

Lecture Notes in Control and Information Sciences
- Proceedings

Elena Zattoni
Silvio Simani
Giuseppe Conte *Editors*

15th European Workshop on Advanced Control and Diagnosis (ACD 2019)

Proceedings of the Workshop Held in
Bologna, Italy, on November 21–22,
2019



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Editors

15th European Workshop on Advanced Control and Diagnosis (ACD 2019)

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Preface

The 15th European Workshop on Advanced Control and Diagnosis (ACD 2019) was held on November 21–22, 2019 in Bologna, Italy. The conference was technically co-sponsored by IFAC (The International Federation of Automatic Control), through the Technical Committees TC2.2 “Linear Control Systems” and TC6.4 “Fault Detection, Supervision and Safety of Technical Processes—SAFEPROCESS”, by SIDRA (the Italian Society of Researchers and Professors in Automatica) and by CERR (Confindustria Emilia Romagna Ricerca Innovation Hub).

The European Workshop on Advanced Control and Diagnosis is a scientific event periodically organized by research groups which are active in the areas of advanced control and diagnosis. Its aim is gathering academics and professionals from diverse fields of control systems and automation and offering them a forum to discuss current research developments and open problems, illustrate practical applications, and articulate industry needs and priorities. The first edition of the workshop took place in Duisburg, Germany, in November 2003. Since then, the workshop has been organized annually and hosted at various European Universities in France, Germany, the UK, Poland, Italy, Hungary, Denmark, the Czech Republic, and Romania. It is notable that the 15th edition of the workshop, which was held at the beautiful venue of Palazzo Grassi, one of the few surviving examples of noble dwellings built during the Middle Age in the lively and excellently located city of Bologna, definitely overrode the European borders, featuring contributions not only from Europe but also from North, Central, and South America, Africa, Japan, Russia, China, Australia, and Asia.

The 15th edition of the workshop featured contributed and invited papers, as well as plenary lectures delivered by high-profile scientists in advanced control and diagnosis. The contributions presented at the conference, either of a more theoretical nature or with a focus on applications, covered a variety of up-to-date topics in the field of systems and control. These included, but were not limited to, robust control, adaptive control, fault-tolerant control, control reconfiguration, model-based diagnosis of linear, nonlinear and hybrid systems, data-driven diagnosis methods, process supervision, diagnosis and control of discrete-event systems, maintenance and repair strategies, statistical methods for fault diagnosis, reliability

and safety, signal and image processing, system identification, vision and robotics, condition monitoring, maintenance engineering, prognosis and health management, interval methods, numerical methods, neural and fuzzy methods, artificial intelligence methods for control and diagnosis. The main fields of applications were distributed systems, industrial processes, intelligent sensors and actuators, transportation systems, renewable energy systems. Further, the scope of ACD 2019 was broadened with respect to the previous editions to include challenging issues arising in the areas of cyber-physical production systems, industrial internet of things, systems and control for sustainability and structural methods for complex systems.

The technical program of ACD 2019 included 90 regular papers organized in 13 sessions. The fully reviewed and presented papers constitute the content of this proceedings volume, arranged by following the topics of the technical sessions: Design Techniques for Fault Detection and Diagnosis, System Structure and Control, Advanced Methodologies for Fault-Tolerant Control, Optimization Methods for Control of Complex Dynamical Systems, Condition Monitoring and Supervision, Model Predictive Control for Distributed Architecture and Industrial Processes, Industry-Oriented Approaches to Observer Design, Control and Diagnosis for Environmental Issues, Predictive Control for Industrial Systems, Control Design for Industrial Applications, Enhanced Reliability Control Systems, Control Design for AGVs, UAVs and Mobile Robots, Fault Detection, and Identification for Industrial and Civil Structures.

The ACD 2019 technical program also featured two plenary talks, aimed at giving to the conference participants the opportunity to share and draw on the knowledge of internationally-renowned experts in new perspectives for research in sliding mode control theory and applications, as well as in discrete event systems used for estimation and cyber-security. A round table was also organized on the topic “Exponential Technologies and Complex Systems at the Edge of Industry”. The panelists were representatives of top industrial realities, thus ensuring the close connection between science and technology which is a main characteristic of the workshop. During the workshop, two awards, the best student paper award (application or theoretical) and the best industry paper award, respectively, funded by MDPI Energies and Confindustria Emilia Romagna Ricerca Innovation Hub, were granted to young researchers and students.

Now, we would like to gratefully acknowledge all the authors for their participation in the workshop, their scientific contributions, and their precious collaboration during the publication process of these proceedings, the plenary speakers for having accepted our invitation and for their inspiring talks, the panelists for sharing their experiences in the field and further motivating our researches. Our thanks also go to the International Program Committee, the Associate Editors and the Reviewers. We are also very grateful to the Steering Committee for their encouragement and support in all steps of the workshop organization. Indeed, all these colleagues and friends have made ACD 2019 a very successful event and an unforgettable experience to us.

On a final note, we really hope that researchers and professionals in fields related to Advanced Control and Diagnosis may find in this proceedings volume valuable references, capable of inspiring their work towards new brilliant achievements.

Bologna, Italy
Ferrara, Italy
Ancona, Italy
June 2021

Elena Zattoni
Silvio Simani
Giuseppe Conte

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