

Roberto Casadei, PhD

CV (2023–04–02)

Assistant Professor



Overview (highlights)

Current position: Assistant Professor (RTD-A)

2022/02 → 2025/01

Theme Techniques & strategies for Green Autonomic Internet of Things

Università di Bologna (IT)

Education: PhD in Computer Science and Engineering

2016/11 → 2020/04

Thesis Engineering Self-* Collective Processes for Cyber-Physical Ecosystems Università di Bologna (IT)

Research record & recent service:

Bibliometrics: 54+ in journals/conf.proceedings; H-index 18 (gscholar),

Organisation: DISCOLI'23 Workshop Chair; eCAS'21 Workshop Chair; ACSOS'22 Proceedings Chair; DisCoTec'23 AEC Chair; PC member of AAAI'23/SAC'23/ACSOS'23/...

Editorial: Topical Advisory Board of Electronics

Teaching

- Software Design & Development (B. in Computer Systems Technologies, UNIBO) a.y. 22-23
- Object-Oriented Programming (B. in Computer Science & Eng., UNIBO) a.y. 22-23
- Foundations of Informatics (B. in Electrical/Biomedical Engineering) a.y. 22-23

Open-source/academic software projects

Notably SCAFI aggregate programming toolkit (Lead Developer), Alchemist simulator (Contributor)

Research & Education experience abroad

2018 TU Wien (Austria) – Visiting PhD student (2 mo)

2017 University of St Andrews (Scotland) – Visiting PhD student (3 mo)

2012 University of Limerick (Ireland) – Erasmus Programme (4 mo)

Scholarships, awards, qualifications, and (public) competitions

Awards ECOOP'22 Distinguished Artifact; IEEE TCSC Outstanding PhD Thesis; Prize G. Bassi'17

Scholarships PhD scholarship (MIUR); Mobility Grants (MarcoPolo, conferences)

Qualifications Associate professor 09/H1 & 01/B1 (ASN 21-23); High-school professor A041

Competitions RTD-A; STEM A041 (1st winner); PhD admission/funding (1st winner)

Recent activity

Summary I am currently a research fellow (RTD-A) at the Department of Computer Science & Engineering of the University of Bologna (UNIBO). I got the qualification as associate professor for 09/H1 and 01/B1 (ASN Fascia II) in 2022/23. I have 54+ publications at international journals and conferences; my current H-Index is 18 (GScholar), 15 (SCOPUS). I got a PhD in CS & Eng. from UNIBO, with a thesis on awarded by the IEEE TCSC. I have been a visiting PhD student at the University of St Andrews (refereed by Prof. Simon Dobson) and at TU Wien (refereed by Prof. Schahram Dustdar). I got awards for research, service, and as a student. I am Adjunct Professor in various courses at BEng Degrees in Computer Science and Engineering.

Research Themes in a Nutshell

In a nutshell, my research interests and activity revolve around two main themes: **software engineering** and **distributed artificial intelligence**. In particular, I focus on paradigms, models, and techniques fostering intelligence and autonomy in socio-technical systems. My research may be considered in the context of fields like multi-agent systems, distributed cyber-physical systems, self-* systems, and collective intelligence.

Qualifications

(ASN Fascia II) National Scientific qualification as associate professor in the Italian higher education system (Call 2021/2023, Ministerial Decree n. 553/2021 and 589/2021) for the disciplinary field of 01/B1 - Informatics

2023-02 → 2033-02

I got this qualification by passing a CV evaluation by a committee on the basis of bibliometrics, publications, and qualifications.

(ASN Fascia II) National Scientific qualification as associate professor in the Italian higher education system (Call 2021/2023, Ministerial Decree n. 553/2021 and 589/2021) for the disciplinary field of 09/H1 - Information processing systems

2022-02 → 2031-02

I got this qualification by passing a CV evaluation by a committee on the basis of bibliometrics, publications, and qualifications.

Qualification for teaching *Computer Science and Technologies* (c.c. A041) in Italian Secondary School

since 2021

I got this qualification by passing the ordinary public competition for STEM subjects in 2021 (see section on public competitions).

Public Competitions

1st WINNER - Public Competition for a Position of Fixed-Term Junior Researcher (RTD-A) on project “Techniques & strategies for Green Automatic Internet of Things (GA-IoT)”, Department of Computer Science and Engineering (DISI), Alma Mater Studiorum–Università di Bologna
Comparative evaluation by qualifications and public discussion.

2021
Cesena

1st WINNER - Ordinary Public Competition for Recruitment (and Qualification) of Secondary School Teachers - STEM (Science, Technology, Engineering and Mathematics) - cf. D.D. n.499 21/4/2020 (art.59 c.14 d.l. 73/2021) - Competition class A041 (Computer science and technologies) - Region: Emilia-Romagna, Italy

2021
Modena

I won the public regional competition at position 1 with a score of 192/200 points after one written part (a test of 50 questions about computer science topics like computational models, operating systems, networks, programming, and web technologies) and one oral part (about the design of a didactical activity).

1st WINNER - Public Competition for Admission to the PhD Programme in Computer Science and Engineering, Alma Mater Studiorum–Università di Bologna

2016
Bologna

Comparative evaluation by qualifications and public discussion.

Research Community Service

Editorial roles

Frontiers in Robotics & AI (Q2) - Guest Associate Editor - “Mobile Cyber-Physical Collectives” 2021–2022

I am guest associate editor for a special issue, also called a research topic, entitled “Mobile Cyber-Physical Collectives”. I have prepared, together with Prof. Lukas Esterle, the special issue proposal, contacted potential authors, run publicity campaigns, and been handling the review activity for submitted papers.

Metrics: Scimago Quartile 2021: Q2.

MDPI Electronics (Q2) - Topical Advisory Panel Member 2021–
MDPI Electronics Journal

Core responsibilities include: (1) providing regular reviews; (2) setting up special issues; (3) providing support for special issues; (4) promoting the journal e.g. at conferences; (5) supporting editorial board members.

MDPI Electronics (Q2) - Topic Board Member 2020–2021
MDPI Electronics Journal - Topic Editors

Event Chairing

DISCOLI'23 Workshop Chair 2022
2nd DISCOLI Workshop on DIStributed COLlective Intelligence (co-located with Pafos, Cyprus

the 19th International Conference on Distributed Computing in Smart Systems and the Internet of Things, DCOSS-IoT'23).

