



FIRA RoboWorld Cup 2006: Robot-Soccer as a Scientific Challenge

Soccer as the basis of scientific-technical research – that seems to be an entertaining leisure-time activity. But its development and implementation is a highly complicated and challenging task. At least when autonomously working robots are supposed to play this game.

That is exactly what scientists from the Chair Computer Science I at the Universität Dortmund are trying to do at the moment: A central computer is to take over all tasks, ranging from picture analysis to strategy planning through to controlling the soccer-robots. And apart from hands and offside, there are in fact no big differences to soccer players of flesh and blood. The robots are playing according to different complicated tactics and there are fouls and penalty kicks. The “players” have to be able to decide autonomously, to communicate efficiently, to work as a team, to plan their actions in advance, to react to unexpected situations and problems and to learn from and to adapt to these experiences.

Each research team is completely free in developing the necessary software. Here strategy and action planning is in the fore, but the teams also have to deal with problems concerning movement control of the single robots. To do this, an interdisciplinary cooperation is absolutely essential; methods and technologies from mechanical engineering, electrical engineering, neurology and computer science are applied.

When the fundamental problems are finally solved the game can eventually start. There are totally different classes. Most of the teams are participating in the “MiroSot”-class. These robots have a side length of 7.5 cm and reach a maximum speed of 3 meters per second. A camera over the field takes at least 30 pictures per second and transmits them to a computer on the sidelines. It evaluates the game and makes concrete decisions concerning tactics and actions. A human referee ensures that the rules are followed. These rules more or less correspond with those of the conventional “human” soccer game.

The games are played by teams with five or eleven robots. The field is 440 by 280 cm and the minimum playtime is two halves of 5 minutes each. The batteries of the artificial “players” do not last longer. Meanwhile this technique has been established to such an extent that there are even international robot-soccer-initiatives like the “Federation of International Robot-soccer Association (FIRA). They





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organize world and European championships in robot-soccer for scientist and students.

By dealing with the subject robot-soccer essential knowledge can be gained for research into intelligent and mobile robots which is going to influence the development of autonomous robot systems. These systems are primarily used in the industry.

No matter if and when robots are on a par with or even outclass the human being: Robot-soccer is highly interdisciplinary, ideal for the education at universities and more and more entertaining for spectators.

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