

Danilo Pianini

CONTACTS	Via Venezia, 52 47521 Cesena (FC) Italy	Mobile: +39 320 4136573 E-mail: danilo.pianini@unibo.it WWW: www.danilopianini.org
OBJECTIVE	Placement in an academic position that allows for advanced research in pervasive computing (i.e., modeling, analysis, design, and verification) with a particular focus on simulation.	
CITIZENSHIP	Italy	
RESEARCH THEMES	My current research is focussed on the engineering aspects of pervasive computing, with the goal of providing a robust, easy, and coherent chain of tools and procedures that can lead to robust, adaptive, self-healing, and possibly evolving software ecosystems. I recently got fascinated by aggregate programming, namely all the languages and techniques that enable the programming of groups of devices as a single entity distributed in space and time.	
EDUCATION	Dipartimento di Ingegneria Elettronica, Informatica e delle Telecomunicazioni, Università di Bologna , Bologna (BO), Italy Ph.D. in Electronics, Computer Science and Telecommunications Engineering, <ul style="list-style-type: none">• Thesis Title: <i>Engineering Complex Computational Ecosystems</i>• Supervisor: Prof. Mirko Viroli• Tutor: Prof. Antonio Natali• External reviewer: Prof. Giovanna di Marzo Serugendo• External reviewer: Prof. Simon Dobson• Area of Study: Pervasive computing <p>Self-organising pervasive ecosystems of devices are set to become a major vehicle for delivering infrastructure and end-user services. The inherent complexity of such systems poses new challenges to those who want to dominate it by applying the principles of engineering. The recent growth in number and distribution of devices with decent computational and communicational abilities, that suddenly accelerated with the massive diffusion of smartphones and tablets, is delivering a world with a much higher density of devices in space. Also, communication technologies seem to be focussing on short-range device-to-device (P2P) interactions, with technologies such as Bluetooth and Near-Field Communication gaining greater adoption. Locality and situatedness become key to providing the best possible experience to users, and the classic model of a centralised, enormously powerful server gathering and processing data becomes less and less efficient with device density. Accomplishing complex global tasks without a centralised controller responsible of aggregating data, however, is a challenging task. In particular, there is a local-to-global issue that makes the application of engineering principles challenging at least: designing device-local programs that, through interaction, guarantee a certain global service level. In this thesis, we first analyse the state of the art in coordination systems, then motivate the work by describing the main issues of pre-existing tools and practices and identifying the improvements that would benefit the design of such complex software ecosystems. The contribution can be divided in three main branches. First, we introduce a novel simulation toolchain for pervasive ecosystems, designed for allowing good expressiveness still retaining high performance. Second, we leverage existing coordination models and patterns in order to create new spatial structures.</p>	

Third, we introduce a novel language, based on the existing “Field Calculus” and integrated with the aforementioned toolchain, designed to be usable for practical aggregate programming.

Seconda Facoltà di Ingegneria, Università di Bologna, Cesena (FC), Italy

M.S., Software Engineering, March 2011

- 110L/110 - *Magna cum Laude*
- Thesis Topic: *A Framework for Simulation of Pervasive Services Ecosystems*
- Supervisor: Dr. Mirko Viroli
- Area of Study: Computational Models

My master thesis was focused in the definition of a model and the realisation of a framework to simulate pervasive service ecosystems as they are meant in the SAPERE European Project. It analyses the relevance of the simulation both in the scientific method and in the specific context of pervasive computing. It introduces the Monte Carlo method and its realisation in the biochemistry field, through the well-known Stochastic Simulation Algorithms (SSA) described first by Gillespie and then optimized by Gibson and Slepoy. A computational model able to face highly dynamic requirements is then introduced, and an extension to the existing SSA algorithm “Next Reaction” is proposed to support it. The simulation framework Alchemist was then developed, and two case studies featuring high complexity (morphogenesis and crowd steering) were shown.

B.S., Software Engineering, October 2008

- 106 / 110
- Thesis Topic: *From Swarm Intelligence to Self-Organising Coordination: a Pervasive Scenarios Application*
- Adviser: Prof. Andrea Omicini
- Area of Study: Distributed Systems

My bachelor thesis discusses the motivations which are pressing software engineers to move away from the object oriented towards the multi agent programming paradigm. It introduces the concept of coordination among agents with specific focus on the Linda tuple spaces medium and its extension with programmable behaviour, TuCSon. Nature-inspired patterns are discussed and a taxonomy is proposed. A proof-of-concept example is then proposed, exploiting TuCSon to produce a real distributed application which uses an ant-inspired pattern.

