Roberto Casadei, PhD

CV (Feb 2021) *Research Fellow & Adjunct Professor*

Overview (highlights)

Current position: **Fixed-Term Junior Researcher (RTD-A)** 2022/02 → 2025/01
Theme Techniques & strategies for Green Autonomic Internet of Things — Università di Bologna

Education: **PhD in Computer Science and Engineering** 2016/11 → 2020/04
Thesis Engineering Self-* Collective Processes for Cyber-Physical Ecosystems — Università di Bologna

Research record & service:

Bibliometrics: 38+ in journals/conf.proceedings; H-index 14 (gscholar), 6 pubs in Q1 journals
Organisation: eCAS'21 Workshop Chair; ACSOS'21 PC & Publicity Chair; COORDINATION'21 PC
Editorial: SI in Robotics & AI journal; SI in Electronics journal

Teaching

- Object-Oriented Programming (B. in Computer Science & Engineering, UNIBO) 2020-21, 2021-22 editions
- Foundations of Informatics (B. in Electrical/Biomedical Engineering), 2020-21, 2021-22 editions
- Intelligent Cyber-Physical Systems (Minor "Smart Infrastructures", UNIBO) 2021-22

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)

Job experience

- Software developer at Apex-Net (now We-Do Srl), Part-time, 2014/03 → 2015/12

Scholarships, awards, and (public) competitions

Awards IEEE TCSC PhD Thesis Award; Prize G. Bassi'17
Scholarships PhD scholarship (MIUR); Mobility Grants (MarcoPolo, conferences)
Competitions STEM High-School Recruitment A041 (1st winner); PhD admission/funding (1st winner)

Recent activity

Summary I am currently a research fellow at the Department of Computer Science & Engineering of the University of Bologna (UNIBO). I have 38+ publications at international journals and conferences; my current H-Index is 14 (GScholar), 12 (SCOPUS). I got a PhD in *CS & Eng.* from UNIBO, with a thesis on "Engineering Collective Adaptive Processes for Cyber-Physical Ecosystems" (supervised by Prof. Viroli), awarded by the IEEE TCSC. I have been a visiting PhD student as the University of St Andrews (refereed by Prof. Simon Dobson) and at TU Wien (refereed by Prof. Schahram Dustdar). I got awards as a Master graduate/student, and for my PhD dissertation. In 2014-15, I have also worked as a part-time software engineer. I am also involved in teaching activities: I am Adjunct Professor in the BEng courses *Object-Oriented Programming* and *Foundations of Informatics*, a.y. 2020-21 and 2021-22, at UNIBO, Cesena.

Qualifications

(ASN Fascia II) National Scientific qualification as associate 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 an evaluation of 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).

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.

Research Community Service

Editorial roles

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

MDPI Electronics (Q2) - Guest Editor 2021–2022
"QA & Risk Mitigation in Large-Scale Distributed Systems"

MDPI Electronics - Topical Advisory Panel 2021–
MDPI Electronics Journal

MDPI Electronics - Topic Board Member 2020–2021
MDPI Electronics Journal - Topic Editors

Organising roles

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

ACSOS'22 Publication Chair 2021
3rd IEEE International Conference on Autonomic Computing and Self-Organizing Systems Washington DC, USA
As Publication Chair, I was responsible for managing the production of all material to be published in relation to the conference. The activity required to interact with IEEE, prepare the conference proceedings according to IEEE guidelines, and checking proper inclusion of all material (accepted&presented papers, tutorial abstracts, workshop papers..) to ensure proper publication on IEEE Xplore.

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

ACSOS'21 Publicity Chair 2021
2nd IEEE International Conference on Autonomic Computing and Self-Organizing Systems Washington DC, USA
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.

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

SASO'18 Web Chair (Organizing Committee Member) 2018
12th IEEE International Conference on Self-Adaptive and Self-Organizing Systems Trento, Italy
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.

