

Team Five: Erin Keith & Qandeel Sajid

Lab 5

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Introduction

In this lab we were commissioned with the task of designing a robot to follow a line. Once the robot reached the end of the winding black line, it was to find home by “listening” for us to encourage it once it was facing the correct direction.

Description

The first step was to build the robot so that it could follow the line. We the most problems skipping the green line, and knew we’d have problems detecting the end of the line. We had to add a color sensor to handle these problems.

To follow the line, the two light sensors were attached right next to each other. We implemented a proportional controller to keep the robot on the line. When the robot went too far in one direction or the robot reached a corner, it would correct its course dependent on how much the difference was.

Once the colored tag at the end of the line was reached, the robot went into home finding mode. It spun one way until it was facing the correct direction, at which point we would yell and be loud. Once the noise rose above a particular threshold, the robot would go straight forward.

Difficulties Encountered

Once we went with the proportional controller, following the line was very straight forward. We had to fiddle with some of the constants, to get the robot to follow the line smoothly. We would have like to have gone faster, but we didn’t quite have time to work out all of the parameters.

The greatest problem was getting the robot to turn the correct direction when first encountering the line. We had to hard code the turn direction and make sure that the color sensor went pass the black line that was inside the line.

Discussion of Unsolved Problems

There were no unsolved problems in this lab.

Results

The results have not been posted, but our robot did not perform as well as we expected. It did a fantastic job running through the tunnel towards the end, and turned around perfectly. Unfortunately when it ran into a little ledge, the turning angle was so small, that it could not turn enough to avoid it. Our robot continued to get stuck on that ledge and turn completely around, which I’m sure lost us points. It did eventually return to its starting place, and so did successfully navigate the tunnel.

Conclusion

Our robot solved the problem; we would have like it to follow the line a little faster. Some of the other robots switched turn direction when looking for home, which helped them find home

faster. Implementing the proportional controller was a very straight forward and effective solution to the line following problem.

Appendix

See website for source code.