatici *2024 - 2025*
In this course, I teach fundamental software design and development principles, emphasizing object-oriented programming concepts, design patterns, and agile methodologies. The curriculum covers software architecture, testing strategies, and best practices for building maintainable and scalable applications. Students engage in hands-on projects to apply theoretical knowledge to real-world software development challenges.

Software Design and Development – 30 hours (teaching module) **University of Bologna**
Laurea Professionalizzante in Tecnologie dei Sistemi Informatici *2023 - 2024*
In this course, I teach fundamental software design and development principles, emphasizing object-oriented programming concepts, design patterns, and agile methodologies. The curriculum covers software architecture, testing strategies, and best practices for building maintainable and scalable applications. Students engage in hands-on projects to apply theoretical knowledge to real-world software development challenges.

Advanced School in Artificial Intelligence `https://asai-er.github.io/services/docenti/`
Introduction to Reinforcement Learning – 4 hours *July 2023*

Tutoring

Concurrent and Distributed Programming **University of Bologna**
Master in Computer Science and Engineering – 30 hours *2022–today*

Programming and Development Paradigms **University of Bologna**
Master in Computer Science and Engineering – 30 hours *2022–today*

CRIAD Coding **Grade schools**
Snap! courses *2018 - 2019*

Thesis (Co)Supervisor - Selected

Master Thesis, Student: Luce Deluigi *2024*
Design and implementation of a scalable domain specific language foundation for ScaFi with Scala 3.

Master Thesis, Student: Davide Domini *2024*
Aggregate Computing and Many-Agent Reinforcement Learning: Towards a Hybrid Toolchain

Master Thesis, Student: Francesco Dente *2023*
A functional-reactive perspective on the Aggregate Computing paradigm

Master Thesis, Student: Giacomo Cavalieri *2023*
Gestione degli effetti in linguaggi di programmazione funzionale: tecniche di modellazione e interpretazione

Bachelor Thesis, Student: Cerioni, Matteo *2022*
Progettazione di un ambiente di programmazione visuale block-based per ScaFi.

Bachelor Thesis, Student: Mancini, Kevin *2022*
ScaFi: Integration and Performance Analysis with Scala Native.

For a complete list of supervised theses, please visit AMS thesis: `https://amslaurea.unibo.it/view/relatore/Aguzzi=3AGianluca=3A=3A/`

Talks

Multi-Agent Reinforcement Learning - Introduction *2024*

Advanced Software Modelling and Design

Deep Reinforcement Learning – Introduction *2024*
Fundamentals of Artifical Intellingence - University of Urbino

It's all about effects - Effect systems in Functional Programming *2024*
Advanced Software Modelling and Design

Leveraging Large Language Models in Software Engineering *2024*
Advanced Software Modelling and Design

Multi-Agent Reinforcement Learning, Unleashing Collective Intelligence *2023*
Advanced School in Artificial Intelligence Summer School

Intro to Deep Reinforcement Learning *2023*
Fundamentals of Artifical Intellingence - University of Urbino

Engineering Cyber-Physical Swarm *2022*
DIGIT lunch meetings – Aarhus Universitat

Multi-Agent Reinforcement Learning, Introduction *2022*
Talk @ Pervasive Computing - University of Bologna

Scala to the large *2022*
Programming and Development Paradigms - University of Bologna

Cross Platform in Scala *2022*
Programming and Development Paradigms - University of Bologna

On Collective Reinforcement Learning *2021*
Alma Mater Studiorum – University of Bologna

Talk @ Pervasive Computing

MVC meets Monad *2021*
Programming and Development Paradigms – University of Bologna

Create your own video game in Snap! *2019*
Orientation Fair - Forlì

Technical Skills

Programming Languages

●●●●● **Scala**	:	●●●●● **Kotlin**	:	●●●●● **TypeScript**	:
●●●●● **Java**	:	●●●●● **JavaScript**	:	●●●●● **Haskell**	:
●●●●● **C#**	:	●●●●● **Bash**	:	●●●●● **C++**	:
●●●●● **C**	:	●●●●● **Prolog**	:		

Other Languages

●●●●● **HTML**	:	●●●●● **Markdown**	:	●●●●● **SPARQL**	:
●●●●● **XML**	:	●●●●● **LaTeX**	:	●●●●● **YAML**	:
●●●●● **JSON**	:	●●●●● **OWL**	:	●●●●● **SQL**	:
●●●●● **RDF**	:				

Libraries

●●●●● **Scala.js**	:	●●●●● **Monix**	:	●●●●● **ScalaPy**	:
●●●●● **Tensorflow**	:	●●●●● **Matplotlib**	:	●●●●● **Cats**	:
●●●●● **Pytorch**	:	●●●●● **Akka**	:	●●●●● **ZIO**	:
●●●●● **OpenAI Gym**	:				

Software Tools

●●●●● **Gimp**	:	●●●●● **Inkscape**	:	●●●●● **NPM**	:
●●●●● **Git**	:	●●●●● **Blender**	:	●●●●● **SBT**	:
●●●●● **GHA**	:	●●●●● **OWL**	:	●●●●● **Hugo**	:
●●●●● **Docker**	:	●●●●● **Kdenlive**	:	●●●●● **Gradle**	:

Miscellaneous

Presentation at GENERARE *2025*

Delivered an engaging talk on Large Language Models, demystifying advanced concepts for a broader audience.

Presenting Aggregate Computing @ Researcher Night *2024*

In that occasion I presented Aggregate Computing with physical robots highlighting the potential of the paradigm.

Scala Italy 2023 *2023*

Scala in machine learning scenario: a personal experience

Student class representative @ Alma Mater Studiorum *2020*

Presenting Snap! @ Researcher Night *2018*

In that occasion I presented Snap! to the public as a tool for teaching the computational thinking to the youngest.