ITCG L. Einaudi, Novafeltria (RN), Italy

Senior high school specializing in science education with focus on biology, July 2005

- 100/100

PUBLICATIONS
ORDERED BY TIME

- [1] D. Pianini, S. Virruso, R. Menezes, A. Omicini, and M. Viroli, “Self organization in coordination systems using a wordnet-based ontology,” in *Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems, SASO 2010, Budapest, Hungary, 27 September - 1 October 2010*, 2010, pp. 114–123. [Online]. Available: <http://dx.doi.org/10.1109/SASO.2010.35>
- [2] D. Pianini, M. Viroli, and S. Montagna, “A simulation framework for pervasive services ecosystems,” in *Proceedings of the 12th Workshop on Objects and Agents, Rende (CS), Italy, Jul 4-6, 2011*, 2011, pp. 150–157. [Online]. Available: http://ceur-ws.org/Vol-741/ID15_PianiniViroliMontagna.pdf

- [3] S. Montagna, M. Viroli, M. Risoldi, D. Pianini, and G. D. M. Serugendo, "Self-organising pervasive ecosystems: A crowd evacuation example," in *Software Engineering for Resilient Systems - Third International Workshop, SERENE 2011, Geneva, Switzerland, September 29-30, 2011. Proceedings*, 2011, pp. 115–129. [Online]. Available: http://dx.doi.org/10.1007/978-3-642-24124-6_12
- [4] D. Pianini, S. Montagna, and M. Viroli, "A chemical inspired simulation framework for pervasive services ecosystems," in *Federated Conference on Computer Science and Information Systems - FedCSIS 2011, Szczecin, Poland, 18-21 September 2011, Proceedings*, 2011, pp. 667–674. [Online]. Available: <http://fedcsis.eucip.pl/proceedings/pliks/98.pdf>
- [5] S. Montagna, D. Pianini, and M. Viroli, "Gradient-based self-organisation patterns of anticipative adaptation," in *Sixth IEEE International Conference on Self-Adaptive and Self-Organizing Systems, SASO 2012, Lyon, France, September 10-14, 2012*, 2012, pp. 169–174. [Online]. Available: <http://dx.doi.org/10.1109/SASO.2012.25>
- [6] —, "A model for drosophila melanogaster development from a single cell to stripe pattern formation," in *Proceedings of the ACM Symposium on Applied Computing, SAC 2012, Riva, Trento, Italy, March 26-30, 2012*, 2012, pp. 1406–1412. [Online]. Available: <http://doi.acm.org/10.1145/2245276.2231999>
- [7] M. Viroli, D. Pianini, S. Montagna, and G. Stevenson, "Pervasive ecosystems: a coordination model based on semantic chemistry," in *Proceedings of the ACM Symposium on Applied Computing, SAC 2012, Riva, Trento, Italy, March 26-30, 2012*, 2012, pp. 295–302. [Online]. Available: <http://doi.acm.org/10.1145/2245276.2245336>
- [8] M. Viroli, D. Pianini, and J. Beal, "Linda in space-time: An adaptive coordination model for mobile ad-hoc environments," in *Coordination Models and Languages - 14th International Conference, COORDINATION 2012, Stockholm, Sweden, June 14-15, 2012. Proceedings*, 2012, pp. 212–229. [Online]. Available: http://dx.doi.org/10.1007/978-3-642-30829-1_15
- [9] B. Anzenruber, D. Pianini, J. Nieminen, and A. Ferscha, "Predicting social density in mass events to prevent crowd disasters," in *Social Informatics - 5th International Conference, SocInfo 2013, Kyoto, Japan, November 25-27, 2013. Proceedings*, 2013, pp. 206–215. [Online]. Available: http://dx.doi.org/10.1007/978-3-319-03260-3_18
- [10] G. Stevenson, J. Ye, S. Dobson, D. Pianini, S. Montagna, and M. Viroli, "Combining self-organisation, context-awareness and semantic reasoning: the case of resource discovery in opportunistic networks," in *Proceedings of the 28th Annual ACM Symposium on Applied Computing, SAC '13, Coimbra, Portugal, March 18-22, 2013*, 2013, pp. 1369–1376. [Online]. Available: <http://doi.acm.org/10.1145/2480362.2480619>
- [11] D. Pianini, S. Montagna, and M. Viroli, "Chemical-oriented simulation of computational systems with ALCHEMIST," *J. Simulation*, vol. 7, no. 3, pp. 202–215, 2013. [Online]. Available: <http://dx.doi.org/10.1057/jos.2012.27>
- [12] D. Pianini, M. Viroli, F. Zambonelli, and A. Ferscha, "HPC from a self-organisation perspective: The case of crowd steering at the urban scale," in *International Conference on High Performance Computing & Simulation, HPCS 2014, Bologna, Italy, 21-25 July, 2014*, 2014, pp. 460–467. [Online]. Available: <http://dx.doi.org/10.1109/HPCSim.2014.6903721>