Participation in program committees

COORDINATION'22 Artifact Evaluation Committee Member 2022
24th International Conference on Coordination Models and Languages Lucca, Italy

ALPACA'22 Technical Program Committee Member 2022
1st Workshop on Adaptive, Learning PervAsive Applications (ALPACA) Pisa, Italy

ACSOS'21 Program Committee Member 2021
2nd IEEE International Conference on Autonomic Computing and Self-Organizing Systems Washington DC, USA

COORDINATION'21 Program Committee Member 2021
23rd International Conference on Coordination Models and Languages Valletta, Malta

MODELS'21 Student Research Competition Committee Member 2021
ACM/IEEE 24th International Conference on Model Driven Engineering Languages and Systems (MODELS 2021) Virtual Conference

PLDI'21 Artifacts Program Committee Member 2021
42nd ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2021) Virtual Conference

WOA'21 Program Committee Member 22nd Workshop "From Objects to Agents" 2021
Bologna, Italy

CLOUD COMPUTING'21 Program Committee Member 2021
12th International Conference on Cloud Computing, GRIDs, and Virtualization Porto, Portugal

eCAS'20,'17 Program Committee Member 2020
5th eCAS Workshop on Engineering Collective Adaptive Systems Washington, USA
Same role in the past: 2017, Tucson USA (2nd eCAS)

Talks at Conferences and Events

FScaFi: A Core Calculus for Collective Adaptive Systems Programming 2021/10
Event 10th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation Rhodes (GRC)

6th eCAS Workshop on Engineering Collective Adaptive Systems: Introduction to the workshop 2021/10
Event 6th eCAS Workshop on Engineering Collective Adaptive Systems Online

Augmented Collective Digital Twins for Self-Organising Cyber-Physical Systems 2021/10
Event SISSY Workshop on Self-Improving System Integration Online

Tuple-Based Coordination in Large-Scale Situated Systems 2021/06
Event 23rd International Conference on Coordination Models and Languages Online

Collective Adaptive Systems as Coordination Media: The Case of Tuples in Space-Time 2020/08
Event 5th eCAS Workshop on Engineering Collective Adaptive Systems Online

Engineering Resilient Collaborative Edge-enabled IoT 2019/07
Event 16th IEEE International Conference on Services Computing Milan (ITA)

Aggregate Processes in Field Calculus 2019/06
Event 21th International Conference on Coordination Models and Languages Copenaghen (DNK)

On Context-Orientation in Aggregate Programming 2019/06
Event 4th eCAS Workshop on Engineering Collective Adaptive Systems Umeå (SWE)

Coordinating Computation at the Edge: a Decentralized, Self-Organizing, Spatial Approach 2019/06
Event 4th IEEE International Conference on Fog and Mobile Edge Computing Rome (ITA)

Collective Abtractions & Platforms for Large-Scale Self-Adaptive IoT 2018/09
Event 3rd eCAS Workshop on Engineering Collective Adaptive Systems Trento (ITA)

From Field-Based Coordination to Aggregate Computing 2018/06
Event 20th International Conference on Coordination Models and Languages Madrid (ESP)

Compositional Blocks for Optimal Self-Healing Gradients 2017/09
Event 11th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO'17) Tucson, Arizona (USA)

Practical Aggregate Programming in Scala 2016/10
Event Scala Symposium 2016 Amsterdam (NLD)

Programming Actor-based Collective Adaptive Systems 2016/10
Event AGERE'16 (international workshop on agents and actors) Amsterdam (NLD)

On Execution Platforms for Large-Scale Aggregate Computing 2016/09
Event Workshop on Collective Adaptation in Very Large Scale Ubicomp: Towards a Superorganism of Wearables, Ubicomp/ISWC Adjunct Heidelberg (DEU)

Towards Aggregate Programming in Scala 2016/06
Event 1st International Workshop on Programming Models and Languages for Distributed Computing (PMLDC) – co-located with ECOOP Rome (ITA)

Reviewer Activity

- **Excellent reviewer** according to Publons
- 18 verified reviews (2020-21) on Publons

Peer reviewing in Journals and Conferences (10+)

- IEEE Internet of Things
- IEEE Transactions on Services Computing
- IEEE Transactions on Intelligent Transportation Systems
- Springer Software and Systems Modeling
- Elsevier Journal on Pervasive and Mobile Computing (PMC)
- For more, see my publons profile

Books (see e.g. acknowledgments sections)

