QUANTICOL

A Quantitative Approach to Management and Design of Collective and Adaptive Behaviours

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QUANTICOL 2016 summer school

Revision: 1.0

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Due date of deliverable: Month 39 (June 2016)

Actual submission date: June 30, 2016

Nature: R. Dissemination level: PU

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Part. no.	Participant organisation name	Acronym	Country
1 (Coord.)	University of Edinburgh	UEDIN	UK
2	Consiglio Nazionale delle Ricerche – Istituto di Scienza e Tecnologie della Informazione "A. Faedo"	CNR	Italy
3	Ludwig-Maximilians-Universität München	LMU	Germany
4	Ecole Polytechnique Fédérale de Lausanne	EPFL	Switzerland
5	IMT Lucca	IMT	Italy
6	University of Southampton	SOTON	UK
7	Institut National de Recherche en Informatique et en Automatique	INRIA	France

COOPERATION

Report on the Summer School

Introduction

The QUANTICOL summer school was organised, in collaboration with Professor Marco Bernardo of the University of Urbino, as the 16th edition of an annual series that has been running since 2000. Each year Professor Bernardo co-organises a summer school on a topic related to Formal Methods for the Design of Computer, Communication and Software Systems. In keeping with the QUANTICOL project, the focus for 2016 was on Quantitative Evaluation of Collective Adaptive Systems. Each summer school takes place at the University Residential Centre in Bertinoro, (CEUB) which is affiliated with the University of Bologna. Administrative support was provided by the team at CEUB and the administrative team at the University of Edinburgh. The school took place 20th – 24th June 2016 and further details can be found at the website `http://www.sti.uniurb.it/events/sfm16quanticol/index.html`.

Programme

The programme of the summer school is reported below (QUANTICOL speakers are shown in bold). As well as attending the lectures, where appropriate, the students were also invited to download the associated software tools and gain experience in their use. In particular the QUANTICOL-developed software — the CARMA Eclipse Plug-in, topochecker and ERODE — were made available to the students during the summer school. The programme allowed ample time for them to take advantage of this opportunity

Day	Time	Lecturer	Topic
Monday	09:30 − 12:30	Giovanna Di Marzo Serugendo	Self-Organisation in Distributed Computing Systems
	15:00 − 18:00	Carolyn Talcott	Formal Specification and Analysis of Robust Adaptive Distributed Cyber Physical Systems
Tuesday	09:30 − 12:30	Carlo Ghezzi	Dependability of Adaptable and Evolvable Distributed Systems
	15:00 − 18:00	**Luca Bortolussi** & **Nicolas Gast**	Mean-Field Limits: Beyond Ordinary Differential Equations
Wednesday	09:30 − 12:00	**Jane Hillston** **Michele Loreti**	Modelling and Analysis of Collective Adaptive Systems with CARMA and Its Tools
	15:00 − 18:00	**Vashti Galpin**	Spatial Representations and Analysis Techniques
Thursday	09:30 − 12:00	**Mieke Massink** **Vincenzo Ciancia**	Spatial Logic and Spatial Model Checking
	15:00 − 18:00	Radu Grosu Ezio Bartocci	Spatio-Temporal Model Checking
Friday	09:30 − 12:00	**Mirco Tribastone** **Andrea Vandin**	Quantitative Abstractions for Collective Adaptive Systems
	15:00 − 18:00	Jake Beal	Aggregate Programming

All the presentations that were used during the school are available on the website[1], both for the participants and for other interested parties.

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[1] `http://www.sti.uniurb.it/events/sfm16quanticol/index.html`

Participants

The summer school attracted a reasonable number of applicants and 24 students from five countries attended. Details are given in the table below. 25% of participants were female.

Name	Affiliation
Yehia Abd Alrahman	IMT Lucca (IT)
Mai Abusair (F)	Università dell' L'Aquila (IT)
Faeq Alrimawi	Lero Limerick (IE)
Giorgio Audrito	Università di Torino (IT)
Marco Biagi	Università di Firenze (IT)
Celia Biane (F)	Université Paris Saclay (FR)
Aimee Borda (F)	Trinity College Dublin (IE)
Angelo Croatti	Università di Bologna (IT)
Daniele Di Pompeo	Università dell' L'Aquila (IT)
Tan Duong	GSSI L'Aquila (IT)
Christian Hirsch	TU Wien (AT)
Emilio Incerto	GSSI L'Aquila (IT)
Timo Kehrer	Politecnico di Milano (IT)
Anna Lukina	TU Wien (AT)
Sandro Mehic	Università di Firenze (IT)
Ada Ndeye Sylla (F)	CEA Grenoble (FR)
Lorenzo Pagliari	GSSI L'Aquila (IT)
Paul Piho	University of Edinburgh (UK)
Saikat Saha	Università Milano Bicocca (IT)
Ines Sarray (F)	INRIA Sophia Antipolis (FR)
Stefano Tognazzi	IMT Lucca (IT)
Christos Tsigkanos	Politecnico di Milano (IT)
Tabea Waizmann (F)	IMT Lucca (IT)
Natalia Zon (F)	University of Edinburgh (UK)