- [13] D. Pianini, S. Sebastio, and A. Vandin, “Distributed statistical analysis of complex systems modeled through a chemical metaphor,” in *International Conference on High Performance Computing & Simulation, HPCS 2014, Bologna, Italy, 21-25 July, 2014*, 2014, pp. 416–423. [Online]. Available: <http://dx.doi.org/10.1109/HPCSim.2014.6903715>
- [14] F. Zambonelli, A. Omicini, B. Anzenberger, G. Castelli, F. L. D. Angelis, G. D. M. Serugendo, S. A. Dobson, J. L. Fernandez-Marquez, A. Ferscha, M. Mamei, S. Mariani, A. Molesini, S. Montagna, J. Nieminen, D. Pianini, M. Risoldi, A. Rosi, G. Stevenson, M. Viroli, and J. Ye, “Developing pervasive multi-agent systems with nature-inspired coordination,” *Pervasive and Mobile Computing*, vol. 17, pp. 236–252, 2015. [Online]. Available: <http://dx.doi.org/10.1016/j.pmcj.2014.12.002>
- [15] S. Montagna, A. Omicini, and D. Pianini, “Extending the gillespie’s stochastic simulation algorithm for integrating discrete-event and multi-agent based simulation,” in *Multi-Agent-Based Simulation XVI - International Workshop, MABS 2015, Istanbul, Turkey, May 5, 2015, Revised Selected Papers*, 2015, pp. 3–18. [Online]. Available: http://dx.doi.org/10.1007/978-3-319-31447-1_1
- [16] —, “A gillespie-based computational model for integrating event-driven and multi-agent based simulation: Extended abstract,” in *Proceedings of the 2015 International Conference on Autonomous Agents and Multiagent Systems, AAMAS 2015, Istanbul, Turkey, May 4-8, 2015*, 2015, pp. 1763–1764. [Online]. Available: <http://dl.acm.org/citation.cfm?id=2773424>
- [17] F. Damiani, M. Viroli, D. Pianini, and J. Beal, “Code mobility meets self-organisation: A higher-order calculus of computational fields,” in *Formal Techniques for Distributed Objects, Components, and Systems - 35th IFIP WG 6.1 International Conference, FORTE 2015, Held as Part of the 10th International Federated Conference on Distributed Computing Techniques, DisCoTec 2015, Grenoble, France, June 2-4, 2015, Proceedings*, 2015, pp. 113–128. [Online]. Available: http://dx.doi.org/10.1007/978-3-319-19195-9_8
- [18] M. Viroli, D. Pianini, S. Montagna, G. Stevenson, and F. Zambonelli, “A coordination model of pervasive service ecosystems,” *Sci. Comput. Program.*, vol. 110, pp. 3–22, 2015. [Online]. Available: <http://dx.doi.org/10.1016/j.scico.2015.06.003>
- [19] D. Pianini, M. Viroli, and J. Beal, “Protelis: practical aggregate programming,” in *Proceedings of the 30th Annual ACM Symposium on Applied Computing, Salamanca, Spain, April 13-17, 2015*, 2015, pp. 1846–1853. [Online]. Available: <http://doi.acm.org/10.1145/2695664.2695913>
- [20] J. Beal, D. Pianini, and M. Viroli, “Aggregate programming for the internet of things,” *IEEE Computer*, vol. 48, no. 9, pp. 22–30, 2015. [Online]. Available: <http://dx.doi.org/10.1109/MC.2015.261>
- [21] M. Viroli, D. Pianini, A. Ricci, P. Brunetti, and A. Croatti, “Multi-agent systems meet aggregate programming: Towards a notion of aggregate plan,” in *PRIMA 2015: Principles and Practice of Multi-Agent Systems - 18th International Conference, Bertinoro, Italy, October 26-30, 2015, Proceedings*, 2015, pp. 49–64. [Online]. Available: http://dx.doi.org/10.1007/978-3-319-25524-8_4
- [22] D. Pianini, A. Croatti, A. Ricci, and M. Viroli, “Computational fields meet augmented reality: Perspectives and challenges,” in *2015 IEEE International Conference on Self-Adaptive and Self-Organizing Systems Workshops, SASO*

