CS148
Building Intelligent Robots

Week Midterm - RoboSoccer *Out: 7 Mar 2001*

RoboSoccer
In RoboSoccer two robots are pitted against each other in battle to determine the ultimate soccer playing robot. You will be responsible for designing a robust robot who is capable of handling both offensive and defensive actions. The robot acts as the ball. The players will be told at the beginning of the round which player "has" the ball and which player is the defender. At the beginning of each round, the robots will be placed on the center mark. You are allowed to position your robot, in any direction that you see fit. Each time possession changes the robots will be placed back in the center of the board, you are able to change programs during possession changes.

Rules: Offense

1. The player who "has the ball" is responsible for finding the defender's goal.
2. Once the player has made it's way into the goal it has 5 seconds to stop movement and play ascending tones notifying the audience that it knows that it made it's way to the goal. If the robot does not play a sound within 5 seconds, the player does not get a goal point, and possession changes.
3. If the offensive player veers out of bounds, it has 5 seconds from when robot crosses over the line, ie. entire robot is out of bounds, to realize that it is out of bounds and make it's way in bounds. If the robot does not come back in bounds within 5 seconds, both the robots are stopped. The defending robot then gains possession of the ball, with play resuming in the center.
4. If the defending robot activates the offending robot's front bumper, the offending robot has 3 seconds to halt and play a sound acknowledging that it has been tagged. Possession of the ball is then given to the defending robot, and play resumes from the center line. If the offending robot fails to recognize that it has been hit within the allotted amount of time, the robot will lose one point, and the possession changes.
5. If the robot scores in the wrong goal, a point is deducted from it's score.
6. The robot is not responsible for stopping/detecting whether or not it has been hit on the side or in the back.

Rules: Defense

1. The defending player is permitted to spend unlimited time out of bounds with no penalty.
2. The defending player should attempt to disable the offender by touching it's front bumper.
3. The defense is not allowed to cripple the other player by ejecting objects into the playing arena, or having parts that extend beyond the robot's size specifications.

Specification: *Robot*

1. The robot is not to exceed more than 10 inches in any given plane (width x height x length).
2. The robot can use as many sensors as desired but remember that you are responsible for line recognition, direction recognition, and touch detection.
3. You must have a front bumper that is at least 2 lego units high, and covers the area in between your treads/wheels. Additionally the bumper may not begin more than 3" above the ground.
4. You may write separate programs for the offensive and defensive strategies, just be aware of the program size limitations of the RCX brick.
5. You may not make structural/hardware changes to your robot during possession changes, or at any other point during the game.
6. No "damaging or light emitting" foreign objects may be added to the robot. TA's reserve the right to deny objects which they feel may be dangerous or inappropriate. Please see a ta if you feel that there are objects which you wish to use but might be considered questionable.
7. You may not emit firmware or other harmful IR signals during any part of the game.

Playing field

1. The playing field is approximately 3'x6.5'.
2. The goal area is designated by 3 black lines, each 3/4" thick and 1" apart.
3. The out of bounds area is designated by a single black line which is 3/4" thick.
4. In the center of the playing field is a checkerboard, measuring approximately 40x32 cm. Each small box is approximately one square centimeter. You can use this pattern to help figure out when you are in the center of the field.
5. There will be a strong light approximately 12" off the ground at each of the goals.

Game
In order to receive a satisfactory grade on the midterm, you are responsible for completing a number of required features.

1. Your robot must be able to find a light source and head in its general direction.
2. Your robot must stop when it's front touch bumper is activated.
3. Your robot must demonstrate that it has a defensive strategy.
4. Your robot must demonstrate that it recognizes the out-of-bounds line.
5. Your robot must demonstrate that it recognizes the goal.
6. **Each robot will be tested individually for the above criteria before it enters the playing field with another robot! Make sure that each part of the midterm game can be demonstrated for the TAs. These demonstrations will account for 70 % of your grade - your writeup will count for 15 %. The last 15 % will be reserved for how your robot actually performs when on the playing field with another robot.**