As Workshop Chair, I have prepared/submitted the workshop proposal, run publicity campaigns, selected the program committee, handled the peer review process, took the decisions regarding the final program, and chaired the workshop event.

DISCOLI'22 Workshop Chair 2022
1st DISCOLI Workshop on DIStributed COLlective Intelligence (co-located with Bologna, Italy

the 42nd IEEE International Conference on Distributed Computing Systems, ICDCS'22).

As Workshop Chair, I have prepared/submitted the workshop proposal, run publicity campaigns, selected the program committee, handled the peer review process, took the decisions regarding the final program, and chaired the workshop event.

eCAS'21 Workshop Chair 2021
6th eCAS Workshop on Engineering Collective Adaptive Systems (co-located with ACSOS'21) Washington DC, USA

As Workshop Chair, I prepared/submitted the workshop proposal, run publicity campaigns, selected the program committee, handled the peer review process, and planned/run the workshop day.

eCAS'19 Workshop Chair 2019
4th eCAS Workshop on Engineering Collective Adaptive Systems (co-located with SASO'19) Ulmea, Sweden

As Workshop Chair, I prepared/submitted the workshop proposal, run publicity campaigns, selected the program committee, handled the peer review process, and planned/run the workshop day.

Participation in organising committees

DisCoTec'23 Artifact Evaluation Chair

DisCoTec 2023 (18th International Federated Conference on Distributed Computing Techniques) is one of the major events sponsored by the IFIP and the EAPLS. It gathers three conferences: COORDINATION'23, DAIS'23, FORTE'23.

As Artifact Evaluation Chair of DisCoTec, I organise and supervise the artifact evaluation process for the entire multi-conference, coordinating with the AECs of the individual conferences, and organise a journal special issue for a selection of the artifact papers.

2023
Lisbon, Portugal

CyberSciTech'22 Track 3 "Cyber Physical Computing & Systems" Chair

The 7th IEEE Cyber Science and Technology Congress

I co-chair the Track on "Cyber Physical Computing & Systems".

2022
Calabria, Italy

ACSOS'22 Publication/Proceedings Chair

3rd IEEE International Conference on Autonomic Computing and Self-Organizing Systems

As Publication Chair, I am responsible for managing the production of all material to be published in relation to the conference. The activity requires to interact with IEEE, prepare the conference proceedings according to IEEE guidelines, and check proper inclusion of all material (accepted&presented papers, tutorial abstracts, workshop papers..) to ensure proper publication on IEEE Xplore.

2021
Washington DC, USA

eCAS'22 Web Chair

7th eCAS Workshop on Engineering Collective Adaptive Systems

2022
Virtual

ACSOS'21 Publicity Chair

2nd IEEE International Conference on Autonomic Computing and Self-Organizing Systems

As Publicity Chair, I was responsible to develop the communications/audience development plan along the various organisation milestones. Tasks included promoting the CfP and the conference through various channels (mailing-lists, websites, social media), sending reminders for events, and using social media to fuel participation.

2021
Washington DC, USA

SASO'18 Web Chair

12th IEEE International Conference on Self-Adaptive and Self-Organizing Systems

As a Web Chair, I was responsible for setting up and publishing content on the conference website and social media. As such, I interacted with many of the other OC members to ensure prompt publication of conference-related information.

2018
Trento, Italy

Participation in program committees

ICCCI'23 Program Committee Member

15th International Conference on Computational Collective Intelligence

2023
Budapest, Hungary

ACSOS'23 Program Committee Member

4th IEEE International Conference on Autonomic Computing and Self-Organizing Systems

2023
Toronto, Canada

★ SAC'23 IRMAS track Program Committee Member

IRMAS - Intelligent Robotics and Multi-Agent Systems technical track on the 38th ACM Symposium on Applied Computing (SAC 2023)

2022-23
Tallinn, Estonia

★ AAAI'23 Reviewer 37th AAAI Conference on Artificial Intelligence (AAAI 2023) Sponsored by the Association for the Advancement of Artificial Intelligence, AAAI is an A++ conference (GGS rating).	2022-23 Washington, DC, USA
DASC/PiCOM/CBDCom/CyberSciTech'22 Program Committee Member 7th IEEE Cyber Science and Technology Congress (CyberSciTech 2022)	2022 Calabria, IT
ACSOS'22 Program Committee Member 3rd IEEE International Conference on Autonomic Computing and Self-Organizing Systems	2022 Virtual
COORDINATION'22 Artifact Evaluation Committee Member 24th International Conference on Coordination Models and Languages	2022 Lucca, Italy
eCAS'22 Program Committee Member 7th eCAS Workshop on Engineering Collective Adaptive Systems	2022 Virtual
WOA'22 Program Committee Member 23rd Workshop "From Objects to Agents"	2021 Genova, Italy
ALPACA'22 Technical Program Committee Member 1st Workshop on Adaptive, Learning Pervasive Applications (ALPACA)	2022 Pisa, Italy
ACSOS'21 Program Committee Member 2nd IEEE International Conference on Autonomic Computing and Self-Organizing Systems	2021 Virtual
COORDINATION'21 Program Committee Member 23rd International Conference on Coordination Models and Languages	2021 Valletta, Malta
★ MODELS'21 Student Research Competition Committee Member ACM/IEEE 24th International Conference on Model Driven Engineering Languages and Systems (MODELS 2021)	2021 Virtual Conference
★ PLDI'21 Artifacts Program Committee Member 42nd ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2021)	2021 Virtual Conference
WOA'21 Program Committee Member 22nd Workshop "From Objects to Agents"	2021 Bologna, Italy
CLOUD COMPUTING'21 Program Committee Member 12th International Conference on Cloud Computing, GRIDs, and Virtualization	2021 Porto, Portugal
eCAS'20 Program Committee Member 5th eCAS Workshop on Engineering Collective Adaptive Systems	2020 Washington, USA
eCAS'17 Program Committee Member 2nd eCAS Workshop on Engineering Collective Adaptive Systems	2017 Tucson, USA

