

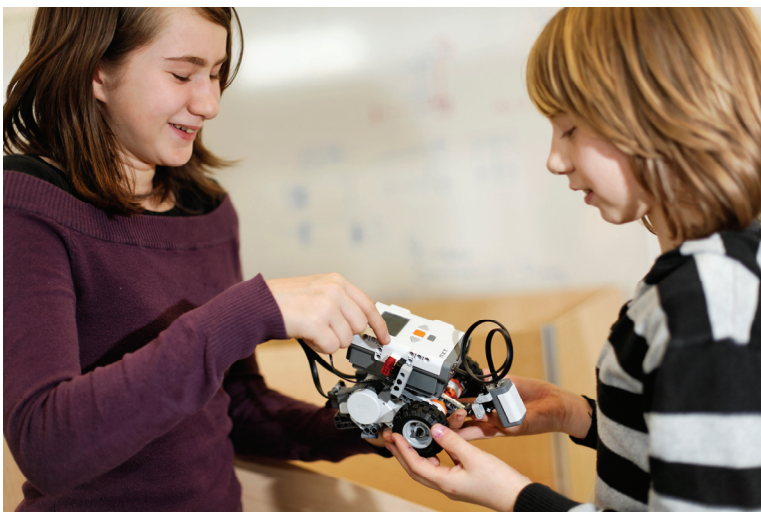
RoboCup 2009 GRAZ

June 29 - July 5 2009
Stadthalle Graz
www.robocup2009.org



RoboCup leagues of the future: New ideas for future robotics competitions

The initial idea was that the RoboCup events are the leading motive force for robotics research. To constantly broaden and deepen the challenges, demonstrations of possible robotic disciplines of the future are being held at RoboCup 2009 in Graz. Nano robots measure up against each other under the microscope, other conspecifics are turned into ice-hockey players or merge with the “real” robots in the simulated leagues.



New Leagues - new challenges: The RoboCup as motive force for robotics research (© TU Graz/Bergmann)

“Nanogram” robots compete under the microscope

They sprint from A to B, overcome an obstacle slalom and dribble silicon dioxide discs with the diameter of a human hair. Despite all this action, nano robots can only be observed under the microscope. Because they're small. Tiny in fact. These so-called “nanobots” measure between 200 and 300 micrometers – one micrometer is one thousandth of a millimetre – and aren't much bigger than house-dust mites. These mini robots measure up against each other in various disciplines on a playing field no bigger than a grain of rice. Made of materials such as aluminium, nickel, gold, silicon and chrome, the nano robots are remote controlled. Their movements are reactions to altered magnetic fields or electrical signals transmitted over the mini arena. To win the nanogram demonstration, the micro robots have to show speed and agility and be able to react to disturbing factors. They put these skills to the test in three events: in the Two Millimetre Dash, each mini robot has to complete a sprint; in the Slalom Drill, they have to avoid polymer carriers in a race; and in the Shootout, they have to dribble as many “nanoballs” of silicon dioxide as possible – each with a diameter of 100 micrometers – into a goal.

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Mixed reality robotics – between reality and Simulation

The robot is real, but the playing field and ball are simulated. The demonstration “Mixed Reality Robotics” bridges the gap between real robots and the RoboCup virtual league. Robots some two centimetres high move on a horizontal glass plate onto which a game environment and ball is projected. The robots are remote controlled by infrared, and the game environment is programmed in such a way that it reacts to the movements and reactions of “real” players. The demonstration is divided into two events: the first involves football again, where robots play against each other on a projected pitch in a game of five-a-side. In the second event, the roboticists measure up against each other in an open technical contest where originality and scientific and engineering strengths count for everything. “Mixed Reality Robotics” is seen as the ideal introductory league between the junior and senior class since programming and hardware complexity are fairly light-weight although the system makes the same demands on the players as in the “difficult” leagues.

The “Festo Hockey Challenge Cup” – ice-hockey instead of football

Robots with standard hardware and open software attempt to score as many goals as possible in teams – it is reminiscent of robot football but is in fact robot ice-hockey. At the Festo Hockey Challenge Cup, the tiny players are led onto thin ice. The aim is to propel an indoor ice-hockey puck into the goal. The hard thing about it is getting a feel for the ball. The puck “glides” over the pitch. What’s more, it isn’t kicked but rather hit with a stick. The artificial players have to be able to accept the puck, dribble it in front of them, pass it to another player and of course hit it towards goal. Flexibility, team spirit and fast reactions – these are the great challenges. Just like RoboCup soccer, the Festo Hockey Challenge Cup is a platform for new software developments in artificial intelligence.

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