

Duke/DPS Robotics Program

11/05

Lesson Plan 4

Goal: *Create a robot that follows a line as quickly as possible.*

Materials Needed: *Brookbot with two light sensors.*

Part 1: Line Following Optimization Theory

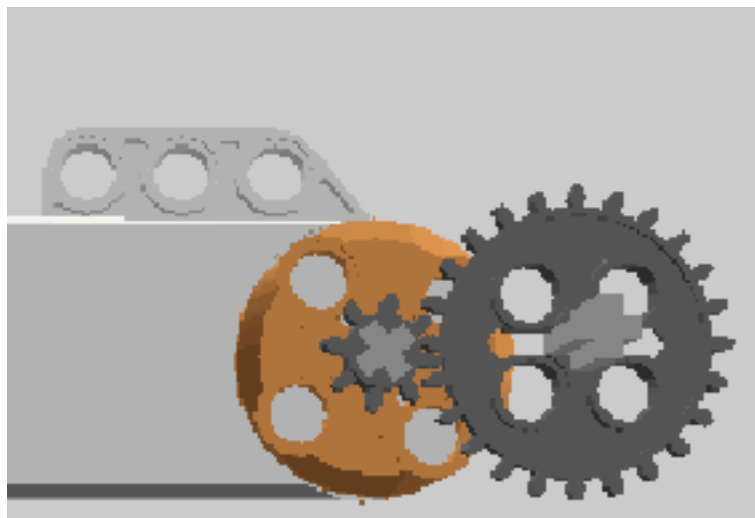
Last week, we built a robot that followed a line with one line sensor. This week we're going to make it follow the line as quickly as possible without compromising too much accuracy. We will make experiment with two changes to speed up the robot: gearing and an additional light sensor.

If you did not get a chance to discuss gearing with your team last week, do so now. Remember that gearing up (larger motor gear, smaller wheel gear) provides more speed but less torque, while gearing down (smaller motor gear, larger wheel gear) provides less speed but more torque.

If we use two light sensors, we want the robot to straddle the line, with the light sensors on either side. Given this setup, have your team brainstorm to come up with an appropriate method. The method should consist of four cases: both sensors on white (when the robot should go straight), only left sensor on black (robot should turn left), only right sensor on black (robot should turn right), and both sensors on black (how you handle this case is up to you). Take this opportunity to complete the worksheet, as it discusses these cases.

Part 2: Construction

Your team will have to mount a second light sensor on their robot so that there is at least the line's width worth of space between them. Your team could also take advantage of this time to experiment with gear combinations. Below is an example of a geared down setup.



Part 3: Programming

Your team already has all the programming tools it needs from previous weeks to complete this program. If they came up with the correct method, it should not be too difficult to translate their thoughts into code. The only challenging part of the program is nesting the if statements:

```
task main()
{
    while(true)
    {
        if(SensorValue[lightL] > 40)
        {
            if(SensorValue[lightR] > 40)
            {
                motor[motorL] = 50;
                motor[motorR] = 50;
            }
            else
            {
                motor[motorL] = 50;
                motor[motorR] = 0;
            }
        }
        else
        {
            if(SensorValue[lightR] > 40)
            {
                motor[motorL] = 0;
                motor[motorR] = 50;
            }
            else
            {
            }
        }
    }
}
```