- Quantum Computing in Action (Johan Vos, 2022)
- *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. 01/01/2019
- 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. 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. Simon Dobson (University of St Andews)**, 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 PRIN Italian Project Fluidware (2017KRC7KT), coordinated by Prof. Franco Zambonelli and involving a consortium of four universities: University of Modena and Reggio Emilia, University of Bologna, University of Camerino, and University of Calabria. The project revolves around models and techniques for adaptive distributed computing. This activity led to two articles published in international journals and one paper on the proceedings of international conferences. prof. Franco Zambonelli. (2019→)
- Participation as scientific collaborator in project on "cybersecurity and threat attribution" by YOROI S.R.L. and University of Bologna. (2021→)
- 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 miscroservices, and their application to large-scale and small-scale retail. (2016→2017)

Experiences Abroad

Visiting PhD student @ TU 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 @ St Andrews (Scotland) 2017, 3 months

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

Erasmus @ 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

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 conference series.

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.

Scholarship for meritorious students 2015
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

Awards

IEEE TCSC Outstanding PhD Dissertation Award 2020 2020
I was selected as winner for an international PhD thesis award promoted by the IEEE Technical Committee on Scalable Computing.

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)

High school graduation award 2009
I was given the "Roberto Ruffilli" acknowledgment for high-school graduation with score 100/100 (cum laude). Cesena (Italy)

Public Competitions

1st WINNER - Ordinary Public Competition for Recruitment (and Qualification) of Secondary School Teachers - STEM (Science, Technology, Engineering and Mathematics) - Competition class A041 (Computer science and technologies) - Region: Emilia-Romagna, Italy 2021
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 techologies) and one oral part (about the design of a didactical activity). Modena

1st WINNER - Public Competition for Admission to the PhD Programme in Computer Science and Engineering, Alma Mater Studiorum–Università di Bologna 2016
Bologna

Selected Publications

1. 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
   - **Metrics:** Q1 (Scimago Quartile); 2020 IF 2.829; 9 cits. (Gscholar)
   - **CRediT:** Methodology, Software, Validation, Writing - original draft, Writing - review & editing
   - **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.
2. **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); 2020 IF 6.212; 14 cits. (Gscholar)

- **CRediT:** Conceptualization, Methodology, Software, Validation, Investigation, Writing - original draft, Writing - review & editing, Visualization
- **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.

3. 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 2020); 2020 IF 3.818
   - **Contribution:** Validation; Visualization; Writing - original draft, Writing - review & editing
   - **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.
4. 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. URL: https://lmcs.episciences.org/8755
   - **Metrics:** Q2 (Scimago Quartile 2020); 2020 IF 0.438
   - **Contribution:** Development of the formal model; Writing - original draft, Writing - review & editing
   - **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.
5. **Roberto Casadei**, Gianluca Aguzzi, and Mirko Viroli. "A Programming Approach to Collective Autonomy". In: *Journal of Sensor and Actuator Networks* 10.2 (2021). ISSN: 2224-2708. DOI: 10.3390/jsan10020027
   - **Metrics:** Q2 (Scimago Quartile)
   - **CRediT:** Conceptualization; methodology; software; validation; investigation; resources; writing–original draft preparation; writing–review and editing; visualization; project administration
   - **Short summary:** In this work, we define an agent control architecture for aggregate multi-agent systems, discuss how the aggregate computing framework relates to both individual and collective autonomy notions, and show how it can be used to program collective autonomous behaviour.
6. **Roberto Casadei**, Danilo Pianini, Andrea Placuzzi, Mirko Viroli, and Danny Weyns. "Pulverization in Cyber-Physical Systems: Engineering the Self-Organizing Logic Separated from Deployment". In: *Future Internet* 12.11 (2020), p. 203. DOI: 10.3390/fi12110203
   - **Metrics:** Q2 (Scimago Quartile); 6 cits. (Gscholar)
   - **CRediT:** Conceptualization, Investigation, Writing - original draft
   - **Short summary:** This work proposes and formalises an architectural meta-model whereby a self-organising CPS application can be decomposed into multiple responsibilities mapping to several deployable components. This kind of "pulverisation" enables flexibility regarding deployment and application execution, hence promoting self-* properties like self-adaptation and self-optimisation. The approach is

instantiated into the aggregate computing framework and verified using a simulated Green IoT case study of pollution-aware household heating control running on heterogeneous ICT infrastructure.

