Worksheet: Faster Line Tracking

Introduction to Mobile Robotics > Faster Line Tracking Investigation

This worksheet is provided for reference only. Be sure that you follow the steps in the online directions, and answer the questions at the appropriate times. Fill out all your answers on a separate sheet of paper.

Power Up

Observations:

1. What happened when you tried to increase the speed with the original light sensor positioning?

Reversal: Overpowered

Observations:

2. What is the reason the robot starts looping around instead of tracking the line when it tries to go too fast?

3. Based on the pole demonstration in the video, suggest one possible way to fix the "overshooting" problem at high speeds.

Reversal: Backward Tracking

Observations:

4. Where are the two turning centers located?

5. Why does the robot have to track in reverse after the changes?

Conclusions

6. Explain why high speed line tracking works better with the revised configuration than the original configuration.

7. Compare the performance of the old and new line trackers.

i. Build a line for the robot to track on a flat surface.

ii. With the light sensor on the front of the robot and the robot moving forward, find the highest motor power that will allow the robot to successfully track the entire line. Time how long it takes (in seconds) for the robot to track the line.

iii. Now switch the sensor to the back of the robot and find the highest motor power that will allow it to track the entire line backward. Measure how long it takes to track with this configuration.

iv. Express the new robot's line tracking speed as a percentage of the original (front-facing) robot's line tracking speed.

$$\frac{\text{Speed with new configuration}}{\text{Speed with original configuration}} \times 100\%$$

8. Identify the two main behaviors in the revised program (the two inside the switch block).

9. Ordinarily, it's pretty clear which side of the robot is its left, and which is its right. However, things might not be so clear when the robot is traveling backwards. Explain why, and propose a convention (a set of rules that everyone will use) for describing "left" and "right" when talking about a robot that will be line tracking part of the time, but moving normally the rest of the time.