

Assignment 6: Goalie and Penalty Kick Tournament

CS 393R: Autonomous Robots

Due Date: 8:45 AM Thursday, November 1, 2018

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 the other robot the role of attacker. Teams will take turns attacking and defending, with 30 seconds of setup time before starting the round and 30 seconds of setup time when switching from attacking to defending or vice versa. Thus each round proceeds per the following table:

Setup Period	30 seconds
Home team attacks, Away team defends	90 seconds
Home team attacks, Away team defends	90 seconds
Setup Period	30 seconds
Away team attacks, Home team defends	90 seconds
Away team attacks, Home team defends	90 seconds

It is **strongly** recommended that you use button presses for transitioning between attacking and defending. For example, see the `ButtonModule` for code that handles chest button presses and state transitions:

<https://github.com/utaustinvilla/robotics-2018/blob/master/core/sensor/ButtonModule.cpp#L112-L139>

A team wins the round if they win a majority of the games. For placement in the semifinals, teams will be ranked on accumulated points. Winning a round is worth 3 points, and a tie is worth 1 point. Note that points for the purposes of placement differ from points for grading.

Attackers will start on the left or right side of the ball relative to the goal, facing in the ball's general direction. The attacker must walk to the ball and then score a goal. The attacker may reposition the ball if you want, but you must shoot the ball from outside the goal box.

The goalie will start out positioned at the center of the goal and must stay within the goal box. The goalie may execute blocks, but no diving is allowed. The goalie may only block for 5 seconds, and may not repeatedly and excessively execute blocks. A block is any position other than upright on two feet with legs extended. Any other position, including squatting, sitting, laying on the ground, etc, counts as a block. Some blocks are available here:

<https://github.com/utaustinvilla/robotics-2018/blob/master/core/python/pose.py#L167-L203>

The attacking team wins if they are able to score a goal within 90 seconds. The goalie wins if the timer expires, if the goalie stops the ball from entering the goal, or if 30 seconds pass without the attacker touching the ball. After each round the robots will be reset back to their initial positions.

Landmarks will include beacons along the sides of the field, the blue goal, and a white goal box. The complete field configuration is specified at the following link.

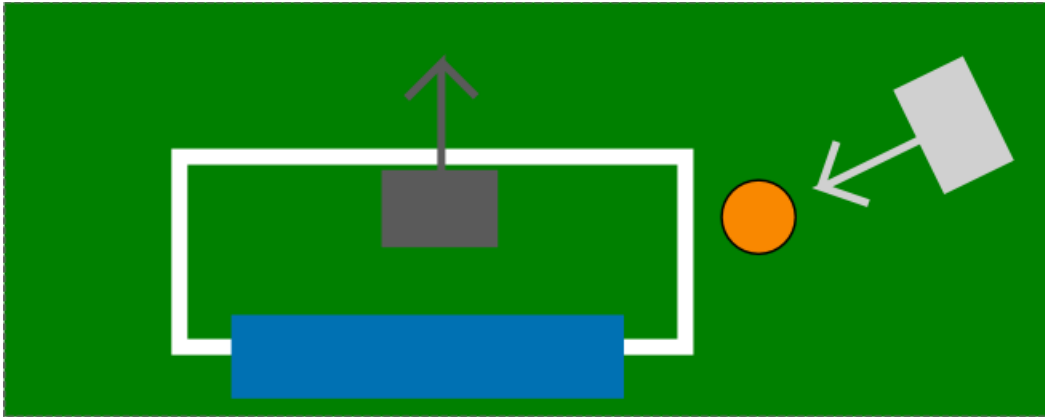
http://www.cs.utexas.edu/~pstone/Courses/393Rfall18/assignments/tournament_fields.png

Do not forget to write a short but professional memo (one memo from each team, co-authored by all team members), concisely but clearly describing what you did, what problems you encountered, how you overcame them, and how successful you were in the end. Also be sure to briefly describe the contributions that each team member made to the final outcome. **The memo is due Thursday at 11:59:59 PM.**

Additional Information

Valid Goalie Movement

The intent of requirement #3 is that you actually write a complete goalie behavior for the tournament and don't simply rely on your solution to Assignment 4. In general, your goalie should be between the ball and the goal. For instance, consider the scenario below. Here the goalie (dark grey) is facing directly forward, away from the ball, so that an attacker (light grey) has an open shot on the goal. This is sub-optimal.



