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(*Eds.*)

Proceedings of the

1st International Workshop on Adjustable Autonomy and Physical Embodied Intelligence

AAPEI '24

Santiago de Compostela, Spain
October 20th, 2024

Preface

The "*1st International Workshop on Adjustable Autonomy and Physical Embodied Intelligence*" (AAPEI 24) was held in the city of Santiago de Compostela, Spain, on October 20th, 2024. Hosted within the S*chools of Philology and Communication Sciences of the University of Santiago de Compostela*, the workshop brought together researchers interested in all aspects of combining adjustable autonomy and physical embodied intelligence. AAPEI 24 was co-located with the "*27th European Conference on Artificial Intelligence*" (ECAI 2024), which took place from October 19th to 24th, 2024. ECAI 2024 marked the 50th anniversary of European Conferences on AI, thus providing the workshop a thriving environment for discussion and fostering opportunities for collaboration.

Regulating the autonomy of AI systems is a crucial challenge in AI, especially in contexts where the systems are immersed in and interact with human individuals and societies. In such cases, the systems need the ability to operate and learn autonomously, while understanding when their decisions are unsafe, questionable, or unethical, and thus human supervision is required. Since situations are more and more frequent where agents exhibiting a high degree of autonomy are embodied into complex cyberphysical systems, such as robots, this form of adjustable autonomy also needs to consider the specific properties of the physical embodiments. To unify these two perspectives, scientific foundations, techniques, and tools for adjustable autonomy need to be devised, to equip software and/or physical AI systems with the required abilities to operate and learn in human environments, while being fully integrated in the environment and trustworthy. The objective of the workshop is to serve as a forum for researchers interested in investigating all the aspects of combining adjustable autonomy and physical embodied intelligence, to openly discuss relevant issues, research and development progress, future directions and open challenges.

The workshop featured a blend of contributed and invited talks by international experts, alongside presentations of novel research contributions, which were submitted in response to an open call for papers. The program has been organized in two sessions: the morning one focusing mainly on learning-based approaches and the afternoon one mostly devoted to Knowledge- and Logic-based approaches. A final discussion was held at the end, during which transversal topics to the presented works were analyzed and potential future research directions were outlined. This format allowed for a comprehensive exploration of both theoretical and practical aspects of adjustable autonomy in physical embodied systems ensuring a rich exchange of ideas.

To collect and evaluate innovative research contributions, we released a public Call for Papers encouraging submissions on a range of topics, including (but not limited to) the following:

- Humans and AI
- Knowledge Representation and Reasoning
- Machine Learning and Reinforcement Learning
- AI and Robotics
- Logic-based approaches for AI
- Fairness, Ethics, and Trust
- Multi-Agent Systems
- Human-Robot Interaction and cooperation
- Embodied Intelligence
- Robot Learning
- Planning, execution and monitoring for autonomy
- LLMs for embedded autonomy
- Experiences in deploying embedded autonomy, from conception to maturity in practice

In response to the call for papers, we received a total of 12 submissions. Each submission underwent a single-blind peer-review process conducted by at least two members of the Program Committee, who assessed the papers based on their technical quality, relevance, originality, significance, and clarity. As a result, 7 papers were accepted for publication in this volume (4 classified as regular papers and 3 as short papers), while the remaining contributions were accepted solely for oral presentation at the workshop.

Further details can be found on the official website of the event, available at the following link: https://sites.google.com/diag.uniroma1.it/aapei24/home-page.

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AAPEI 2024 Organizing Committee

Committees

Organizing Committee

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Raffaello Camoriano	*Politecnico di Torino, Italy*
Carlo Masone	*Politecnico di Torino, Italy*
Marco Roveri	*University of Trento, Italy*
Luigi Palopoli	*University of Trento, Italy*
Giuseppe Averta	*Politecnico di Torino, Italy*
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Francesco Leofante	*Imperial College London, UK*
Laurent Perrussel	*University Toulouse Capitole, France*
Isabelle Kuhlmann	*FernUniversität in Hagen, Germany*

Program

Morning Session

Session Chair: Fabio Patrizi

- Opening Remarks
  Fabio Patrizi (Organizing Committee)
- [Invited talk] Modelling and Adapting to Human Behaviour in Shared Autonomy Systems
  Bruno Lacerda (University of Oxford):
- Transfer Learning between non-Markovian RL Tasks through Semantic Representations of Temporal States
  Andrea Fanti (Sapienza University of Rome)
- Multi-Agent Model-Based Reinforcement Learning in Discrete Non-Markovian Reward Decision Processes
  Alessandro Trapasso (Sapienza University of Rome)
- Fairness-Driven Explainable Learning in Multi-Agent Reinforcement Learning
  Reza Shahbazian (University of Calabria)
- Efficient Simulation-Based Training of Robust Reinforcement Learning Policies for Soft Robots
  Raffaello Camoriano (Politecnico di Torino)

Afternoon Session

Session Chair: Marco Roveri

- Exploring Bias in Compositional Zero-Shot Action Recognition
  Stefano Berti (Italian Institute of Technology)
- Examples of Assistive Robotic Solutions for Healthy Aging and Rehabilitation at University of Calabria
  Simone Leone (University of Calabria)
- Adaptive and Scalable Knowledge Management for Robotic Applications via Probabilistic Logic Languages
  Enrico Saccon (University of Trento)
- Towards IoT Workflows for Kitchens Enabled with Ambient Intelligence: A Position Paper
  Filippos Ventirozos (Manchester Metropolitan University)
- Effective Approach to LTLf Best-Effort Synthesis in Multi-Tier Environments
  Gianmarco Parretti (Sapienza University of Rome)
- Towards Strategy Repair for Adjustable Autonomy
  Giuseppe Perelli (Sapienza University of Rome)
- Playing Quantitative Games Against an Authority: On the Module Checking Problem
  Aniello Murano (University of Naples “Federico II”)

- On the General Epistemic Abstract Argumentation Framework
  Irina Trubitsyna (University of Calabria)
- Discussion and Closing
  Marco Roveri (Organizing Committee)

Acknowledgements

This workshop has been organized in collaboration with FAIR - Future Artificial Intelligence Research and received funding from the European Union Next-GenerationEU (PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) – MISSIONE 4 COMPONENTE 2, INVESTIMENTO 1.3 – D.D. 1555 11/10/2022, PE00000013). This workshop reflects only the organizers' views and opinions, neither the European Union nor the European Commission can be considered responsible for them.