Workshop on Robot Competitions

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Abstract. Robot competitions are more and more used as a tool for education as well as an entertainment activity. This workshop brings together organizers, participants, teachers, and other people interested to share best practices, discuss issues and possibly improve their work.

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Educational robotics

1 Introduction

Robot competitions are existing already for more than 40 years [4]. Currently, dozens of competitions are organized every month around the world and are well respected for their help in education and research (see e.g. [1–6]). However, except of a few well-known like RoboCup or FLL, most of them are local and the organizers are not cooperating or exchanging experience.

For more than 40 years [4] to now, dozens of robotics competitions are running each month all around the world.

At the early beginnings, the main task was just to construct a robot. Today, massive data processing from sensors is required and very complex and sophisticated algorithms for robot decisions are involved [2].

Irreplaceable role of the competitions is in promotion and motivation for STEM areas of the study. Student competitions motivate students to produce the best possible design and therefore force them to learn and utilize all the necessary tools and techniques required to achieve a good performance [6]. Students are learning by doing, they immediately see the importance of some theoretical lectures, and can see the results of their effort. Moreover they often work in teams, besides the technical side of the project they learn how to manage resources, time and energy.

To mention both sides of the coin, it is an expensive method of teaching and consumes much more student's, and teacher's time. More consultations are required and the teacher should be gifted by some manager skills. There is also

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a principal problem of each competition – there is just one winner and several losers. Some education psychologists point out that competitions are therefore harmful to many students' self-esteem [6].

Increasing role of the robot competitions is to support the research and benchmarking. Typically, the research results are reported for a specific robotic system and a self-chosen set of tasks performed in the laboratory of its authors. Quite common technique used is "proof by video", showing the robotic system working once and not showing its problems and alternative scenarios during the less controlled conditions. But when carefully prepared, competitions can also be considered as benchmarks for objective performance assessment [1]. It is possible to make them more scientifically grounded and thus more suitable for the objective benchmarking. To achieve this, standardization is one of the requirements. As one of the successful examples we can mention the AAAI Mobile Robot Competition where the competition platform for the Urban Search and Rescue task was provided by the National Institute of Standards and Technology (NIST) [5].

In order to move the research borders even faster, some competitions organizers require to share the technical information about the winning systems. The teams are required to release a detailed technical description after the competition. It is even more useful, when the competition is accompanied by technical conference, where the underlying methods are discussed [3].

Let us summarize some of the benefits of the robotics competitions [2]:

- they promote interest in robotic studies and research among students,
- they help to compare scientific results, and exchange experiences,
- they establish new contacts between students, schools and industrial companies,
- ideas are often applied also in 'useful' projects,
- they serve as a very good educational tool, widening students' knowledge.
- Last but not least, competitions create media interest and may even generate additional funds from external sources [4].

2 Workshop Description

2.1 Objectives

The main objectives of this workshop are to gather organizers of different robot competition events, competition participants, teachers, and other interested people from various environments to:

- foster establishing of a network of organizers and their events to support participants exchanges and to motivate them to attend also other than local events,
- connect the workshop participants to share best practices, discuss issues and possibly improve their work.

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