Workshops 2015, Cambridge, MA, USA, September 21-25, 2015, 2015, pp. 80–85. [Online]. Available: <http://dx.doi.org/10.1109/SASOW.2015.18>

- [23] M. Viroli, J. Beal, F. Damiani, and D. Pianini, “Efficient engineering of complex self-organising systems by self-stabilising fields,” in *2015 IEEE 9th International Conference on Self-Adaptive and Self-Organizing Systems, Cambridge, MA, USA, September 21-25, 2015*, 2015, pp. 81–90. [Online]. Available: <http://dx.doi.org/10.1109/SASO.2015.16>
- [24] D. Pianini, J. Beal, and M. Viroli, “Improving gossip dynamics through overlapping replicates,” in *Coordination Models and Languages - 18th IFIP WG 6.1 International Conference, COORDINATION 2016, Held as Part of the 11th International Federated Conference on Distributed Computing Techniques, DisCoTec 2016, Heraklion, Crete, Greece, June 6-9, 2016, Proceedings*, 2016, pp. 192–207. [Online]. Available: http://dx.doi.org/10.1007/978-3-319-39519-7_12
- [25] M. Viroli, R. Casadei, and D. Pianini, “On execution platforms for large-scale aggregate computing,” in *Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing, UbiComp Adjunct 2016, Heidelberg, Germany, September 12-16, 2016*, 2016, pp. 1321–1326. [Online]. Available: <http://doi.acm.org/10.1145/2968219.2979129>
- [26] —, “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.*, 2016, pp. 1495–1504. [Online]. Available: <http://dx.doi.org/10.15439/2016F407>
- [27] A. Ricci, M. Viroli, A. Omicini, S. Mariani, A. Croatti, and D. Pianini, *Spatial Tuples: Augmenting Physical Reality with Tuple Spaces*. Cham: Springer International Publishing, 2017, pp. 121–130. [Online]. Available: http://dx.doi.org/10.1007/978-3-319-48829-5_12
- [28] S. Dobson, M. Viroli, J. L. Fernandez-Marquez, F. Zambonelli, G. Stevenson, G. Di Marzo Serugendo, S. Montagna, D. Pianini, J. Ye, G. Castelli, and et al., “Spatial awareness in pervasive ecosystems,” *The Knowledge Engineering Review*, vol. 31, no. 4, p. 343–366, Sep 2016. [Online]. Available: <https://dx.doi.org/10.1017/S0269888916000199>
- [29] J. Beal, M. Viroli, D. Pianini, and F. Damiani, “Self-adaptation to device distribution changes,” in *10th IEEE International Conference on Self-Adaptive and Self-Organizing Systems, SASO 2016, Augsburg, Germany, September 12-16, 2016*, 2016, pp. 60–69. [Online]. Available: <http://dx.doi.org/10.1109/SASO.2016.12>
- [30] M. Viroli, G. Audrito, F. Damiani, D. Pianini, and J. Beal, “A higher-order calculus of computational fields,” *CoRR*, vol. abs/1610.08116, 2016. [Online]. Available: <http://arxiv.org/abs/1610.08116>
- [31] M. Viroli, A. Bucchiarone, D. Pianini, and J. Beal, “Combining self-organisation and autonomic computing in cass with aggregate-mape,” pp. 186–191, 2016. [Online]. Available: <https://doi.org/10.1109/FAS-W.2016.49>
- [32] J. Beal, M. Viroli, D. Pianini, and F. Damiani, “Self-adaptation to device distribution in the internet of things,” *ACM Trans. Auton. Adapt. Syst.*, vol. 12, no. 3, pp. 12:1–12:29, Sep. 2017. [Online]. Available: <http://doi.acm.org/10.1145/3105758>
- [33] M. Viroli, D. Pianini, A. Ricci, and A. Croatti, “Aggregate plans for multiagent systems,” *International Journal of Agent-Oriented Software Engineering*, 2017, to appear.