Of course, the students were not the only ones who learned more about the work of the QUANTI-COL project during the course of the summer school. The school also provided a good opportunity to disseminate results of the project to the other lecturers. Indeed, dissemination to distinct communities, as well as coherence of the programme, was considered in choosing the external lecturers to invite. The external lecturers were:

Ezio Bartocci is an Assistant Professor in the Cyber-Physical Systems group of the Technical University of Wien. He works in formal methods and computational tools to support the modelling and automated analysis of complex computational systems, including medical cyber-physical systems and biological systems.

Jake Beal works for BBN Technology, Boston as a research scientist. He is very active in the the area of pervasive computing, self-organisation and coordination, particularly through aggregate computing. He also has an interest in synthetic biology, where the designed systems can be seen as examples of collective adaptive systems for which it is strongly desirable to have predictive models of dynamic behaviour.

Giovanna Di Marzo Serugendo is Professor at the University of Geneva, where she heads the institute of Services Science. Her current research interests are related to the engineering of autonomous systems, in particular self-assembly of software, self-organising, self-adaptive and large-scale services, and formal methods to assist in the construction of dynamically resilient systems.

Carlo Ghezzi is Professor at the Politecnico di Milano and is an international leader in the field of software engineering. He serves on the program committees of the major conferences in the area. His research in recent years has focused on methods and tools to improve dependability of adaptable and evolvable distributed applications, including ubiquitous and pervasive computer systems.
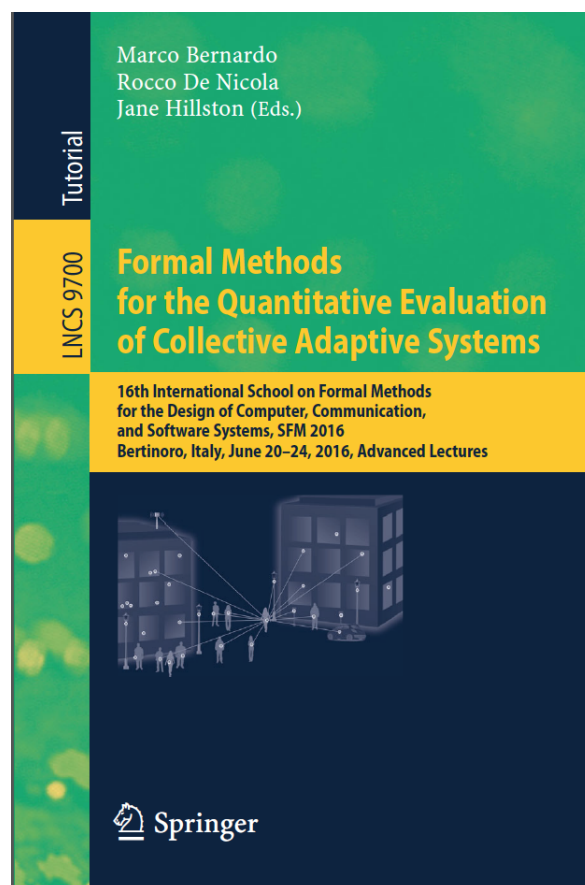
Radu Grosu is Professor at the Technical University of Wien, where he heads the Cyber-Physical Systems group. The group focus on specification, design , analysis and control of cyber-physical systems using techniques such as spatial-temporal logics, symbolic and stochastic model checking and probabilistic hybrid systems. Professor Grosu has chaired many international conferences, including most recently, Cyber-Physical Systems Week 2016.

Carolyn Talcott works for SRI International where she is program director of the Symbolic Systems Biology group. In addition to systems biology, in recent years her work has been aimed to bring formal reasoning techniques to bear on autonomous adaptive systems, such as drones.

There were many interesting and lively discussions between the lecturers over lunch and dinner during the week.

Tutorial book

A tutorial book was published by Springer in conjunction with the summer school and a copy was given to each of the participants and each of the lecturers. All lecturers except Prof Di Marzo Serugendo contributed to the book. The table of content is shown below. The book will be available from Springer for purchase or online access.

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Acknowledgements