Talks at Conferences and Events

Presentations of peer-reviewed papers

Towards Automated Engineering for Collective Adaptive Systems: Vision and Research Directions	2022/09 Falerna, ITA
Event 1st International Workshop on COMMunity-OrieNted WEARrable Computing Systems (COMMON-WEARS 2022)	
FScaFi: A Core Calculus for Collective Adaptive Systems Programming	2021/10 Rhodes, GRC
Event 10th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation	
Augmented Collective Digital Twins for Self-Organising Cyber-Physical Systems	2021/10 Online
Event SISSY Workshop on Self-Improving System Integration	
Tuple-Based Coordination in Large-Scale Situated Systems	2021/06 Online
Event 23rd International Conference on Coordination Models and Languages	
Collective Adaptive Systems as Coordination Media: The Case of Tuples in Space-Time	2020/08 Online
Event 5th eCAS Workshop on Engineering Collective Adaptive Systems	
Engineering Resilient Collaborative Edge-enabled IoT	2019/07 Milan, ITA
Event 16th IEEE International Conference on Services Computing	
Aggregate Processes in Field Calculus	2019/06 Copenhagen, DNK
Event 21th International Conference on Coordination Models and Languages	
On Context-Orientation in Aggregate Programming	2019/06 Umeå, SWE
Event 4th eCAS Workshop on Engineering Collective Adaptive Systems	
Coordinating Computation at the Edge: a Decentralized, Self-Organizing, Spatial Approach	2019/06 Rome, ITA
Event 4th IEEE International Conference on Fog and Mobile Edge Computing	
Collective Abstractions & Platforms for Large-Scale Self-Adaptive IoT	2018/09 Trento, ITA
Event 3rd eCAS Workshop on Engineering Collective Adaptive Systems	
From Field-Based Coordination to Aggregate Computing	2018/06 Madrid, ESP
Event 20th International Conference on Coordination Models and Languages	
Compositional Blocks for Optimal Self-Healing Gradients	2017/09 Tucson, AZ, USA
Event 11th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO'17)	
Practical Aggregate Programming in Scala	2016/10 Amsterdam, NLD
Event Scala Symposium 2016	
Programming Actor-based Collective Adaptive Systems	2016/10 Amsterdam, NLD
Event AGERE'16 (international workshop on agents and actors)	
On Execution Platforms for Large-Scale Aggregate Computing	2016/09 Heidelberg, DEU
Event Workshop on Collective Adaptation in Very Large Scale Ubicomp: Towards a Superorganism of Wearables, Ubicomp/ISWC Adjunct	

Towards Aggregate Programming in Scala

Event 1st International Workshop on Programming Models and Languages for Distributed Computing (PMLDC) – co-located with ECOOP

2016/06
Rome, ITA

Other talks

Introduction to the 1st DISCOLI workshop on distributed collective intelligence

Event 1st DISCOLI Workshop on DIStributed COLlective Intelligence

2022/06
Bologna, IT

6th eCAS Workshop on Engineering Collective Adaptive Systems: Introduction to the workshop

Event 6th eCAS Workshop on Engineering Collective Adaptive Systems

2021/10
Online

Reviewer Activity

- **Excellent reviewer** according to my [Web of Science™ profile](#) (according to the feedback provided by associate editors)
- 20 verified reviews on my [Web of Science™ profile](#)

Peer review activity in international journals

- IEEE Internet of Things
- IEEE Transactions on Services Computing
- IEEE Transactions on Intelligent Transportation Systems
- ACM Transactions on Autonomous and Adaptive Systems
- Springer Software and Systems Modeling
- Elsevier Journal on Pervasive and Mobile Computing
- Autonomous Agents and Multi-Agent Systems
- Robotics
- Sensors
- Applied Sciences
- Informatics
- Scientific Programming
- International Journal of Information Technology & Decision Making

Other review activity (books)

I am in the reviewer pool of *Manning Publications*, a well-known publisher of books on computer technology topics. The evidence of this activity lies in the “Acknowledgments” sections of the books that I reviewed. These include:

- *Software Mistakes and Tradeoffs: How to make good programming decisions* (Tomasz Lelek and Jon Skeet, 2022, Manning)
- *Quantum Computing in Action* (Johan Vos, 2022, Manning)
- *Programming with Types* (Vlad Riscutia, 2019, Manning)
- *Classic Computer Science Problems in Python* (David Kopec, 2019, Manning)

Collaborations with Research Groups

- Participation in the research activity of the research group coordinated by **Prof. Mirko Viroli (University of Bologna, Italy)**. This is the research group with which Roberto has collaborated mostly in his career and that led to more than 30 publications in international journals and conference proceedings. (2016→)
- Collaboration with the research group coordinated by **Prof. Ferruccio Damiani (University of Turin, Italy)** on themes related to field-based coordination and distributed computation. Output of this collaboration includes 3 articles published on international journals and 5 papers on proceedings of international conferences. (2016→)
- Collaboration with the research group coordinated by **Prof. Giancarlo Fortino (University of Calabria, Italy)**, on themes revolving around the software engineering of opportunistic services in the Internet of Things and edge computing. Output of this collaboration includes 2 articles published on international

journals and 1 paper on proceedings of international conferences. Moreover, collaboration continues in the context of the [Fluidware project](#). (2019→)