7. Antonio Bucchiarone, Mirko D'Angelo, Danilo Pianini, Giacomo Cabri, Martina De Sanctis, Mirko Viroli, **Roberto Casadei**, and Simon Dobson. "On the Social Implications of Collective Adaptive Systems". In: *IEEE Technology and Society Magazine* 39.3 (2020), pp. 36–46. DOI: 10.1109/MTS.2020.3012324
   - **Metrics:** Q2 (Scimago Quartile); IF 1.554; 3 cits. (Gscholar)
   - **Contribution:** I actively carried out the first draft, the revisions, and developed the sections of introduction, concepts, and application domains.
   - **Short summary:** This manuscript analyses the relationships between engineered collective adaptive systems (CAS), humans, and human society. Based on this analysis, it discusses open research challenges for the engineering of "human-oriented" CASs where humans take a key role as users or components of the system.

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* (2020). DOI: 10.1016/j.future.2020.07.032
   - **Metrics:** Q1 (Scimago Quartile); IF 7.187; 10 cits. (Gscholar)
   - **CRediT:** Conceptualization, Methodology, Software, Validation, Writing - original draft, Writing - review & editing, Visualization.
   - **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
   - **Metrics:** Q2 (Scimago Quartile); IF 0.685; 25 cits. (Gscholar)
   - **Contribution:** I contributed to the literature review, discussion of algorithms, presentation of ScaFi, and specific topics in perspectives and roadmaps.
   - **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
    - **Metrics:** Q1 (Scimago Quartile); IF 5.910; 51 cits. (Gscholar)
    - **Contribution:** I largely contributed to the conceptualisation, writing, and modelling parts.
    - **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

- **Metrics:** Q1 (Scimago Quartile); IF 5.768; 107 cits. (Gscholar)
- **Contribution:** I contributed to conceptualisation, writing, modelling, and case study definition.
- **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.

12. **Roberto Casadei**, Alessandro Aldini, and Mirko Viroli. "Towards attack-resistant Aggregate Computing using trust mechanisms". In: *Science of Computer Programming* 167 (2018), pp. 114–137. DOI: 10.1016/j.scico.2018.07.006

    - **Metrics:** Q3 (Scimago Quartile); IF 1.088; 18 cits. (Gscholar)
    - **Contribution:** I contributed to conceptualisation, writing, software, implementation, and experiments.
    - **Short summary:** This work proposes the use of trust and recommendations to provide a kind of protection against voluntary or involuntary "attacks" towards aggregate computing algorithms.

Peer-Reviewed Publications and Bibliometrics

Bibliometrics

- **H-index**: 14 (Gscholar), 12 (Scopus).
- **i10-index**: 20 (Gscholar).
- **Number of citations**: 606 (Gscholar), 425 (Scopus).
- **Number of publications:** 38 (36 in Scopus).
- **Number of journal publications:** 13.
  - **Number of Q1 journal publications:** 6.
  - **Number of Q2 journal publications:** 6.
  - **Number of Q3 journal publications:** 1.

All my publications (ordered by year, descending):

1. **Roberto Casadei**, Danilo Pianini, Mirko Viroli, and Danny Weyns. "Digital Twins, Virtual Devices, and Augmentations for Self-Organising Cyber-Physical Collectives". In: *Applied Sciences* 12.1 (2022). ISSN: 2076-3417. DOI: 10.3390/app12010349. URL: https://www.mdpi.com/2076-3417/12/1/349
2. **Roberto Casadei**, Andrea Placuzzi, Mirko Viroli, and Danny Weyns. "Augmented Collective Digital Twins for Self-Organising Cyber-Physical Systems". In: *IEEE International Conference on Autonomic Computing and Self-Organizing Systems, ACSOS 2021, Companion Volume, Washington, DC, USA, September 27 - Oct. 1, 2021*. IEEE, 2021, pp. 160–165. DOI: 10.1109/ACSOS-C52956.2021.00051. URL: https://doi.org/10.1109/ACSOS-C52956.2021.00051
3. Gianluca Aguzzi, **Roberto Casadei**, Danilo Pianini, Guido Salvaneschi, and Mirko Viroli. "Towards Pulverised Architectures for Collective Adaptive Systems through Multi-Tier Programming". In: *IEEE International Conference on Autonomic Computing and Self-Organizing Systems, ACSOS 2021, Companion Volume, Washington, DC, USA, September 27 - Oct. 1, 2021*. IEEE, 2021, pp. 99–104. DOI: 10.1109/ACSOS-C52956.2021.00033. URL: https://doi.org/10.1109/ACSOS-C52956.2021.00033
4. Giorgio Audrito, **Roberto Casadei**, and Gianluca Torta. "Towards Integration of Multi-Agent Planning with Self-Organising Collective Processes". In: *IEEE International Conference on Autonomic Computing and Self-Organizing Systems, ACSOS 2021, Companion Volume, Washington, DC, USA, September 27 - Oct. 1, 2021*. IEEE, 2021, pp. 297–298. DOI: 10.1109/ACSOS-C52956.2021.00042. URL: https://doi.org/10.1109/ACSOS-C52956.2021.00042

