Assignment 3: Goalie and Penalty Kick Tournament
CS 393R: Robotics

Due Date: Thursday, October 8, 2009

Your task: Compete in the Penalty Kick Tournament. Each game will involve two robots. One robot will be take on the role of goalkeeper and other robot the role of attacker. Robot behaviors must follow the Aibo RoboCup rules, found at:
http://www.tzi.de/spl/pub/Website/Downloads/AiboRules2008.pdf

First, develop a goalie. Implement a Kalman filter to track the ball and its velocity.

The attacker will try to score a goal by taking a penalty kick. The goalkeeper will try to prevent a goal by stopping the ball. The game will be divided into two halves of three attempts each with the robots' roles reversed after the first half. The team that scores highest number of goals wins.

The goalkeeper's movement will be restricted by a penalty box (yellow tape in the lab), with the goalkeeper required to stay within the goal or the penalty box. Similarly, the attacker's movement will also be restricted to be outside of the penalty box. The goalkeeper can use any of its body parts to stop a goal. However, the goalkeeper's body must block less than 50% of the goal, except for brief periods (< 3 seconds), while blocking a shot.

The attacker will take a penalty kick with the ball at a specified position with respect to the goal. The attacker may shoot from that spot or may choose to "dribble" the ball closer to the goal and then shoot into the goal. The attacker will be allowed to shoot the ball again if it rebounds out of the penalty box. The penalty kick ends after 1 minute, or if the ball is stuck in the penalty box (where the attacker is not allowed to touch it) or past the goal line.

In addition, the attacking team is allowed to attach something to the opponent's goalie to help with detecting it. However, if this disturbs the goalie's movement or function, it will be removed.

In each half of the game the attacker will get four tries. A tie in the semi-finals and finals will be followed by a "sudden death" round wherein the teams will alternate taking penalty kicks until one of the robots wins (after an equal number of tries).

Setup: The goal, the penalty box, and penalty shoot location will be set up in the lab. The keeper will start in the middle of the goal.

Tournament: The first round of the tournament will proceed with two pools of 5 teams each playing in a round robin format. The two top teams in each pool will move on to compete in a single elimination tournament. The tournament will take place during class on October 8. Any remaining games will be played the following class period.

Checklist:

[____] (0.5 point) Demonstrate goalie's ability to move and stay inside the goal or penalty box.

[_____] (4 points) Demonstrate goalie's ability to stop the ball when shot from a variety of locations and speeds, by using a Kalman filter to track the ball and its velocity.

[_____] (0.5 point) Demonstrate attacker's ability to move and stay outside the penalty box.

[_____] (1 points) Demonstrate attacker's ability to take a penalty kick and a rebound.

[_____] (1 points) Demonstrate attacker's ability to dribble and shoot the ball in the goal.

[_____] (2 points) Clarity and quality of your memo. Turn it in at the time your assignment is graded.

[_____] (1-5 points) Tournament performance: 1 point will be awarded for each game won, 0.75 pts for a draw, and 0.5 pts in case of a loss.