- Collaboration with **Danny Weyns (Katholieke Universiteit Leuven, Belgium)** on self-adaptive software architectures. Output of this collaboration includes one article accepted on an international journal and two papers in the proceedings of international conferences. (2020→)
- Collaboration with the research group coordinated by **Prof. Franco Zambonelli (University of Modena e Reggio Emilia, Italy; IEEE Fellow, ACM Distinguished Scientist)**, especially in the context of [Fluidware project](#). Output of this collaboration includes one article accepted on an international journal and one paper published in the proceedings of an international conference. (2019→)
- Collaboration with **Prof. Lukas Esterle (University di Aarhus, Danimarca)**, on themes related to collective adaptive systems. Output of this collaboration includes one paper published in an international journal (ACM TAAS). We have also co-chaired the eCAS'21 workshop and co-edited one special issue. (2020→)
- Collaboration with **Prof. Alessandro Ricci (University di Bologna, Italy)**, on themes related to coordination and multi-agent systems. Output of this collaboration includes two papers published in the proceedings of international conferences. (2020→)
- Collaboration with **Prof. Guido Salvaneschi (University of St.Gallen)** on programming languages for distributed computing. Output of this collaboration includes two papers published in the proceedings of international conferences. (2019→)
- Collaboration with **Prof. Volker Stolz (University of Oslo)** on themes related to distributed runtime verification and monitoring. Output of this collaboration includes one article published on an international journal. (2020→2021)
- Collaboration with **Prof. Simon Dobson (University of St Andrews)**, on themes related to sensor systems and complex networks. The collaboration included a 3-month visit period at the University of St Andrews. Output of this collaboration includes one article accepted on an international IEEE magazine. (2017→2020)
- Collaboration with the research group coordinated by **Prof. Schahram Dustdar (TU Wien, Austria; IEEE Fellow, ACM Distinguished Scientist)**, on themes related to the engineering of resilient, collaborative, Internet of Things systems. This collaboration started with my 2-month visit at TU Wien (Austria). Output of this collaboration includes one paper published in the proceedings of an international conference. (2018)
- Collaboration with **Prof. Antonio Bucchiarone (Fondazione Bruno Kessler, Trento, Italy)** on themes related to collective adaptive systems. Output of this collaboration includes one article accepted on an international IEEE magazine. (2019)
- Collaboration with **Prof. Alessandro Aldini (University of Urbino Carlo Bo', Italy)**, on the intersection of computational trust techniques and collective adaptive systems. Output of this collaboration includes one article published on an international journal and one paper in the proceedings of an international conference. (2017→2018).
- Collaboration with **Dr. Jacob Beal (Raytheon BBN Technologies, USA)** on aggregate computing. Output of this collaboration includes one article accepted on an international journal and one paper published in the proceedings of an international conference. (2018→2019)
- Collaboration with the research group coordinated by **Prof. Andrea Omicini (University of Bologna, Italy)**, on themes related to the engineering of multi-agent systems. Output of this collaboration includes one paper published in the proceedings of an international conference. (2018)

Research for Public and Private Institutions

- **Fixed-Term Junior Researcher (RTD-A)** on project “Techniques & strategies for Green Autonomic Internet of Things (GA-IoT)” (Department of Computer Science and Engineering, Alma Mater Studiorum - Università di Bologna, Italy), supervised by Prof. Mirko Viroli. (2022-02→2025-01)
- **Research fellowship** on project “Engineering evolving collective adaptive systems for smart infrastructures” (Department of Computer Science and Engineering, Alma Mater Studiorum - Università di Bologna, Italy), supervised by Prof. Mirko Viroli. (2021→2022)
- **Research fellowship** on project “Engineering evolving collective adaptive systems for modern infrastructures” (Department of Computer Science and Engineering, Alma Mater Studiorum - Università di Bologna, Italy), supervised by Prof. Mirko Viroli. (2020→2021)
- **Research fellowship** on project “Engineering collective adaptive processes through aggregate computing” (Department of Computer Science and Engineering, Alma Mater Studiorum - Università di Bologna, Italy), supervised by Prof. Mirko Viroli. (2019→2020)
- Participation as scientific collaborator in project on “cybersecurity and threat attribution” by YOROI S.R.L. and University of Bologna. (2021→2022)
- Participation as scientific collaborator in project “Realizzazione di un Compilatore da specifica di alto livello a comandi PLC per macchine monolama per la lavorazione del legno” by the University of Bologna and SCM Group S.p.A. (2020→2021)
- Participation as scientific collaborator in project “Realizzazione tramite Model Driven Engineering di un sistema di reporting moderno per l’ERP Star4” by the University of Bologna and Formula Impresoft S.R.L. (2020→2021)
- Participation as scientific collaborator in project PG/2016/667492 “Re-ingegnerizzazione da Cobol a .NET di una piattaforma gestionale intersettoriale” by University of Bologna and Harvard Group (now Impresoft S.R.L.). (2017→2018)
- Research activity “Software infrastructures for the management of IoT systems” on scholarship issued by the Department of Computer Science and Engineering (Alma Mater Studiorum - Università di Bologna), on funds by Centro Studi - Orizzonti Holding. The research focussed on technologies for IoT, process mining, and microservices, and their application to large-scale and small-scale retail. (2016→2017)

Experiences Abroad

Visiting PhD student @ Technische Universität Wien (Austria)

2018, 2 months

Collaboration with the research group coordinated by *Prof. Schahram Dustdar* (TU Wien, Austria; IEEE Fellow, ACM Distinguished Scientist), on themes related to the engineering of resilient, collaborative, Internet of Things systems. This collaboration started with my 2-month visit at TU Wien (Austria). Output of this collaboration includes one paper published in the proceedings of an international conference.

Visiting PhD student @ University of St Andrews (Scotland)

2017, 3 months

Collaboration with *Prof. Simon Dobson* (University of St Andrews), on themes related to collective adaptive systems. Output of this collaboration includes one article accepted on an international IEEE magazine.

Marco Polo scholarship

Erasmus @ University of Limerick (Ireland)

2012, 4 months

Taking exams on specific BEng courses (see Education section).

Erasmus scholarship

Scholarships and Grants

Computer Science and Engineering PhD Scholarship

2016/11 → 2019/10

This scholarship, granted by the Italian Ministry of Education, Universities, and Research (MIUR), covered all the 3 years of my PhD in Computer Science and Engineering at Alma Mater Studiorum–Università di Bologna (Italy). I got this scholarship by winning the corresponding public competition based on qualifications and interview.

Università di Bologna (IT)

Travel/Conference Grant – DisCoTec 2019

2019

Issuer Denmarks Tekniske Universitet (DTU)

This selective grant covered my participation to the COORDINATION 2019 conference in Copenhagen, Denmark.

Mobility Grant – Marco Polo 2016

2017

Issuer Department of Computer Science and Engineering (DISI), UNIBO

This selective grant covered my PhD abroad period in St Andrews, Scotland.

Travel/Conference Grant – Scala Symposium 2016

2016

Issuer École polytechnique fédérale de Lausanne (EPFL)

Grant issued by École polytechnique fédérale de Lausanne (EPFL) for presentation at the Scala Symposium 2016, co-located with the SPLASH'16 conference.

