Roberto Casadei

Curriculum Vitae *PhD, Research Fellow*

Overview

Research Fellow (Department of Computer Science & Engineering) 2019/11 → 2021/10
Università di Bologna
Theme Engineering collective adaptive processes through aggregate computing

PhD in Computer Science and Engineering, "Excellent" defence 2016/11 → 2020/04
Università di Bologna
Thesis Engineering Self-* Collective Processes for Cyber-Physical Ecosystems

Research, community, teaching 2016 →
Papers 27+ in journals/conf.proceedings; h-index 10 (SCOPUS), 12 (gscholar)
Service ACSOS'21 PC, COORDINATION'21 PC, eCAS'19 Chair
Teach. Teaching & tutoring in Bachelor's and Master's Courses

Open-source/academic software projects
Notably SCAFI (Lead Developer), Alchemist (Contributor)

Research & Education experience abroad
2018 TU Wien (Austria) – Visiting PhD student
2017 University of St Andrews (Scotland) – Visiting PhD student
2012 University of Limerick (Ireland) – Erasmus Programme

Work experience as Software Engineer (part-time, while studying) 2014/03 → 2015/12
Notably Backend, Front-end, Web and App Developer (.NET)

Scholarships & awards
Notably IEEE TCSC PhD Thesis Award; Prize G. Bassi'17

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

Recent activity

Summary I am currently a research fellow at the Department of Computer Science & Engineering of the University of Bologna (UNIBO). I have 20+ publications at international journals and conferences; my current H-Index is 12 (GScholar), 10 (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. In 2014-15, I have also worked as a part-time software engineer. I also enjoy teaching; I am Adjunct Professor in the BEng course *Object-Oriented Programming*, a.y. 2020-21, at UNIBO, Cesena.

Research Community Service

eCAS'21 Workshop Chair   2019
6th eCAS Workshop on Engineering Collective Adaptive Systems   Washington DC, USA

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

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

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

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

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

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

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)

eCAS'19 Workshop Chair   2019
4th eCAS Workshop on Engineering Collective Adaptive Systems   Ulmea, Sweden

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

Experiences Abroad

Visiting PhD student @ TU Wien (Austria)   2018, 2 months
Collaboration on collective adaptive systems and edge computing.
Foreign reference professor: Prof. Schahram Dustdar

Visiting PhD student @ St Andrews (Scotland)   2017, 3 months
Collaboration on topological methods and distributed computing.   Marco Polo scholarship
Foreign reference professor: Prof. Simon Dobson

Erasmus @ Limerick (Ireland)   2012, 4 months
Taking exams on specific BEng courses.   Erasmus scholarship

Scholarships

Computer Science and Engineering PhD Scholarship   2016/11 → 2019/10
First classified in the general merit ranking for admission to the PhD Programme   Università di Bologna
and scholarship assignment.

Travel/Conference Grant – DisCoTec 2019   2019
Issuer   Denmarks Tekniske Universitet (DTU)

Mobility Grant – Marco Polo 2016   2017
Issuer   Department of Computer Science and Engineering (DISI), UNIBO

Travel/Conference Grant – Scala Symposium 2016   2016

Study Scholarship   2016/09 → 2016/11

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

▬▬▬ Awards

IEEE TCSC Outstanding PhD Dissertation Award 2020   2020
I was selected as one of 6 winners for an international PhD thesis award promoted
by the IEEE Technical Committee on Scalable Computing.

Best master graduate student (G.Bassi 2017 prize)   2017
Winner of prize *Gianni Bassi*, with 5000€ scholarship, issued by Rotary Club   Faenza (Italy)
Faenza for *Best Master Graduate Student* across all Engineering faculties of
Romagna (district 2072) based on Grade Average and number of laudes.

High school graduation award   2009
"Roberto Ruffilli" acknowledgment for high-school graduation with score 100/100.   Cesena (Italy)

▬▬▬ Peer-reviewed 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* (2021), p. 110908

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

3. **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

4. **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*. Springer, 2020, pp. 344–360. ISBN: 978-3-030-61470-6

5. 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

6. 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)

7. R. Casadei, M. Viroli, and A. 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 Companion (ACSOS-C)*. 2020, pp. 139–144

8. 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

9. **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

10. **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](10.1109/SCC.2019.00019)

11. **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

12. **Roberto Casadei**, Danilo Pianini, Guido Salvaneschi, and Mirko Viroli. "On Context-Orientation in Aggregate Programming". In: *2019 IEEE 4th International Workshops on Foundations and Applications of Self* Systems (FAS* W)*. IEEE. 2019, pp. 92–97

13. Danilo Pianini, **Roberto Casadei**, and Mirko Viroli. "Security in Collective Adaptive Systems: A Roadmap". In: *2019 IEEE 4th International Workshops on Foundations and Applications of Self* Systems (FAS* W)*. IEEE. 2019, pp. 86–91

14. 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

15. **Roberto Casadei**, Danilo Pianini, Mirko Viroli, and Antonio Natali. "Self-organising Coordination Regions: A Pattern for Edge Computing". In: *International Conference on Coordination Languages and Models*. Springer. 2019, pp. 182–199

16. **Roberto Casadei**, Mirko Viroli, Giorgio Audrito, Danilo Pianini, and Ferruccio Damiani. "Aggregate Processes in Field Calculus". In: *International Conference on Coordination Languages and Models*. Springer. 2019, pp. 200–217

17. **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)*. IEEE. 2018, pp. 106–111

18. 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*. ACM. 2018, pp. 271–276

19. **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* (2018)