5. Giorgio Audrito, **Roberto Casadei**, and Gianluca Torta. "Fostering resilient execution of multi-agent plans through self-organisation". In: *IEEE International Conference on Autonomic Computing and Self-Organizing Systems, ACSOS 2021, Companion Volume, Washington, DC, USA, September 27 - Oct. 1, 2021*. IEEE, 2021, pp. 81–86. DOI: 10.1109/ACSOS-C52956.2021.00076. URL: https://doi.org/10.1109/ACSOS-C52956.2021.00076

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

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. URL: https://lmcs.episciences.org/8755

8. **Roberto Casadei**, Mirko Viroli, Alessandro Ricci, and Giorgio Audrito. "Tuple-Based Coordination in Large-Scale Situated Systems". In: *Coordination Models and Languages - 23rd IFIP WG 6.1 International Conference, COORDINATION 2021, Proceedings*. Vol. 12717. Lecture Notes in Computer Science. Springer, 2021, pp. 149–167. DOI: 10.1007/978-3-030-78142-2_10

9. Gianluca Aguzzi, **Roberto Casadei**, Niccolò Maltoni, Danilo Pianini, and Mirko Viroli. "ScaFi-Web: A Web-Based Application for Field-Based Coordination Programming". In: *Coordination Models and Languages - 23rd IFIP WG 6.1 International Conference, COORDINATION 2021, Proceedings*. Vol. 12717. Lecture Notes in Computer Science. Springer, 2021, pp. 285–299. DOI: 10.1007/978-3-030-78142-2_18

10. **Roberto Casadei**, Gianluca Aguzzi, and Mirko Viroli. "A Programming Approach to Collective Autonomy". In: *Journal of Sensor and Actuator Networks* 10.2 (2021). ISSN: 2224-2708. DOI: 10.3390/jsan10020027

11. 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

12. **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

13. **Roberto Casadei**, Danilo Pianini, Andrea Placuzzi, Mirko Viroli, and Danny Weyns. "Pulverization in Cyber-Physical Systems: Engineering the Self-Organizing Logic Separated from Deployment". In: *Future Internet* 12.11 (2020), p. 203. DOI: 10.3390/fi12110203

14. **Roberto Casadei**, Mirko Viroli, Giorgio Audrito, and Ferruccio Damiani. "FScaFi : A Core Calculus for Collective Adaptive Systems Programming". In: *Leveraging Applications of Formal Methods, Verification and Validation: Engineering Principles - 9th International Symposium on Leveraging Applications of Formal Methods, ISoLA 2020, Rhodes, Greece, October 20-30, 2020, Proceedings, Part II*. vol. 12477. Lecture Notes in Computer Science. Springer, 2020, pp. 344–360. DOI: 10.1007/978-3-030-61470-6_21

15. Antonio Bucchiarone, Mirko D'Angelo, Danilo Pianini, Giacomo Cabri, Martina De Sanctis, Mirko Viroli, **Roberto Casadei**, and Simon Dobson. "On the Social Implications of Collective Adaptive Systems". In: *IEEE Technology and Society Magazine* 39.3 (2020), pp. 36–46. DOI: 10.1109/MTS.2020.3012324

16. 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* (2020). DOI: 10.1016/j.future.2020.07.032

17. **Roberto Casadei**, Mirko Viroli, and Alessandro Ricci. "Collective Adaptive Systems as Coordination Media: The Case of Tuples in Space-Time". In: *2020 IEEE International Conference on Autonomic*

