PHD PROPOSAL

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HUMANOID ROBOTICS: HIGH-LEVEL CONTROL OF A ROBOTIC SOCCER TEAM

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Key words: Robotic Soccer, Humanoid Robotics, Multi-Agent Systems, Artificial Intelligence
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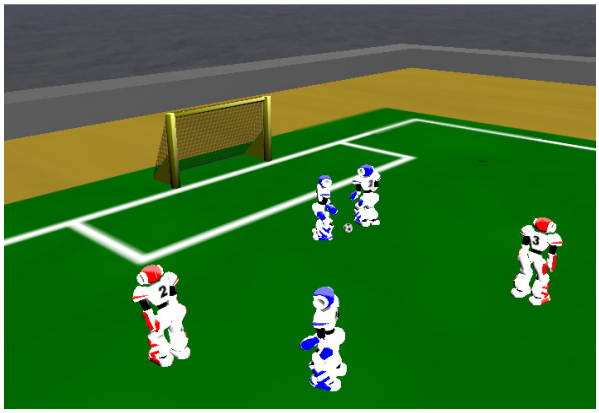
Motivation


3D Humanoid Simulation

Robotic Soccer is currently one of the main testbenchs in the areas of Artificial Intelligence and Robotics. The RoboCup initiative (www.robocup.org) has motivated several research groups around the world to focus on identical challenges and to meet regularly in conferences and competitions. This makes this research topic extremely active.

Within the RoboCup Soccer competitions the Simulation League is focused on the coordination of multiagent systems, and high-level decision and control of virtual teams of robots. Each agent decides autonomously what to do but it must coordinate its decisions with teammates so that team objectives are accomplished. The current 3D simulator uses a humanoid robot model which opens several research challenges on the embodiment of high level decisions and general agent architecture.

The FC Portugal team started in 2000 and has been focused on the development of coordination methodologies applied in the simulation leagues of RoboCup. This team has won the RoboCup 2000 World Championship (Melbourne) and the 2000 (Amsterdam) and 2001 (Paderborn) European Championships in the 2D competition, and the RoboCup 2006 World Championship (Bremen) and 2006 (Eindhoven) and 2007 (Hannover) European Championships in the 3D competition (using the former sphere model).

Objectives

The aim of this thesis is the specification, implementation, test and performance evaluation of the coordination, high-level decision and sensor fusion modules of a team of virtual humanoid agents. Also the agent architecture must be addressed in order to integrate the concepts of strategy, tactics, role and behavior, and the integration of sensor information and communication from teammates in the agent world model. All these tasks must be performed considering the flexibility, but also the restrictions, imposed by the use of a humanoid robot model as, for example, its stability and safety.

The developed work should be tested in the scope of the FC Portugal 3D team of the Simulation League or similar environments. The research institutes of the supervisors own basic humanoid robots so that part of the developed methodologies in simulation may be tested in real humanoid robots.