20. **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

21. Mirko Viroli, Jacob Beal, Ferruccio Damiani, Giorgio Audrito, **Roberto Casadei**, and Danilo Pianini. "From Field-Based Coordination to Aggregate Computing". In: *International Conference on Coordination Languages and Models*. Springer. 2018, pp. 252–279

22. **Roberto Casadei** and Mirko Viroli. "Programming actor-based collective adaptive systems". In: *Programming with Actors*. Springer, 2018, pp. 94–122

23. Giorgio Audrito, **Roberto Casadei**, Ferruccio Damiani, and Mirko Viroli. "Compositional Blocks for Optimal Self-Healing Gradients". In: *Self-Adaptive and Self-Organising Systems (SASO), IEEE International Conference on*. IEEE. 2017

24. **Roberto Casadei**, Alessandro Aldini, and Mirko Viroli. "Combining trust and aggregate computing". In: *International Conference on Software Engineering and Formal Methods*. Springer. 2017, pp. 507–522

25. Giorgio Audrito, Ferruccio Damiani, Mirko Viroli, and **Roberto Casadei**. "Run-Time Management of Computation Domains in Field Calculus". In: *Foundations and Applications of Self* Systems, IEEE International Workshop on*. IEEE. 2016, pp. 192–197

26. **Roberto Casadei**, Danilo Pianini, and Mirko Viroli. "Simulating large-scale aggregate MASs with Alchemist and Scala". In: *Computer Science and Information Systems (FedCSIS), 2016 Federated Conference on*. IEEE. 2016, pp. 1495–1504

27. 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. URL: http://doi.acm.org/10.1145/2968219.2979129

28. **Roberto Casadei** and Mirko Viroli. "Towards Aggregate Programming in Scala". In: *First Workshop on Programming Models and Languages for Distributed Computing*. PMLDC '16. Rome, Italy: ACM, 2016, 5:1–5:7. ISBN: 978-1-4503-4775-4. DOI: 10.1145/2957319.2957372. URL: http://doi.acm.org/10.1145/2957319.2957372

Talks

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

Event 21th International Conference on Coordination Models and Languages

2019/06
Copenaghen (DNK)

On Context-Orientation in Aggregate Programming

Event 4th eCAS Workshop on Engineering Collective Adaptive Systems

2019/06
Umeå (SWE)

Coordinating Computation at the Edge: a Decentralized, Self-Organizing, Spatial Approach

Event 4th IEEE International Conference on Fog and Mobile Edge Computing

2019/06
Rome (ITA)

Collective Abtractions & Platforms for Large-Scale Self-Adaptive IoT

Event 3rd eCAS Workshop on Engineering Collective Adaptive Systems

2018/09
Trento (ITA)

From Field-Based Coordination to Aggregate Computing

Event 20th International Conference on Coordination Models and Languages

2018/06
Madrid (ESP)

Compositional Blocks for Optimal Self-Healing Gradients

Event 11th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO'17)

2017/09
Tucson, Arizona (USA)

Practical Aggregate Programming in Scala

Event Scala Symposium 2016

2016/10
Amsterdam (NLD)

Programming Actor-based Collective Adaptive Systems

Event AGERE'16 (international workshop on agents and actors)

2016/10
Amsterdam (NLD)

On Execution Platforms for Large-Scale Aggregate Computing

Event Workshop on Collective Adaptation in Very Large Scale Ubicomp: Towards a Superorganism of Wearables, Ubicomp/ISWC Adjunct

2016/09
Heidelberg (DEU)

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)

Teaching

Teaching

- Bachelor's Degree course on *Object-Oriented Programming* - Laboratory Module 3 (a.y. 2020-21), Cesena

    - *I run 30CFU of teaching and laboratory material preparation and assessment on OOP in Java and related programming tools (version control, Eclipse, etc.)*

- Lectures in the context of the BBS open-program *Internet of Things* in modules *Distributed Systems* (on cloud-native apps) and *Software Production* (on testing), 2018, Bologna Business School, Bologna

    - *I did seminars to engineers and professionals on specialised topics such as software testing and cloud-native application development*

- 30 hours teaching the basics of programming in Python in the context of IFTS, 2018

- 60 hours teaching the basics of programming in JavaScript in the context of IFTS (Istruzione e Formazione Tecnica Superiore), courses funded by Regione Emilia-Romagna, 2017.

Tutoring

- Master's Degree course *Development of Software Systems* (*Programming and Development Paradigms* and *Concurrent and Distributed Programming*) (a.y. 2016-17, 2017-18, 2018-19, 2019-20)

    - *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).*

- Bachelor's Degree course *Object-Oriented Programming* (a.y 2019-20)

Reviewer Activity

Peer reviewing in Journals and Conferences (10+)

- IEEE Internet of Things

- 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

- *Programming with Types (Vlad Riscutia, 2019, Manning)*

- *Classic Computer Science Problems in Python (David Kopec, 2019, Manning)*

Contributions (open-source/academic projects)

SCAFI (Lead developer)

A framework for Aggregate Computing in Scala. It includes the following: field calculus DSL, simulator, distributed platform.

ALCHEMIST (Contributor)
Alchemist is a meta-simulator tailored to pervasive computing, on the JVM.
Miscellaneous Contributions
– org.protelis.protelisdoc: Kotlin gradle plugin to generate Protelis docs, via dokka
Slides @ Slideshare
Slides with notes about computer science, lectures, and talks.

Professional Experience

Software Engineer
Web application development in ASP.NET MVC and JavaScript within a Scrum/Kanban process framework.

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

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
Università di Bologna

Thesis   Engineering self-adaptive collective processes for cyber-physical ecosystems

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)

Master's Degree in Computer Science and Engineering

2013/09 → 2016/03
Università di Bologna

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

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 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.

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".