Study Scholarship

2016/09 → 2016/11

Issuer Department of Computer Science and Engineering (DISI), UNIBO

University of Bologna

Financ. Centro Studi - Orizzonti Holding SPA

Theme Software Infrastructures for the Management of IoT Systems

This scholarship supported a study of proof-of-concept IoT solutions for the retail market. In this context, I got familiarity with microservices, Docker, and process mining. I renounced to the scholarship once I got formally admitted to the PhD Programme, for incompatibility of the scholarships.

Awards

Student Awards

Best District-2072 MEng graduate student (G.Bassi 2017 prize)

2017

I was selected as winner of prize *Gianni Bassi*, with 5000€ scholarship, issued by Rotary Club Faenza for *Best Master Graduate Student* across all Engineering faculties of Romagna (district 2072) based on Grade Average and number of laudes.

Faenza (Italy)

Prize for meritorious students (UNIBO)

a.y. 2014-15

I was selected among the ex-aequo winners of the public competition for meritorious students of the University of Bologna in academic year 2014/2015 (section common to all Engineering and Architecture faculties), granting a scholarship.

Università di Bologna (IT)

High school graduation award

2009

I was given the “Roberto Ruffilli” acknowledgment for high-school graduation with score 100/100 (cum laude).

Cesena (Italy)

Selected Publications

1. Danilo Pianini, Federico Pettinari, **Roberto Casadei**, and Lukas Esterle. “A Collective Adaptive Approach to Decentralised k-Coverage in Multi-robot Systems”. In: *ACM Trans. Auton. Adapt. Syst.* 17 (2022),

4:1–4:39. DOI: [10.1145/3547145](https://doi.org/10.1145/3547145). URL: <https://doi.org/10.1145/3547145>

- **Metrics:** Q1 (Scimago Quartile 2021); 2021 IF 1.913
 - **Short summary:** This work addresses the online multi-object k-coverage problem (OMOkC) problem through a collective adaptive systems approach, and accordingly provides novel algorithms improving over state-of-the-art solutions as well as a toolchain and simulation for experimenting with mobile robots with field of view.
2. Giorgio Audrito, **Roberto Casadei**, Ferruccio Damiani, Guido Salvaneschi, and Mirko Viroli. “Functional Programming for Distributed Systems with XC”. in: *36th European Conference on Object-Oriented Programming, ECOOP 2022, June 6-10, 2022, Berlin, Germany*. Ed. by Karim Ali and Jan Vitek. Vol. 222. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2022, 20:1–20:28. DOI: [10.4230/LIPIcs.ECOOP.2022.20](https://doi.org/10.4230/LIPIcs.ECOOP.2022.20). URL: <https://doi.org/10.4230/LIPIcs.ECOOP.2022.20>
- **Metrics:** Class 1/A+ conference (GGS Conf Rating 2021)
 - **Short summary:** In this work, we present a more general variant of the field calculus supporting differentiated messages and describe its support for distributed programming of resilient systems, with a narrative tailored to the programming language community.
3. **Roberto Casadei**, Giancarlo Fortino, Danilo Pianini, Andrea Placuzzi, Claudio Savaglio, and Mirko Viroli. “A Methodology and Simulation-Based Toolchain for Estimating Deployment Performance of Smart Collective Services at the Edge”. In: *IEEE Internet of Things Journal* 9.20 (2022), pp. 20136–20148. DOI: [10.1109/JIOT.2022.3172470](https://doi.org/10.1109/JIOT.2022.3172470)
- **Metrics:** Q1 (Scimago Quartile 2021); 2021 IF 10.238
 - **Short summary:** In this work, we present a methodology and toolchain for evaluating deployments of self-organizing systems developed through aggregate computing, across the IoT-fog-cloud continuum.
4. Giorgio Audrito, **Roberto Casadei**, Ferruccio Damiani, Volker Stolz, and Mirko Viroli. “Adaptive distributed monitors of spatial properties for cyber-physical systems”. In: *Journal of Systems and Software* 175 (2021), p. 110908. DOI: [10.1016/j.jss.2021.110908](https://doi.org/10.1016/j.jss.2021.110908)
- **Metrics:** Q1 (Scimago Quartile 2021); 2021 IF 3.514; 13 cits. (Scopus)
 - **Short summary:** In this work, we propose a compositional mapping of Spatial Logic for Closure Spaces (SLCS) constructs to field calculus constructs, enabling the direct encoding of SLCS formulas as decentralised monitors for runtime verification of spatial properties. We formally prove the generated monitors are correct and optimally self-stabilising, and validate the response to variable dynamics by means of simulations of crowd monitoring/control scenarios.
5. **Roberto Casadei**, Mirko Viroli, Giorgio Audrito, Danilo Pianini, and Ferruccio Damiani. “Engineering collective intelligence at the edge with aggregate processes”. In: *Engineering Applications of Artificial Intelligence* 97 (2021), p. 104081. ISSN: 0952-1976. DOI: <https://doi.org/10.1016/j.engappai.2020.104081>
- **Metrics:** Q1 (Scimago Quartile 2021); 2021 IF 7.802; 24 cits. (Scopus)
 - **Short summary:** Aggregate processes are a programming abstraction, introduced as an extension to the field calculus and implemented in the ScaFi aggregate programming DSL, that captures *concurrent dynamic collective computations*. Its versatility in supporting collective intelligence and self-organisation is shown through simulations of IoT/edge computing scenarios.
6. Giorgio Audrito, **Roberto Casadei**, Ferruccio Damiani, Danilo Pianini, and Mirko Viroli. “Optimal resilient distributed data collection in mobile edge environments”. In: *Computers & Electrical Engineering* (2021), p. 107580. ISSN: 0045-7906. DOI: <https://doi.org/10.1016/j.compeleceng.2021.107580>. URL: <https://www.sciencedirect.com/science/article/pii/S0045790621005140>
- **Metrics:** Q1 (Scimago Quartile 2021); 2021 IF 4.152; 9 cits. (Scopus)

