

Lab 5: Line Following

Team 2

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Introduction

The objective of this week's lab was to find a line and then follow the line to the end, which was designated by a yellow square. Then once we found the end of the line we had to find home which was designated by a black square. We used the color sensor to find the line and once we found the line we used the light sensors to position the robot over the line and follow it. Once the robot found the end of the line we used the speaker sensor to control the movement of the robot and find home.

Hardware and Software Design

On the hardware side, we kept the design from the previous project. The hard part was how to attach all the different sensors. We created a bumper that had both the light sensors attached to it that we measured based on the width of the line. We then attached the color sensor on an angle a couple inches above the light sensors so that we could get an accurate reading. The speaker sensor we had to suspend from the robot due to noise interference from the motors.

On the software side, we made different tasks for each different objective that there was in the lab. The first task was to find the line, which used the color sensor to find the line which was black in color. This wasn't difficult due to the fact that we knew the approximate start location of the robot. The next task was to follow the line, which was also quite simple. The way we did this was used two light sensors. We made the light sensors stay on the outside of the line so that if a light sensor hit the line it would make adjustments based on which light sensor hit the line to assure the robot stayed on the line. Again we used the light sensor to sense the yellow square at the end of the line to notify the robot it has reached the end of the line. After the robot reached the end of the line it had to find home. Once the robot found the yellow square we moved into the find home task that made our robot spin in a circle until we made noise using the speaker sensor to make the robot go straight. If no noise was made the robot would continue to spin in a circle. It did this until it found home.

Problems and Solution

Our main problem occurred after the robot found the yellow paper and needed to find home. Our find home function was implemented so that the robot would rotate around in a circle until the microphone would hear a sound that was louder than a threshold that we set. It would then drive straight until the loudness fell below the threshold. The problem that we were having was that the motors were loud enough to trigger the going straight part of the function. This led to the robot going in a straight path when we did not want it to do so. Our first approach to the solution was to raise the microphone high enough to where the the motors did not affect it. This solution was not sufficient because at times the motors would still mess with it. Then we decided to decrease the speed of when it went in a straight line from 100 to 50. This helped solve the problem and the robot performed quite well.

Unsolved Problems

The only unsolved problem that we had was that, very rarely, our robot would approach home from a certain angle that would cause it to miss detecting the yellow square. It would fortunately find the path again and follow it a second time, usually detecting the yellow square on its second attempt. One way we could have solved this was to adjust the angle it would take on the turns. We attempted to do this, but no angle we tried seemed to fix this issue.

Contest Results

We had satisfactory results for this weeks competition. We placed in the middle of the groups. Our robot was able to find the line quickly and follow it quite efficiently. Our find home function was a little slow but it did not have a drastic affect on our performance.

Conclusion

We feel as though we had good results for this weeks competition. Our robot did everything it was supposed to and did not take long in doing so. We now feel comfortable using the light sensors in any subsequent labs.

Appendix

Please see the link "[Line_Runner_V2.nxc](#)" for the code for Lab 5.