Computing and Self-Organizing Systems, ACSOS 2020, Companion Volume, Washington, DC, USA, August 17-21, 2020. IEEE, 2020, pp. 139–144. DOI: 10.1109/ACSOS-C51401.2020.00045

18. 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
19. **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
20. **Roberto Casadei**, Christos Tsigkanos, Mirko Viroli, and Schahram Dustdar. "Engineering Resilient Collaborative Edge-Enabled IoT". in: *2019 IEEE International Conference on Services Computing (SCC)*. 2019, pp. 36–45. DOI: 10.1109/SCC.2019.00019
21. **Roberto Casadei** and Mirko Viroli. "Coordinating Computation at the Edge: a Decentralized, Self-Organizing, Spatial Approach". In: *2019 Fourth International Conference on Fog and Mobile Edge Computing (FMEC)*. 2019, pp. 60–67. DOI: 10.1109/FMEC.2019.8795355
22. **Roberto Casadei**, Danilo Pianini, Guido Salvaneschi, and Mirko Viroli. "On Context-Orientation in Aggregate Programming". In: *IEEE 4th International Workshops on Foundations and Applications of Self* Systems, FAS*W@SASO/ICCAC 2019, Umea, Sweden, June 16-20, 2019*. IEEE, 2019, pp. 92–97. DOI: 10.1109/FAS-W.2019.00035
23. Danilo Pianini, **Roberto Casadei**, and Mirko Viroli. "Security in Collective Adaptive Systems: A Roadmap". In: *IEEE 4th International Workshops on Foundations and Applications of Self* Systems, FAS*W@SASO/ICCAC 2019, Umea, Sweden, June 16-20, 2019*. IEEE, 2019, pp. 86–91. DOI: 10.1109/FAS-W.2019.00034. URL: https://doi.org/10.1109/FAS-W.2019.00034
24. Stefano Mariani, **Roberto Casadei**, Fabrizio Fornari, Giancarlo Fortino, Danilo Pianini, Barbara Re, Wilma Russo, Claudio Savaglio, Mirko Viroli, and Franco Zambonelli. "Case Studies for a New IoT Programming Paradigm: Fluidware". In: *Proceedings of the 1st Workshop on Artificial Intelligence and Internet of Things*. Vol. 2502. CEUR Workshop Proceedings. CEUR-WS.org, 2019, pp. 82–96. URL: http://ceur-ws.org/Vol-2502/paper6.pdf
25. **Roberto Casadei**, Danilo Pianini, Mirko Viroli, and Antonio Natali. "Self-organising Coordination Regions: A Pattern for Edge Computing". In: *Coordination Models and Languages - 21st IFIP WG 6.1 International Conference, COORDINATION 2019, Held as Part of the 14th International Federated Conference on Distributed Computing Techniques, DisCoTec 2019, Kongens Lyngby, Denmark, June 17-21, 2019, Proceedings*. Vol. 11533. Lecture Notes in Computer Science. Springer, 2019, pp. 182–199. DOI: 10.1007/978-3-030-22397-7_11
26. **Roberto Casadei**, Mirko Viroli, Giorgio Audrito, Danilo Pianini, and Ferruccio Damiani. "Aggregate Processes in Field Calculus". In: *Coordination Models and Languages - 21st IFIP WG 6.1 International Conference, COORDINATION 2019, Held as Part of the 14th International Federated Conference on Distributed Computing Techniques, DisCoTec 2019, Kongens Lyngby, Denmark, June 17-21, 2019, Proceedings*. Vol. 11533. Lecture Notes in Computer Science. Springer, 2019, pp. 200–217. DOI: 10.1007/978-3-030-22397-7_12
27. **Roberto Casadei** and Mirko Viroli. "Collective Abstractions and Platforms for Large-Scale Self-Adaptive IoT". in: *2018 IEEE 3rd International Workshops on Foundations and Applications of Self* Systems (FAS*W), Trento, Italy, September 3-7, 2018*. IEEE, 2018, pp. 106–111. DOI: 10.1109/FAS-W.2018.00033. URL: https://doi.org/10.1109/FAS-W.2018.00033
28. Danilo Pianini, Giovanni Ciatto, **Roberto Casadei**, Stefano Mariani, Mirko Viroli, and Andrea Omicini. "Transparent Protection of Aggregate Computations from Byzantine Behaviours via Blockchain". In: *Proceedings of the 4th EAI International Conference on Smart Objects and Technologies for Social Good, GOODTECHS 2018, Bologna, Italy, November 28-30, 2018*. ACM, 2018, pp. 271–276. DOI: 10.1145/3284869.3284870