- **Short summary:** New algorithms for dynamic spatial data collection/summarisation are introduced, supporting better reactivity and resilience in highly-variable scenarios than state-of-the-art algorithms. Results are validated through controlled experiments and a simulated case study in edge data mining.
7. Danilo Pianini, **Roberto Casadei**, Mirko Viroli, Stefano Mariani, and Franco Zambonelli. “Time-Fluid Field-Based Coordination through Programmable Distributed Schedulers”. In: *Logical Methods in Computer Science* Volume 17, Issue 4 (Nov. 2021). DOI: [10.46298/lmcs-17\(4:13\)2021](https://doi.org/10.46298/lmcs-17(4:13)2021). URL: <https://lmcs.episciences.org/8755>
 - **Metrics:** Q2 (Scimago Quartile 2021); 2021 IF 0.591; 8 cits. (Scopus)
 - **Short summary:** This work proposes an extension to field-based programming models whereby the scheduling of applications can be programmed by the applications themselves, leveraging the ideas of *triggers*, *causality fields* and *computation trees*. This enables a kind of “time-fluid” distributed computation where the computation rate can adapt to balance performance (system reactivity) and cost (resource usage). The model is formalised in terms of the structural operational semantics of a whole network of devices, implemented in the Protelis DSL, and validated through Alchemist simulations.
 8. Danilo Pianini, **Roberto Casadei**, Mirko Viroli, and Antonio Natali. “Partitioned integration and coordination via the self-organising coordination regions pattern”. In: *Future Generation Computer Systems* 114 (Jan. 2021), pp. 44–68. DOI: [10.1016/j.future.2020.07.032](https://doi.org/10.1016/j.future.2020.07.032). URL: <https://doi.org/10.1016/j.future.2020.07.032>
 - **Metrics:** Q1 (Scimago Quartile 2021); 2021 IF 7.307; 26 cits. (Scopus)
 - **Short summary:** This work presents a very general design pattern for decentralised feedback-regulated self-integration in dynamic environments. The *Self-organising Coordination Regions (SCR)* pattern consists of a dynamic distributed process involving leader election, coalition formation, and feedback loops between leaders and subordinates. The paper shows SCR has many known uses in literature and enjoys great versatility, shown via case studies in edge computing and hierarchical networks.
 9. Mirko Viroli, Jacob Beal, Ferruccio Damiani, Giorgio Audrito, **Roberto Casadei**, and Danilo Pianini. “From distributed coordination to field calculus and aggregate computing”. In: *Journal of Logical and Algebraic Methods in Programming* (2019), p. 100486. ISSN: 2352-2208. DOI: [10.1016/j.jlamp.2019.100486](https://doi.org/10.1016/j.jlamp.2019.100486)
 - **Metrics:** Q2 (Scimago Quartile 2019); 2019 IF 0.685; 39 cits. (Scopus)
 - **Short summary:** This manuscript provides a comprehensive research account on field-based coordination and aggregate computing. Specifically, it provides a detailed account of their historical development, discusses related works, presents the state of the art, and organically shows directions for future research.
 10. **Roberto Casadei**, Giancarlo Fortino, Danilo Pianini, Wilma Russo, Claudio Savaglio, and Mirko Viroli. “A development approach for collective opportunistic Edge-of-Things services”. In: *Information Sciences* 498 (2019), pp. 154–169. DOI: [10.1016/j.ins.2019.05.058](https://doi.org/10.1016/j.ins.2019.05.058)
 - **Metrics:** Q1 (Scimago Quartile 2019); 2019 IF 5.910; 52 cits. (Scopus)
 - **Short summary:** This work describes an approach to opportunistic edge computing that leverages collective-based services. In particular, it proposes a *Collective IoT Service* design abstraction. Experimental evaluation is performed through a crowd management case study, comparing Edge vs. Cloud deployments w.r.t. reactivity and precision.
 11. **Roberto Casadei**, Giancarlo Fortino, Danilo Pianini, Wilma Russo, Claudio Savaglio, and Mirko Viroli. “Modelling and simulation of Opportunistic IoT Services with Aggregate Computing”. In: *Future Generation Computer Systems* 91 (2018), pp. 252–262. DOI: [10.1016/j.future.2018.09.005](https://doi.org/10.1016/j.future.2018.09.005)
 - **Metrics:** Q1 (Scimago Quartile 2018); 2018 IF 5.768; 107 cits. (Scopus)
 - **Short summary:** This work describes an aggregate approach of opportunistic computing for the IoT. The approach is based on the integration of the IoT Service Metamodel and the Aggregate Computing metamodel. Validation is performed with a simulated crowd safety case study.

Peer-Reviewed Publications and Bibliometrics

Journal publications

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— Edited volumes

50. **Roberto Casadei**, Elisabetta Di Nitto, Ilias Gerostathopoulos, Danilo Pianini, et al., eds. *IEEE International Conference on Autonomic Computing and Self-Organizing Systems, ACSOS 2022, Virtual, CA, USA, September 19-23, 2022*. IEEE, 2022. ISBN: 978-1-6654-7137-4. DOI: [10.1109/ACSOS55765.2022](https://doi.org/10.1109/ACSOS55765.2022). URL: <https://doi.org/10.1109/ACSOS55765.2022>
51. **Roberto Casadei**, Elisabetta Di Nitto, Ilias Gerostathopoulos, Danilo Pianini, et al., eds. *IEEE International Conference on Autonomic Computing and Self-Organizing Systems Companion, ACSOS-C 2022, Virtual, CA, USA, September 19-23, 2022*. IEEE, 2022. ISBN: 978-1-6654-5142-0. DOI: [10.1109/ACSOS-C56246.2022](https://doi.org/10.1109/ACSOS-C56246.2022). URL: <https://doi.org/10.1109/ACSOS-C56246.2022>

— Teaching in academic courses

— Teaching in BEng/BSc courses

09730 - Principles of Informatics - 6 cfu

a.y. 2022-23
Cesena, UNIBO

15305 - Foundations of Informatics A - 6 cfu

Role I got the **responsibility** for the entire course.

Course First cycle degree programme (L) in Electronics Engineering and in Biomedical Engineering

Activity I run 3 CFUs (30 hours) of teaching and laboratory material preparation and assessment on the fundamentals of computers science (representation of information, algorithms) and the basics of imperative, structured programming in C.

95648 - Software Design and Development - 9 cfu

a.y. 2022-23
Cesena, UNIBO

Role I got the **responsibility** for the entire course.

Course First cycle degree programme (L) in Computer Systems Technologies

Activity I run 3 CFUs (30 hours) of teaching the basics of software design and development, object-oriented programming, and Java.