- [34] D. Pianini, S. Dobson, and M. Viroli, “Self-stabilising target counting in wireless sensor networks using euler integration,” *11th IEEE International Conference on Self-Adaptive and Self-Organizing Systems, SASO 2017, Tucson, AZ, USA, September 18-22, 2017*, 2017, to appear.
- [35] M. Francia, D. Pianini, J. Beal, and M. Viroli, “Towards a foundational api for resilient distributed systems design,” *2017 IEEE 2nd International Workshop on Foundations and Applications of Self* Systems (FAS*W), Tucson, AZ, USA, September 18-23, 2017*, 2017, to appear.
- [36] M. Viroli, G. Audrito, J. Beal, F. Damiani, and D. Pianini, “Engineering resilient collective adaptive systems by self-stabilisation,” *ACM Transactions on Modeling and Computer Simulation (TOMACS)*, 2017, submitted for publication.
- [37] A. Ricci, M. Viroli, A. Omicini, S. Mariani, A. Croatti, and D. Pianini, “Spatial tuples: Augmenting physical reality with tuple spaces,” *Expert Systems*, 2017, submitted for publication.

EDITORIAL ACTIVITY

Scientific programming: member of the editorial board — since 2017

SERVICE IN INTERNATIONAL CONFERENCES

Collective Adaptive Systems and Middleware — Special Track of the 33rd ACM Symposium on Applied Computing (SAC2018)

PC member

1st workshop on Architectures, Languages and Paradigms for IoT (ALP4IoT 2017)

PC chair

2nd eCAS Workshop on Engineering Collective Adaptive Systems (eCAS 2017)

PC member

REVIEWING FOR INTERNATIONAL JOURNALS

Mathematical Problems in Engineering, 2017

Sensors, 2016-2017

Computational and Structural Biotechnology Journal, 2016

Communications of the ACM, 2016

International Journal of Innovative Research in Computer and Communication Engineering, 2016

TALKS IN INTERNATIONAL CONFERENCES

Practical Aggregate Programming with Protelis

Tutorial at the *11th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2017)*

Towards a Foundational API for Resilient Distributed Systems Design

2nd eCAS Workshop on Engineering Collective Adaptive Systems (eCAS 2017)

Simulating Large-scale Aggregate MASs with Alchemist and Scala

10th International Workshop on Multi-Agent Systems and Simulation (MAS&S 2016)

Computational Fields meet Augmented Reality: Perspectives and Challenges

1st Workshop on Spatial and COllective PErvasive Computing Systems (SCOPEs 2015)

Extending the Gillespie’s Stochastic Simulation Algorithm for Integrating Discrete-Event and Multi-Agent Based Simulation

XVI International Workshop on Multi-Agent Based Simulation (MABS 2015)

Protelis: Practical Aggregate Programming
The 30th ACM/SIGAPP Symposium On Applied Computing (SAC 2015)

Gradient-based Self-organisation Patterns of Anticipative Adaptation
6th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2012)

A Chemical Inspired Simulation Framework for Pervasive Services Ecosystems
5th International Workshop on Multi-Agent Systems and Simulation (MAS&S 2011)

Self Organization in Coordination Systems using a WordNet-based Ontology
Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2010)

OTHER TALKS

Continuous integration and delivery
 Seminar for the “Programming and development paradigms” course, 2016

Democratic process and electronic platforms: concerns of an engineer
 Workshop “The Future of Democracy”, 2016

Software development made serious
 Seminar for the “Adaptive complex software systems engineering” course, 2016

Engineering Complex Computational Ecosystems
 PhD defense, 2015

Engineering computational ecosystems
 2nd year PhD seminar, 2013

From Engineer to Alchemist, There and Back Again: An Alchemist Tale
 Seminar for the “Laboratory of systems and applications LM” course, 2012

Engineering computational ecosystems
 Vieni via con noi, 2012, Cesena

Recipes for Sabayon: cook your own Linux distro within two hours
 Linux Day 2012, Cesena

The simulation alchemy
 Seminar for the “Laboratory of systems and applications LM” course, 2011

A Simulation Framework for Pervasive Service Ecosystems
XII Workshop “Dagli Oggetti agli Agenti” (WOA 2010)

