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A European Project on AI-based Robotics

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Abstract—We introduce the project *Artificial Intelligence based Robotics (AiRobo)*, a partnership of universities from France, Germany, Greece, Hungary, and Romania. AiRobo’s aim is to significantly raise the level of competence and skills of academic staff in the field of artificial intelligence (AI) based robotics, thereby also increasing the attractiveness and reputation of the related departments at the partner universities. We further address the European priority in national contexts regarding inclusion in higher education, covering social inclusion and outreach to people with less opportunities, e.g. people with disabilities or with migrant background. The project partners will collaboratively write a comprehensive book on AI-based robotics, provide tools and video tutorials to support the construction and analysis of robotic systems, develop robotic applications in various fields of high interest to the industry, implement trainings for academic staff of the partners, organize an international summer school and an international conference, and disseminate the project results through various channels.

The outcomes of the project will include the training of 25 academic staff from partner universities in teaching AI-based robotic courses, a comprehensive set of teaching materials including the above-mentioned book, 7 robotic applications in different fields, tools and video tutorials, as well as scientific publications.

Index Terms—Higher Education, Computer Science, Robotics, Artificial Intelligence, Formal Verification, Problem-based Learning

I. INTRODUCTION

In this paper we report on a recently started project [1], which addresses an innovative subject intersecting three important domains: robotics, artificial intelligence, and formal verification.

The purpose of this presentation is to make this project known to the scientific community, in order to stimulate interaction and cooperation with international partners. The results of the project will be available in the public domain on the project home page [1] as soon as they are obtained. Furthermore, during the project period we will organize various events (summer school, international conference), which will be worldwide open to higher education students, academic staff, researchers, and industrial experts.

Both in academic research and industrial applications, artificial intelligence (AI) and robotics belong to the most rapidly growing areas. Further strong development can be expected in the future, which will have a fundamental impact on the labour market. Robots play an increasingly important role in modern society, bringing significant benefits in various fields (manufacturing, medicine, space exploration, scientific research, human assistance, and more) representing a constant source of innovation and research. Artificial intelligence improves the efficiency of robotics in education, healthcare, agriculture, industry, and other fields. AI-based robotics transforms the way we approach automation, making it more efficient and sophisticated than ever before. AI-based robots are capable of performing complicated tasks with accuracy, adapting to changing circumstances, and learning from their experiences. AI-based robots in education have the potential to alter the way we learn and teach, leading to improved academic performance and preparing students for the jobs of the future. They have the potential to improve education by offering students tailored and engaging learning experiences. Robots can serve as learning assistants, providing feedback, answering questions, and leading students through classes. They may also adapt their instructions to each student’s individual learning style, speed, and preferences, making the learning process more successful and efficient. However, great power comes with increased risks: errors in the robots’ design can have costly and dramatic consequences, even fatalities, especially when direct interaction with humans is involved. Therefore, formal verification for ensuring correct design is crucial.

Our target groups are (i) *academic staff* (teachers of courses in robotics, teachers of topics that have applications in robotics, researchers in the field of robotics, AI and formal methods, researchers in fields that have applications in robotics) and (ii) *students* of all levels (Bachelor, Master, PhD) from higher educational institutions.

The main motivation of the project is that higher education in computer science needs to permanently adapt to rapid technological changes. By several needs analysis and