Project - Robot Soccer Simulation

Overview

In preassigned groups of four or five, you will be preparing a paper and short presentation outlining your design for a robot soccer team that could compete in the RoboCup 3D Simulation League. You will also be implementing the basic functionality of your system and take part in a robot soccer tournament with the other teams implemented by the class.

Paper

You should prepare a conference-style paper 4-6 pages in length that introduces and motivates the robot soccer problem, surveys relevant previous work in robot soccer and distributed robotic systems, explains in detail the design of your system, outlines your implementation of part of the system, evaluates the performance of your system in your independent experiments and in the robot soccer tournament, and gives ideas for improvements and future work.

When designing your system, you do not need to consider details such as how robots balance, walk, or recover from falls, or the mechanics of dribbling or kicking the ball. Your focus should be on formations, roles, behaviors, and cooperation and coordination in general, using the various algorithms covered during the class so far. You should not limit your approach solely to algorithms that you can implement in the time available since you only need implement the basic functionality of the system.

When writing your paper, review the various RoboCup team description papers and champion team papers for background, style, and inspiration. You explain not only the algorithms that you choose to use in your system, but also the reasons that you chose them.

Implementation

There will be an in-class robot soccer tournament in the final week of class. You are not expected to implement your whole system, but you should implement enough to take part in the competition, complete at least one pass between teammates and score at least one goal. You may prepare a video of your team completing passes and scoring goals independent of the tournament (in the worst case unopposed by another team) and show it as part of your presentation.

You should adapt an existing codebase, such as that released by UT Austin Villa team. Both VMware and VirtualBox virtual machines containing the SimSpark simulation environment and RoboViz monitor and visualization tool will be made available through Duke Box (VMware, VirtualBox). Free student licenses for VMware are available through the Duke OIT OnTheHub site.

The results of your team in the robot soccer tournament itself will not affect your final grade for the project.

Presentation

Your group will present an outline of your design and an evaluation of the performance of your implementation in independent experiments and in the robot soccer tournament an 8-minute presentation during the final class.

Grading

- Paper - 18 points
- Implementation - 6 points
- Presentation - 6 points

The maximum score for the project is 30 points, which is 30% of the final grade for the class.

What to Submit

Upload to Sakai your paper and presentation slides in PDF format and your documented source code. Include detailed instructions for building and running your code, as appropriate. There should be one submission per group.

Deadlines

Documented source code is due at 4:40 pm on Monday, November 27th, 24 hours in advance of the robot soccer competition in class on Tuesday, November 28th. The presentations will take place in class on Thursday, November 30th. Presentation slides and the paper are due at 11:59 pm on Thursday, December 7th. These are all hard deadlines and no extensions will be granted.