TEACHING

Alma Mater Studiorum Università di Bologna, Bologna (BO), Italy

Post-doc

since January 2015

- Co-Supervisor Giuacomo Scaparrotti’s thesis: *Studio delle prestazioni del simulatore Alchemist: ottimizzazione di routing e caching*, 2017.
- Co-Supervisor Matteo Francia’s master thesis: *A Foundational Library for Aggregate Programming*, 2017.
- Seminar “Continuous integration and delivery”, 2017
- Contract Professor for the course “Object-Oriented Programming”, 2017.
- Contract Professor for the course “Object-Oriented Programming”, 2016.
- Co-Supervisor Elisa Casadio’s bachelor thesis: *Revisione e refactoring dell’interfaccia utente del simulatore Alchemist*, 2016.
- Co-Supervisor Gianluca Grossi’s bachelor thesis: *Sviluppo di plugin per IntelliJ IDEA*, 2016.
- Co-Supervisor Simone Costanzi’s master thesis: *Integrazione di piattaforme d’esecuzione*

e simulazione in una toolchain Scala per aggregate programming, 2016.

- Co-Supervisor Giovanni Romio's bachelor thesis: *Backport di una applicazione da Java 8 a Java 7*, 2016.
- Contract Professor for the course "Complex Adaptive Software System Engineering", 2016.
- Seminar "Software development made serious", 2016
- Teaching assistant for the course "Object-Oriented Programming", 2015.
- Contract Professor for the course "Computer Science Foundations A", 2015.
- Teaching assistant for the course "Complex Adaptive Software System Engineering", 2015.

PhD Student

January 2012 to December 2014

- Teaching assistant for the course "Object Oriented Programming", 2014.
- Teaching assistant for the course "Complex Adaptive Software System Engineering", 2014.
- Teaching assistant for the course "Object Oriented Programming", 2013.
- Teaching assistant for the course "Computer Science Foundations A", 2013.
- Co-Supervisor Davide Ensini's master thesis: *Spatial computing per smart devices*, 2014.
- Co-Supervisor Luca Nenni's master thesis: *Simulazioni realistiche di algoritmi di Crowd Steering*, 2014.
- Co-Supervisor Enrico Polverelli's master thesis: *Simulazione di algoritmi di auto-organizzazione basati su gradiente computazionale in Alchemist*, 2012.
- Co-Supervisor Andrea Dallatana's master thesis: *BDI agents for Real Time Strategy games*, 2012.
- Co-Supervisor Francesca Cioffi's master thesis: *Algoritmi gradient-based per la modellazione e simulazione di sistemi auto-organizzanti*, 2012.
- Co-Supervisor Paolo Contessi's master thesis: *Supporting semantic web technologies in the pervasive service ecosystems middleware*, 2012.
- Co-Supervisor in Giacomo Pronti's master thesis: *Simulazione di ecosistemi di servizi pervasivi con supporto ad annotazioni tuple based*, 2012.
- Co-Supervisor in Francesco Cardi's bachelor thesis, 2012.
- Seminar "From Engineer to Alchemist, There and Back Again: An Alchemist Tale", 2012
- Seminar "The simulation alchemy", 2011

Contract Researcher

June 2011 to December 2012

- Contract professor for the course "Laboratory of Multi Agent Systems", 2011.
- Co-Supervisor in Michele Morgagni's master thesis: *Modulo di comunicazione in una infrastruttura per pervasive service ecosystems*, 2011.
- Co-Supervisor in Matteo Desanti's master thesis: *Supporto a regole chimico-semantiche per la coordinazione di service pervasive ecosystems*, 2011.

FORMart, Cesena (FC), Italy

Teacher

January 2016 to March 2017

- "Sistemi informatici e loro gestione" — course on basics of operating systems, networking, and database management
- "Elementi di Programmazione e Sviluppo di Applicazioni" — course on imperative and object oriented programming with C and Java

University of Iowa, Iowa City, IA USA

Visiting Researcher

August 2014 to September 2014

- Seminar "Programming Networks from the Aggregate Perspective"

Florida Institute of Technology, Melbourne, FL USA

Visiting Researcher

July 2009 to October 2009

- Seminar “Self Organization in Coordination Systems using a Wordnet-based Ontology”, along with Sascia Virruso, under the supervision of Dr. Ronaldo Menezes

AWARDS

Best Paper Award, **SASO 2016**, Augsburg, Germany

INTERNATIONAL
EXPERIENCE

University of Iowa, Iowa City, IA USA

Visiting Researcher

May 2016, to June 2016

- Advancements in the aggregate programming field.
- UIowa supervisor: Dr. Jacob Beal
- UniBo supervisor: Prof. Mirko Viroli