In general, the goalie should stay in the center of the attacker's line to the goal. There will be some leniency in how this is enforced, but your goalie must exhibit reasonable behavior in blocking the goal. If, during the competition, we only see a stationary goalie that does not make a single adequate attempt to block or position itself between the ball and the goal, and the attacker's behavior calls for more sophisticated behavior, you will not receive credit for item #3. It may be the case that your goalie simply doesn't have the opportunity to do anything other than stand in the middle facing forward, so in this scenario a stationary, forward-facing strategy is best and will get you full credit. But if you employ a strategy that doesn't move or adjust to the ball, and your robot finds itself in situations where some movement would be helpful, you will not receive full credit.

Penalties

Your robot may be penalized for the following:

1. Robots will be penalized for performing a block for more than 5 seconds (goalie).
2. Excessive blocking (goalie).
3. Having **either foot entirely outside** the goal box (goalie).
4. Putting **any part of a foot** on or over the goal box line (attacker).
5. Behavior that is contrary to the spirit of the rules (please ask if you have questions!)

All penalties are cause the robot to be removed for 30 seconds.

FAQ

1. Can the robot be touched during the round? **You may prevent the attacker or goalie from falling while walking or kicking. The goalie cannot be helped into or out of its blocks.**
2. Do we need to let robot stand up after squatting by itself, or can we manually help it stand up? **The robot must stand up by itself. You may have to tweak the provided poses to accomplish this.**
3. My team has a strategy that we aren't sure is allowed but we don't want to post on Piazza about it. How can we check that it is in the spirit of the rules? **Please email Peter or Josiah privately. That would be better than us having to decide at the tournament whether or not your behavior is legal.**
4. Can the robot's state be reset after penalties? **After being penalized you have the option of applying a button press to your robot to reset its state.**
5. If we are penalized for not standing up in 5 seconds, is the penalty within the same round of game, or is the penalty extends to the next round of the game. In other words, if we are penalized in defence of the first kick, is the goalie robot going to be removed for thirty seconds in the next kick? **The penalty is a 30-second removal from the field regardless of when the penalty is applied.**

Checklist:

1. ☐ (2 points) Tie or win all 4 placement rounds in the tournament (0.5 point per tie/win, an additional 0.5 point extra credit per win).
2. ☐ (1 point) Have the attacker touch the ball in any of the rounds.
3. ☐ (2 points) Perform a shot on goal in the correct direction from outside the goal box.
4. ☐ (2 points) Move the keeper within the goal box so that it stays between the ball and the goal.
5. ☐ (2 points) Clarity and quality of your memo.

Extra Credit:

6. ☐ (.5 points) Make it to the semifinals.
7. ☐ (.5 points) Make it to the championship game.
8. ☐ (1 point) Win the championship.

Tournament Schedule

Round	Field A				Field B			
	Home	Wins (G/D)	Away	Wins (G/D)	Home	Wins (G/D)	Away	Wins (G/D)
1	Team 05		Team 08		Team 02		Team 10	
2	Team 05		Team 09		Team 04		Team 01	
3	Team 09		Team 06		Team 10		Team 01	
4	Team 07		Team 05		Team 03		Team 02	
5	Team 08		Team 07		Team 02		Team 04	
6	Team 08		Team 06		Team 01		Team 03	
7	Team 06		Team 05		Team 01		Team 02	
8	Team 09		Team 08		Team 04		Team 03	
9	Team 07		Team 09		Team 03		Team 10	
10	Team 06		Team 07		Team 10		Team 04	
Semi								
3rd Place								
1st Place								

Team Points

Team 01	Team 02	Team 03	Team 05	Team 06
Team 07	Team 08	Team 09	Team 10	Team 12