29. **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

30. **Roberto Casadei**, Alessandro Aldini, and Mirko Viroli. "Towards attack-resistant Aggregate Computing using trust mechanisms". In: *Science of Computer Programming* 167 (2018), pp. 114–137. DOI: 10.1016/j.scico.2018.07.006

31. Mirko Viroli, Jacob Beal, Ferruccio Damiani, Giorgio Audrito, **Roberto Casadei**, and Danilo Pianini. "From Field-Based Coordination to Aggregate Computing". In: *Coordination Models and Languages - 20th IFIP WG 6.1 International Conference, COORDINATION 2018, Held as Part of the 13th International Federated Conference on Distributed Computing Techniques, DisCoTec 2018, Madrid, Spain, June 18-21, 2018. Proceedings*. Vol. 10852. Lecture Notes in Computer Science. Springer, 2018, pp. 252–279. DOI: 10.1007/978-3-319-92408-3_12

32. **Roberto Casadei** and Mirko Viroli. "Programming Actor-Based Collective Adaptive Systems". In: *Programming with Actors - State-of-the-Art and Research Perspectives*. Vol. 10789. Lecture Notes in Computer Science. Springer, 2018, pp. 94–122. DOI: 10.1007/978-3-030-00302-9_4

33. Giorgio Audrito, **Roberto Casadei**, Ferruccio Damiani, and Mirko Viroli. "Compositional Blocks for Optimal Self-Healing Gradients". In: *11th IEEE International Conference on Self-Adaptive and Self-Organizing Systems, SASO 2017, Tucson, AZ, USA, September 18-22, 2017*. IEEE Computer Society, 2017, pp. 91–100. DOI: 10.1109/SASO.2017.18

34. **Roberto Casadei**, Alessandro Aldini, and Mirko Viroli. "Combining Trust and Aggregate Computing". In: *Software Engineering and Formal Methods - SEFM 2017 Collocated Workshops: FOCLASA, Trento, Italy, September 4-5, 2017, Revised Selected Papers*. Vol. 10729. Lecture Notes in Computer Science. Springer, 2017, pp. 507–522. DOI: 10.1007/978-3-319-74781-1_34

35. Giorgio Audrito, Ferruccio Damiani, Mirko Viroli, and **Roberto Casadei**. "Run-Time Management of Computation Domains in Field Calculus". In: *2016 IEEE 1st International Workshops on Foundations and Applications of Self* Systems (FAS*W), Augsburg, Germany, September 12-16, 2016*. IEEE, 2016, pp. 192–197. DOI: 10.1109/FAS-W.2016.50

36. Mirko Viroli, **Roberto Casadei**, and Danilo Pianini. "Simulating Large-scale Aggregate MASs with Alchemist and Scala". In: *Proceedings of the 2016 Federated Conference on Computer Science and Information Systems, FedCSIS 2016, Gdańsk, Poland, September 11-14, 2016*. Vol. 8. Annals of Computer Science and Information Systems. IEEE, 2016, pp. 1495–1504. DOI: 10.15439/2016F407

37. Mirko Viroli, **Roberto Casadei**, and Danilo Pianini. "On Execution Platforms for Large-scale Aggregate Computing". In: *Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing: Adjunct*. UbiComp '16. Heidelberg, Germany: ACM, 2016, pp. 1321–1326. ISBN: 978-1-4503-4462-3. DOI: 10.1145/2968219.2979129

38. **Roberto Casadei** and Mirko Viroli. "Towards Aggregate Programming in Scala". In: *First Workshop on Programming Models and Languages for Distributed Computing, PMLDC@ECOOP 2016, Rome, Italy, July 17, 2016*. ACM, 2016, p. 5. DOI: 10.1145/2957319.2957372

Teaching

Engineering Intelligent Collective Systems — 2021
Course PhD Programme on Computer Science and Engineering — Online
Activity I run a module of 10 hours on research themes pertaining to collective adaptive systems engineering.

Intelligent Cyber-Physical Systems - Module 2 — a.y. 2021-22
Course Minor "Smart Infrastructures" — Cesena
Activity I run 20 hours of teaching on topics related to intelligent cyber-physical systems, including tutoring for projects.

