

CPE 470/670 Autonomous Mobile Robots

FINAL: Soccer Bot

Team 6

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Hardware and Software

We used a modified version of the castor bot for our hardware. Initially we implemented a kicker mechanism using the third motor. The issue we faced with the kicker is that it was difficult to control the ball with the kicker and once out of every three times it used to kick the ball to our court. We therefore modified the kicker with a straight bumper in front. We 'jerk' the robot to get the effect of the kick. Important aim in our hardware design was that we remain as stable as possible and we reinforced all the joints with as many connections as possible.

The main aim of our algorithm was to make the motors move at 100% power all the time so that we can reach the ball the fastest and kick the ball with all the power we have. We do not do obstacle avoidance all the time, we only avoid obstacles when both the sonar sensors are blocked. We did not want the other robot to utilize our obstacle avoidance algorithm to get the ball.

Our chase Algorithm

Set power of left motor = 100 and power of right motor = 100 (direction = forward)

- 1) get direction and strength from ir sensor
- 2) while strength has not reached maximum threshold
- 3) if direction in (4- 6) move forward with 100 % speed
- 4) if direction is 8, 9, 1, 2 make the appropriate motor go reverse with 100% speed
- 5) to avoid too much jerking, for other cases, adjust speed appropriately

kick Algorithm

- 1) get the current direction using the compass sensor
- 2) if current direction == initial facing direction
- 3) do a jerk - ie ... move one motor reverse and other motor forward with 100% for a short time
- 4) if 2 evaluates to false, then perform a kick ie move turn around till we face the facing direction and move forward at full speed for some time.

Playing algorithm

- 1) chase the ball, and kick, till we are not done
- 2) move backward for some time if both the sonar sensors are blocked

Penalty kick algorithm

1) chase the ball and kick

Defend algorithm

1) get the ir strength

2) wait till the ir strength does not vary much

3) if ir strength varied then chase the ball and kick

Problems and Solutions

The team encountered quite a few problems that were solved. The first issue was the design of the robot, the original design of this bot was to have a moving arm which acted as a kicker, the issue was that because the two robots would be running into each other it would block the arm from swinging, to fix this issue a bumper type of hardware was designed so that the robot would kick the ball by running into it. The second issue was the mounting of the IR sensor. Originally we had it on the side of the robot which worked ok with the original design but after realizing it would be better to push the ball rather than have a motorized arm it no longer worked for that design. The second placement of the sensor was underneath the robot, the problems with that was that the IR signal was not being picked up all the time, this may have been due to the body of the robot blocking the signal, the final placement of the sensor, that worked the best was on top of the robot.

Unsolved problems

Some of the unsolved problems that the team had was an issue with the IR sensor, and being able to turn with the ball.

The issue with the IR sensor is that if the ball would go in a certain location of the sensor it would read 0 and confuse the robot. The issue with the turning with the ball was that the robot has a hard time turning while it is holding the ball, doing so would cause the ball to move away from the robot in the incorrect direction.