

RTcMAS 2018

1st International Workshop on Real-Time compliant Multi-Agent Systems

1. Aim and Scope

Since Artificial Intelligence applications became mature, there has been growing interest in applying them into complex systems and physical equipments, especially in Cyber-Physical Systems (CPS) scenarios. Unfortunately, most AI algorithms are characterized by unpredictable or high-variance performances, making them unsuitable for real-time control under hard deadlines. Recently, research has been conducted on tailoring AI techniques to make them more predictable by explicitly reasoning “within and about” strict timing constraints (deadlines and precedence constraints between different tasks). However, little effort has been spent to transfer these approaches over Multi-Agents Systems (MAS) where additional constraints deriving from concurrent use of mutually exclusive resources stand (e.g. internal memory, communication channels, and peripherals such as sensors and actuators). MAS have been a relevant topic within AI since its very beginning, and their technological advancements lead to a concrete adoption of decentralized flexible systems with increasing connections, interactions, and computational capabilities. Today radically new challenges are arising from the domains of the “Internet of Things” (IoT), CPS and “safety-critical” systems. Unfortunately, in these regards MAS tend to reproduce the same myopic approach of their parent discipline: high-quality of reasoning and human-like interaction with little attention to concrete temporal and resources constraints. In “safety-critical” systems, MAS should not only exhibit rational human-standard behaviors, they must also guarantee the completions of tasks within their deadlines without violating priorities and precedences constraints in accessing mutually exclusive resources. Furthermore, since agents interact, negotiate resources and exchange executions of tasks in a social manner, real-time guarantees should not only be provided at the level of each single agent but they should also be evaluated at the level of the “emergent behaviour” of the entire Agency, and this last vision is quite challenging from a theoretical point of view.

The 1st International workshop on Real-Time compliant Multi-Agent Systems (RTcMAS) aims at gathering contributions from both theoretical and pragmatic perspectives, targeting the employment of MAS in IoT and CPS through the exploitation of methodologies, algorithms and applications from the Real Time Community. As such, RTcMAS has the potential to gather the attention of the AI-interested audience from IJCAI-ECAI and AAMAS, with the goal of building the grounds for the next-generation Intelligent CPS, capable to face the challenges of the “ever more connected” IoT era.

2. Call for Papers

The purpose of RTcMAS is to foster the creation of bridges between Artificial Intelligence and Real-Time, while establishing a common ground for the development of *predictable* and *timing-reliable* intelligent agents.

Agent Oriented Programming is an outstanding expression of distributed AI which is pervading a broad range of domains since new possibilities and challenges have been set by the advent of IoT and CPS. Nevertheless, many challenges have yet to be accomplished. In particular, RTcMAS intends to raise the awareness about the real need of equipping MAS with the capability of guaranteeing the respect of strict timing-constraints.

Recent and increasing attempts from both communities in terms of robust theoretical contributions and practical applications have been widely acknowledged and are fervent to debut in the real world.

Therefore, such kinds of contribution from researchers, engineers, and practitioners who are interested in both theoretical and practical applications of intelligent agents and real-time systems are welcome.

Ideas and suggestions on how to empower agents and artificial intelligence, both in R&D and industrial applications under timing-reliability, are encouraged.

Papers presenting theoretical contributions, simulators, advanced prototypes, tools, brand new or refactored techniques, and general survey papers tracking current evolutions and future directions are also welcome.

RTcMAS is characterized by a single main track covering both applications and research works. Participants are invited to submit papers on all research and application aspects of RTcMAS, including, but not limited to:



Real-Time Multi-Agent Systems	Cyber-Physical Agents
Real-Time Distributed Problem Solving	Emergent Behavioral analysis
Performance analysis of Multi-Agent Systems	Robot and Multi-robot Systems
Real-Time Negotiation and Interaction Protocols	Real-Time Behavior Scheduling
Real-Time Negotiation and Interaction Protocols	Real-Time Autonomous Systems
Simulators and Architectures for Real-Time MAS	Real-Time Cooperation and Coordination
Agent-Oriented Programming for Control Applications	Agent Platforms for safety-critical systems
Agent-Oriented Programming for the Internet Of Things	Real-Time Smart Task Allocation and Execution
Agent-Oriented Programming for Cyber-Physical Systems	Real-World applications of Multi-Agent Systems
Agent-Oriented Software Engineering for Real-Time Systems	Response Time analysis in Multi-Agent Systems
Simulation of General-Purpose and Real-Time Multi-Agent Systems	

Participants are invited to submit papers from 10 up to 16 pages in length, addressing the topics of the workshop. Papers must be edited using the LNCS format (using the [LNCS proceedings template](#)) and have to be submitted electronically as PDF files via the EasyChair [submission page](#). For further information visit the workshop [website](#).

Accepted papers, presented at the workshop by one of the authors, will be published in the LNAI Proceedings of RTcMAS (with an ISBN).

Quality, relevance, and originality will impact on the acceptance of the submitted papers. Either full research reports, work-in-progress reports, and literature reviews are all welcome.

3. Planned Activities

Accepted papers will have 20 minutes for presentations and 5 minutes for questions.

Moreover, the authors are required to briefly present a final slide introducing the open challenges envisioned.

The workshop will be opened by the keynote given by the Prof. Aldo Franco Dragoni: "When Rationality entered Time and became a Physical Agent in a Cyber Society".

The afternoon session will be opened by with a keynote about Dr. Alessandro Biondi about the importance of safety-critical systems and their crucial requirements to be mandatorily considered by Intelligent systems operating in CPS.

The workshop will be concluded by a selected panel where the chairs, the presenters and the attendants will summarize the contributions and will discuss the presented open challenges. The envisioned objectives and milestones will then be organized composing a *roadmap* paper for the future steps in the field of Real-Time compliant Multi-Agent Systems.

4. Organizers:

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