70219 - Object-Oriented Programming - Module 3

a.y. 2022-23
Cesena, UNIBO

Course First cycle degree programme (L) in Computer Science and Engineering

Activity I run 3 CFUs (30 hours) of teaching and laboratory material preparation and assessment on OOP in Java and related programming tools (version control, Eclipse, JavaFX, Gradle, etc.).

Other teaching-related activities

- Tutor for course modules *Programming and Development Paradigms and Concurrent and Distributed Programming* (five editions)** a.y. 2016-17, 2017-18, 2018-19, 2019-20, 2020-21
Course Second cycle degree programme (LM) in Computer Science and Engineering (cod. 8614) Cesena, UNIBO
Activity As a tutor, I prepare exercises, help students in doing them and following the course, and do seminars on specialised topics. These courses cover advanced programming and paradigms (functional, logic, concurrent, distributed). The contract was of 40 hours (2016-17), 60 hours (2017-18), 60 hours (2018-19), 24 hours (2019-20), 60 hours (2020-21).
- Tutor for course module *Object-Oriented Programming*** a.y. 2019-20
Course First cycle degree programme (L) in Computer Science and Engineering Cesena, UNIBO
Activity As a tutor, I prepare exercises (on OOP in Java) and help students in doing them and following the course. The contract is for 56 hours.
- Seminars in the BBS open-program *Internet of Things*, modules *Software Production and Distributed Systems*** 2018
Bologna Business School
Activity I did two seminars to engineers and professionals on specialised topics: (1) software testing and (2) cloud-native application development.
- 30h in IFTS course “Technician for design and development of computer applications specialised in new digital technologies”** 2018
Cesena
What Higher Technical Education and Training (IFTS) is an education programme funded by the Italian Ministry of Education (MIUR).
Activity 30 hours teaching the basics of programming in Python to high-school graduates.
- 60h in IFTS course “Technician for design and development of computer applications specialised in business problem solving”** 2018
Cesena
Activity 60 hours teaching the basics of programming in JavaScript to high-school graduates.

(Co-)Supervised Theses and Students

Full list available in amslaurea.unibo.it.

M.Sc. / M.Eng. in Computer Science and Engineering degree theses

1. [A platform for aggregate computing over LoRaWAN network](#), Andrea Placuzzi, 2020
2. [A Reinforcement Learning approach to discriminate unsafe devices in aggregate computing systems](#), Chiara Volonnino, 2020
3. [Una piattaforma client-server universale per Aggregate Computing](#), Loris Cangini, 2020
4. [Towards Aggregate Processes in a Field Calculus-Based Platform](#), Davide Foschi, 2018
5. [Distributing Aggregate Computations on top of Akka Actors](#), Manuel Peruzzi, 2018
6. [Prototyping a scalable Aggregate Computing cluster with open-source solutions](#), Cristian Paolucci, 2018
7. [Tecniche e algoritmi di aggregate computing a supporto di contesti di smart mobility](#), Filippo Berlini, 2017
8. [Design and Deployment of an Execution Platform based on Microservices for Aggregate Computing in the Cloud](#), Thomas Farneti, 2017

B.Sc. / B.Eng. in Computer Science and Engineering degree theses

1. Progettazione di un ambiente di programmazione visuale block-based per ScaFi, Matteo Cerioni, 2022
2. Un framework per la graficazione di dati in Scala, Andrea Bianchi, 2022
3. Piattaforma a Supporto del Monitoraggio di Sistemi di Computazione Aggregata: Caso di Studio ScaFi-Web, Denys Grushchak, 2021
4. Progettazione di un sistema di categorizzazione delle regressioni per il compilatore Rust, Giacomo Pasini, 2020
5. Design e prototipazione di un middleware per applicazioni aggregate location-based, Linda Vitali, 2020
6. Sviluppo di una libreria in Scala di supporto alla creazione e configurazione di uno stack SMACK, Stefano Salvatori, 2018
7. Sviluppo di un front-end di simulazione per applicazioni aggregate nel framework Scafi, Gianluca Aguzzi, 2018
8. Sviluppo di applicazioni distribuite con lo stack SMACK, Emiliano Ciavatta, 2018
9. Indagine sull'utilizzo di Scala per progetti Android, Giuseppe Ettore Radaelli, 2017

Contributions (e.g. open-source/academic software projects)

SCAFI (Project Lead and Developer)

ScaFi is a Scala toolkit for Aggregate Computing: it includes a field calculus DSL, simulator, distributed platform, and more. It is a collection of project modules for a total of more than 140K LoC. I lead the project and development of ScaFi, check pull requests, and coordinate work.

ALCHEMIST (Contributor)

Alchemist is a meta-simulator tailored to pervasive computing, on the JVM. I issued pull requests mainly on the ScaFi-Alchemist incarnation.

Miscellaneous Contributions

– org.protelis.protelisdoc: Kotlin gradle plugin to generate Protelis docs, via dokka

Slides @ Slideshare

Presentations corresponding to lecture notes (mainly about computer science) and conference talks.

Professional Experience

Full-Stack Software Engineer

Web service (WCF) and application development in ASP.NET MVC and JavaScript within a Scrum/Kanban process framework.

2014/09 → 2015/12
Apex-Net (WEDO)
Cesena (Italy)

- Server-side: ASP.NET MVC
- Client-side: ZURB Foundation, HTML, CSS3, JavaScript, JQuery, KnockoutJS
- Client-server interaction: Comet via SignalR
- Frameworks/libs: DevExpress ASP.NET MVC Extensions
- Web services: WCF (REST-style, SOAP XML & WS-*)

Mobile Software Engineer

Development of a Windows 8.1 application in C#/XAML and development of the related WCF back-end service for SharePoint integration.

2014/03 → 2014/09
Apex-Net (WEDO)
Cesena (Italy)

IT Book reviewer

During the years of high school, I used to write reviews of computer science books for an Italian e-zine (and the next years, more informally, for a [personal blog](#)) The website is dismissed: [look it up on archive.org](#).