University of Iowa, Iowa City, IA USA

Visiting Researcher

August 2014, to September 2014

- Research on aggregate programming and high order functions for field calculus. Refinement of Protelis.
- UIowa supervisor: Dr. Jacob Beal
- UniBo supervisor: Prof. Mirko Viroli

Raytheon BBN Technologies, Cambridge, MA USA

Visiting Researcher

June 2014, to August 2014

- Research on aggregate programming and high order functions for field calculus. Realisation of Protelis.
- BBN supervisor: Dr. Jacob Beal
- UniBo supervisor: Prof. Mirko Viroli

Johannes Kepler Universität, Linz, Austria

Visiting Researcher

July 2013, to October 2013

- Research on crowd density estimation and prediction, crowd steering, crowd simulation, pervasive ecosystems.
- JKU supervisor: Univ.-Prof. Mag. Dr. Alois Ferscha
- UniBo supervisor: Prof. Mirko Viroli

Florida Institute of Technology, Melbourne, FL USA

Visiting Researcher

July 2009 to October 2009

- Research on distributed systems, complex networks and self organisation
- FIT supervisor: Dr. Ronaldo Menezes
- UniBo supervisor: Prof. Andrea Omicini

PROFESSIONAL
EXPERIENCE

twinlogix, Santarcangelo di Romagna (RN), Italy

Software development

March 2016 to January 2017

Valpharma International S.p.A., Pennabilli (RN), Italy

Stage: raw material quality control

July 2004 to August 2004

OTHER ACTIVITIES Contribution to open-source software projects:

- [Alchemist](#)
- [Protelis](#)
- [URLClassLoader util](#)
- [Java Implicit Reflective Factory](#)
- [GoIV](#)
- [javadoc.io linker for Gradle](#)
- [gson-extras](#)
- [SmarTrRR](#)
- [Cnchi](#)
- [Angela the Mandelbrot Set Explorer](#)
- [Sabayon Linux](#)

Frequent contributor to [Wikipedia](#) and [OpenStreetMap](#).

Designer and developer of [JIRF](#), 2017–today

- The Java Implicit Reflective Factory allows for building objects reflectively inside configured contexts, applying implicit type conversions chains when needed.

Designer and developer of [URLClassLoader Util](#), 2016–today

- [URLClassLoader Util](#) is a small library that provides functionality to manipulate the Java classpath at runtime.

Designer and developer of [Javadoc.io Linker](#), 2016–today

- [Javadoc.io linker](#) is a Gradle plugin that configures any Javadoc build to link [javadoc.io](#) when referring to non-local classes.

Designer and leading developer of [Protelis](#), 2014–today

- [Protelis](#) is a programming language aiming at making networked systems just as easy to build for complex and heterogeneous networks as for single machines and cloud systems. This accomplished by separating the different tasks and making some of the hard and subtle parts automatic and implicit.

Designer and leading developer of [Alchemist](#), 2010–today

- [Alchemist](#) is an innovative simulator meant to join the expressiveness of the agent based modelling and the power and speed of the stochastic simulation algorithms used in chemistry. It is tailored to scenarios in which many nodes interact exchanging informations. Its flexibility allows for a wide range of applications, spacing from the classical chemistry to the biology (e.g. complex morphogenesis processes) to pervasive computing.

Designer and developer of [SmarTrRR](#), 2015–2017

- [SmarTrRR](#) is a transitive dependency range resolver plugin for Gradle. It replaces the default [Protelis](#) resolver, implementing a progressive range restriction, and a conflict resolution algorithm. Also, it allows the user to configure specific artifact substitutions.

Creator and maintainer of [Nirvana overlay](#) for Gentoo Linux, 2014–2015

- [Nirvana](#) is an overlay for Gentoo Linux, namely a container of ebuild files, which are scripts describing how to install and maintain packages in a Gentoo Linux distribution. [Nirvana](#) contains those ebuild that work well, but are too hard to maintain to be pushed in [Sunrise](#) or [Sabayon](#) overlays. Moreover, this repository is used by me as a playground for creating new ebuilds. On July 2014 [Nirvana](#) got officially indexed by [Layman](#), and as a consequence it is now available to all Gentoo users using such tool.

Creator and maintainer of Nirvana Community Repository, 2014–2015

- Nirvana Community Repository contains the same packages included in Nirvana overlay, distributed in a pre-compiled form compatible with Sabayon Linux Entropy package manager.

