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Educational Robotics in the Context of the Maker Movement

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Preface

The volume "Educational Robotics in the Context of the Maker Movement" includes papers presented at the International Conference "Educational Robotics in the Makers Era-EDUROBOTICS 2018" held on October 11, 2018, in Rome. The conference was organized by the *Dipartimento di Ingegneria Informatica, Automatica e Gestionale "Antonio Ruberti"*, University "*La Sapienza"* of Rome (Italy, http://www.dis.uniroma1.it/en), EDUMOTIVA (Greece, www.edumotiva.eu), the *Dipartimento di Ingegneria dell'Informazione*, University of Padua (Italy, http://www.dei.unipd.it/en). The conference was the 2018 edition of a sequence of scientific international meetings of researchers working in the Educational Robotics (ER) field, starting from the 1st International Workshop entitled "Teaching Robotics and Teaching With Robotics-TRTWR" organized in Venice in the context of the TERECoP project (www.terecop.eu), followed by other TRTWR workshops (Darmstadt 2010, Riva Del Garda 2012, Padua 2014), and then generating the first edition of the "Educational Robotics in the Makers Era" conference held in Athens in 2016. Publications from those workshops have included open online proceedings, two special issues in the journals: Themes in Science and Technology Education, 2013 and Robotics and Autonomous Systems Journal, 2016, and the book "Educational Robotics in the Makers Era" (Springer 2017).

This book explores more deeply the connection between educational robotics and the maker movement which is currently inspiring new innovative ways to exploit technologies as educational "vehicles" for new ways of learning in and out of school, with a special focus on block-based programming environments, Do-It-Yourself electronics, 3D modelling and printing, the use of intelligent distributed systems, the IoT technology, gamification, and more. So empowered, Educational Robotics (in a broader sense) is proving a more and more fruitful field of development and experimentation both in formal and informal education settings, involving a continuously growing community of researchers and educators with interest in this field across EU and beyond. Starting from pedagogical premises that are the lessons learnt from constructivism, constructionism and social constructivism (Piaget, Papert, Vygotsky), current advances in Educational Robotics focus on the development of STEAM (Science, Technology, Engineering, Arts and

Math) education and the 21st-century skills: creativity, critical thinking, team working, and problem solving.

"Learning by doing" and "Learning by making" are the "mantras" around which the Maker Movement and its inspiring principles are successfully developed. Low-cost materials, free software, and a low access threshold are the pre-conditions to democratize access to new opportunities for learning through the 21st-century digital making technologies. The production of meaningful artefacts, where the "robotic" component can be more or less relevant, is an up-to-date interpretation of those "powerful objects to think with" that Papert considered crucial means for an effective and long-lasting education. The 2018 EDUROBOTICS conference was a valuable occasion to deepen these aspects with scientific contributions that deal with new proposals and innovative experimentations in this field.

The book includes 14 chapters plus six short papers coming from twelve different EU countries, the USA, and Israel.

The content of the book is organized into five sections

First section: Educational Robotics and the Maker Movement
Second section: Pedagogy behind Educational Robotics
Third section: Programming, Games, and Social Robots
Fourth section: Technologies for Educational Robotics
Fifth section: Short Papers Reporting Good Practices or Work in Progress (Presented in the Conference as Posters)

We thank the conference participants, academics, researchers, and educators from all the levels of education (primary, secondary, and tertiary), and the young researchers, PhD and postgraduate students, for their active participation and great contribution to the success of the conference and for authoring this book. Special thanks go to our Programme Committee members who have reviewed the papers and provided important help to authors to improve their manuscripts.

Finally, this book is dedicated to the memory of Edith Ackermann, the brilliant Swiss-American psychologist, collaborator of Seymour Papert at MIT and pioneer in studying the influence of technology on children's learning, who passed away at the end of 2016.

March 2019

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