Foundations of Informatics A - Module 2 (two editions) — a.y. 2020-21, 2021-22, Cesena

Role Since a.y. 2021-22, I got the responsibility for the entire course.
Course First cycle degree programme (L) in Electronics Engineering and Biomedical Engineering
Activity I run 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.

Object-Oriented Programming - Module 3 (two editions) — a.y. 2020-21, 2021-22, Cesena

Course First cycle degree programme (L) in Computer Science and Engineering
Activity I run 30 hours of teaching and laboratory material preparation and assessment on OOP in Java and related programming tools (version control, Eclipse, JavaFX, Gradle, etc.).

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, Cesena

Course Second cycle degree programme (LM) in Computer Science and Engineering (cod. 8614)
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, Cesena

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

Full list available in amslaurea.unibo.it.

M.Sc. / M.Eng. degree

- A platform for aggregate computing over LoRaWAN network, Placuzzi, 2020
- A Reinforcement Learning approach to discriminate unsafe devices in aggregate computing systems, Volonnino, 2020
- Towards Aggregate Processes in a Field Calculus-Based Platform, Foschi, 2018
- Distributing Aggregate Computations on top of Akka Actors, Peruzzi, 2018
- Tecniche e algoritmi di aggregate computing a supporto di contesti di smart mobility, Berlini, 2017
- Design and Deployment of an Execution Platform based on Microservices for Aggregate Computing in the Cloud, Farneti, 2017

B.Sc. / B.Eng. degree

- Progettazione di un sistema di categorizzazione delle regressioni per il compilatore Rust, Pasini, 2020
- Sviluppo di un front-end di simulazione per applicazioni aggregate nel framework Scafi, Aguzzi, 2018
- Sviluppo di applicazioni distribuite con lo stack SMACK, Ciavatta, 2018

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

SCAFI (Lead developer)
ScaFi is a Scala toolkit for Aggregate Computing: it includes a field calculus DSL, simulator, and distributed platform. I lead the 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

Software Engineer 2014/09 → 2015/12
Web application development in ASP.NET MVC and JavaScript within a Scrum/Kanban process framework. Apex-Net (WEDO), Cesena (Italy)

Software Engineer 2014/03 → 2014/09
Development of a Windows 8.1 application in C#/XAML and development of the related WCF back-end service for SharePoint integration. Apex-Net (WEDO), Cesena (Italy)

IT Book reviewer 2007 → 2011
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. programmazione.it

Certifications

TS: Microsoft .NET Framework - Application Development Foundation 2011
(License 8424975 - Prometric) 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
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
Exams
- Anthropology (30L)
- Psychology (30)
- Pedagogy, special pedagogy, and didactics for inclusion (30)
- General methodologies and technologies for didactics (30L)

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
Thesis Aggregate Programming in Scala: a Core Library and Actor-based Platform for Distributed Computational Fields
Exams
- Artificial Intelligence
- Programming and Paradigms
- Autonomous Systems
- Business Intelligence
- Computer Security
- Data Base Systems
- Distributed Systems
- Engineering Complex Adaptive Software Systems
- Programming Languages and Models of Computation
- Project Management
- Semantic Web
- Software Systems Engineering
- Web Services and Applications

Bachelor's Degree in Electronics, Informatics, and Telecommunications Engineering 2009/09 → 2013/03
Università di Bologna

Grade Summa Cum Laude (Grade Average: 29.29/30, 5 laudes)

Thesis Reuse Mechanisms and Concurrency: from Actors to Agent-oriented Programming

Exams
- Automatic Controls
- Computer Networks
- Data Base Systems
- Digital Design Principles and Computer Architecture
- Economics and Business Organisation
- Electrotechnics
- Foundations of Informatics A
- Foundations of Informatics B
- General Physics A
- General Physics B
- Geometry and Algebra
- Mathematical Analysis A
- Mathematical Analysis for the Engineering Information Technology
- Operating Systems
- Operations Research
- Signal Processing
- Software Engineering
- Telecommunications Networks
- Web-related Technologies
- English Proficiency B1

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

Courses
- Distributed Systems
- Human-Computer Interaction
- Real-time Systems
- Software Testing and Inspection

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)

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

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".