Sabayon Linux, 2008–2014

- Member of both testing team and developers team. Sabayon Linux is a Gentoo-based distribution which follows the works-out-of-the-box philosophy, aiming to give the user a wide number of applications that are ready for use and a self-configured operating system.

A.St.I.Ce. Executive Board Member, January 2006 to November 2009

- Founded “I² — Informa Ingegneri”, the technical journal of Seconda Facoltà di Ingegneria, containing articles about the research activity of the faculty.
- Founded “Linux Libera Tutti”, a project meant to allow students access without any charge DVDs and CDs of various Linux distributions, with a special focus on Sabayon Linux.

SKILLS

Hardware/software configuration:

- Windows installation and configuration
- Linux installation and configuration for personal computers, servers, and embedded systems with specific skills for Gentoo Linux, its derivatives and Arch Linux.
- Server and Desktop systems assembling
- Overclocking

Computer Programming:

- Java, Scala, C, Python, Prolog, Groovy, C++, UNIX shell scripting, SQL, Xtend, and others.
- Language design with the Xtext framework
- Object Oriented design
- Distributed systems
- Concurrent programming
- Functional programming
- Mobile programming (Android)

Software engineering and productive teamwork:

- Distributed Version Control Systems (Mercurial, Git)
- Branching models
- Build systems (Gradle, Maven)
- Continuous Integration (Travis CI, drone.io)
- Automated software deployment

Information/Internet Technology:

- Markup languages (XML, HTML, Markdown)
- Database manipulation with SQL
- Networking (UDP, TCP, ARP, DNS)
- Services (SQL, HTTP, application-specific daemon design)
- Content Managing (Joomla, Drupal)
- Static website generators (Jekyllrb)

Operating Systems:

- Linux, with specific skills for Gentoo, Sabayon and Arch
- other UNIX variants
- Microsoft Windows family

Productivity Applications:

- \LaTeX , \BibTeX
- Common productivity packages (for Windows and Linux platforms)

Multimedia (basic knowledge):

- Scalar image editing and analysis (Computer Vision skills, Photoshop, GIMP)
- Vectorial image editing (Dia, Inkscape)
- RAW image processing
- Non-linear video editing (Kdenlive, Openshot)
- 3D Design (Blender)
- 3D Programming (OpenGL)

EXPERTISE

Mathematics:

- Applied Mathematics, Real and Complex Analysis, Discrete Mathematics, Geometry.

Physics:

- Mechanics, Electromagnetism.

Control Theory and Engineering:

- Distributed and Self-adaptive Control, Dynamic Optimization, Bio-mimicry, Bio-inspiration.

Communications and Signal Processing:

- Probability, Random Variables, Stochastic Processes, Networks

Computer Science and Engineering:

- Model Checking, Software Verification, Component-Based Reusable Software, Object Oriented Programming, Logic Programming, Functional Programming, Concurrent Programming, Distributed Systems, Benchmarking, Model Driven Software Development.

Natural Sciences (Biology, Microbiology, Chemistry, Biochemistry):

- Molecular orbital theory, stoichiometry, organic chemistry, DNA transcription and replication processes, PCR, metabolic processes, virus classification, bacteria classification, human morphology, physiology, Earth sciences, astronomy.

REFERENCES AVAILABLE TO CONTACT

Dr. Jacob Beal (e-mail: jakebeal@alum.mit.edu; phone: +1 617 873 7676)

- Scientist, Raytheon BBN Technologies
- ◊ 10 Moulton Street, Cambridge, MA 02138, USA
- ★ *Dr. Beal was my local supervisor during my research period in Cambridge and Iowa City*

Prof. Andrea Omicini (e-mail: andrea.omicini@unibo.it; phone: +39 0547 3 39220)

- Full Professor, Dipartimento di Informatica – Scienza e Ingegneria
Alma Mater Studiorum Università di Bologna
- ◊ Via Venezia 52, 47521 Cesena (FC), Italy
- ★ *Prof. Omicini was my supervisor for Bachelor Thesis and my Italian supervisor during the research period in Florida Tech*

Prof. Mirko Viroli (e-mail: mirko.viroli@unibo.it; phone: +39 0547 3 39216)

- Associate Professor, Dipartimento di Informatica – Scienza e Ingegneria
Alma Mater Studiorum Università di Bologna
- ◊ Via Venezia 52, 47521 Cesena (FC), Italy
- ★ *Dr. Viroli was my supervisor for Master Thesis and PhD*