2007 → 2011
[programmazione.it](#)

Certifications

TS: Microsoft .NET Framework - Application Development Foundation
(License 8424975 - Prometric)

2011
Bologna (Italy)

Education

PhD Programme in Computer Science and Engineering

2016/11 → 2020/04

Thesis [Engineering self-adaptive collective processes for cyber-physical ecosystems](#) Università di Bologna (IT)

Courses

- [Spatial Multiagent Systems and Aggregate Computing: New Directions for Spatial Computing](#) (2017, A. Omicini & M. Viroli)
- [Approximation Algorithms \(BISS'17, F. Grandoni\)](#)
- [Kleene Algebra with Tests and Applications to Network Programming \(BISS'17, A. Silva\)](#)
- [Models and Algorithms for Matching and Assignment Problems](#) (S. Martello)
- [Developing, maintaining, and sharing software tools for research](#) (D. Pianini)

24 CFU Training Programme – Anthropological, psycho-pedagogy disciplines and teaching methodologies and technologies

2018
Università di Bologna (IT)

Exams

- Anthropology, 30L/30
- Psychology, 30/30
- Pedagogy, special pedagogy, and didactics for inclusion, 30/30
- General methodologies and technologies for didactics, 30L/30

Master's Degree in Computer Science and Engineering

2013/09 → 2016/03

Grade Summa Cum Laude (Grade Average: 30/30, 6 laudes)

Università di Bologna (IT)

Thesis [Aggregate Programming in Scala: a Core Library and Actor-based Platform for Distributed Computational Fields](#) (supervisor: Mirko Viroli)

Exams

- [Artificial Intelligence](#) (Vittorio Maniezzo), 30/30
- [Programming and Paradigms](#) (Alessandro Ricci), 30L/30
- [Autonomous Systems](#) (Andrea Omicini), 30L/30
- [Business Intelligence](#) (Stefano Rizzi), 30/30
- [Computer Security](#) (Gabriele D'Angelo), 30L/30
- [Data Base Systems](#) (Matteo Golfarelli), 30/30
- [Distributed Systems](#) (Andrea Omicini), 30/30
- [Engineering Complex Adaptive Software Systems](#) (Mirko Viroli), 30/30
- [Programming Languages and Models of Computation](#) (Gianluigi Zavattaro), 30/30
- [Project Management](#) (Marco Antonio Boschetti), 30L/30
- [Semantic Web](#) (Antonella Carbonaro), 30L/30
- [Software Systems Engineering](#) (Antonio Natali), 30/30
- [Web Services and Applications](#) (Mario Bravetti), 30L/30

Bachelor's Degree in Electronics, Informatics, and Telecommunications Engineering

2009/09 → 2013/03
Università di Bologna (IT)

- Grade** Summa Cum Laude (Grade Average: 29.29/30, 5 laudes)
- Thesis** Reuse Mechanisms and Concurrency: from Actors to Agent-oriented Programming (supervisor: Alessandro Ricci)
- Exams**
- Automatic Controls (Paolo Castaldi), 30L/30
 - Computer Networks (Claudio Salati), 30L/30
 - Data Base Systems (Alessandra Lumini), 30L/30
 - Digital Design Principles and Computer Architecture (Luca Roffia), 30/30
 - Economics and Business Organisation (Cinzia Daraio), 28/30
 - Electrotechnics (Franco Mastri), 28/30
 - Foundations of Informatics A (Mirko Viroli), 30/30
 - Foundations of Informatics B (Andrea Roli), 30/30
 - General Physics A (Maurizio Piccinini), 28/30
 - General Physics B (Maurizio Piccinini), 26/30
 - Geometry and Algebra (Michele Mulazzani), 30/30
 - Mathematical Analysis A (Massimo Cicognani), 28/30
 - Mathematical Analysis for the Engineering Information Technology (Massimo Cicognani), 28/30
 - Operating Systems (Alessandro Ricci), 29/30
 - Operations Research (Daniele Vigo), 30L/30
 - Signal Processing (Davide Dardari), 28/30
 - Software Engineering (Antonio Natali), 30L/30
 - Telecommunications Networks (Franco Callegati), 30L/30
 - Web-related Technologies (Mario Bravetti), 30/30
 - English Proficiency B1

Erasmus Programme

2012/01 → 2012/05
University of Limerick (IRL)

- Courses**
- Distributed Systems (Reiner Dojen), A/A
 - Human-Computer Interaction (Luigina Cioffi), A/A
 - Real-time Systems (Brian Adley), A/A
 - Software Testing and Inspection (Norah Power), A/A

Skills and Technical Expertise

Note: this section is only indicative; current level of mastery can vary; by no means exhaustive.

- Paradigms** Imperative; OOP; Functional; Reactive; Async; Logic; Agent-Oriented
- Languages** Scala, Java/Kotlin, C#, C++, Ruby, Haskell, Python, JavaScript
- Data** E/R modeling; relational modelling; semantic web
- Design/Arch.** Design patterns; SOA/Microservices; cloud-native applications
- Devops** Docker; Kubernetes; CI/CD (Gradle, Travis, GitHub Actions)
- Technologies**
- Cloud** – Google Cloud Platform, Amazon Web Services, Heroku
 - Web dev.** – HTML5; CSS3; jQuery; PHP
 - Frameworks** – Akka; Spring; NodeJs; ASP.NET MVC; Rails; Vert.x; RabbitMQ
 - Data** – MySQL; NoSQL (e.g. MongoDB)
- Process**
- Agile sw dev. and practices:** Scrum; (A)TDD/BDD.
 - Model-driven sw dev.:** UML; DSL; code-generation (XText).
 - Collaborative sw dev.:** version control (git); build automation (Gradle, sbt).

Languages

- Italian** Mother tongue.
- English** Proficient in both spoken and written English.

References

Prof. Mirko Viroli, Full Professor, Department of Computer Science and Engineering (DISI), Alma Mater Studiorum–Università di Bologna

Prof. Viroli was my PhD and Master Thesis advisor, and is currently my research fellowship supervisor.

Prof. Alessandro Ricci, Associate Professor, Department of Computer Science and Engineering (DISI), Alma Mater Studiorum–Università di Bologna

Prof. Ricci was my Bachelor Thesis supervisor and, more recently, has been a co-author in research publications.

Referees from academia

Other referees for my academic profile include: Prof. Simon Dobson, Prof. Ferruccio Damiani, Prof. Andrea Omicini, Prof. Lukas Esterle, Prof. Jacob Beal, Prof. Giancarlo Fortino, Prof. Schahram Dustdar, Prof. Franco Zambonelli.

I hereby authorize the use of my personal data in accordance to the GDPR (General Data Protection Regulation) 679/16 – “European regulation on the protection of personal data”.