CE-8 Lab 7: Last on Sensors

Lab Objectives

By the end of this lab you should be able to:

1. **Identify** how to use RCTIME to get light sensor information.
2. **Create** a program that uses light sensors to make the robot seek out dark areas.
3. **Identify** how the line sensors work.
4. **Create** a program that uses line sensors to follow a line.

Light Sensors

The scribbler comes with three light sensors. These are the three holes that are on the front of the scribbler above the object sensors. The data that comes from the sensors is different to then what we are used to seeing. Instead of only getting a zero or one from the sensor we get a range of values that represent the brightness that they 'see'. They do this by using a photoresistor that effects how long it takes for a capacitor to discharge. The more light there is the faster the capacitor discharges, the less light the longer. The pins that are attached to the right, center, and left sensors are pins 0, 1, and 2 respectively. We will use the command RCTIME to time how long it takes for the capacitor to discharge and thus we can tell how much light the sensors are seeing. We will first have to charge the capacitors that are attached the sensors. We do this with the HIGH command, so:

```
LightRight PIN 0
LightCenter PIN 1
LightLeft PIN 2

HIGH LightRight
HIGH LightCenter
HIGH LightLeft

PAUSE 3
```

We need to make sure we give them time to charge, hence the 'PAUSE 3'. We then check how long they take to discharge, we will store these values in variables so that we can use them later.

```
light_left_value VAR Word
light_center_value VAR Word
light_right_value VAR Word

RCTIME LightLeft, 1, light_left_value
RCTIME LightCenter, 1, light_center_value
RCTIME LightRight, 1, light_right_value
```

The values stored in the variables will be somewhere between 0-65536, where the higher the
value the darker the light.

**Line Sensors**

The last of the sensors that we will learn about are the line following sensors. These can be found on the bottom of the scribbler. The line sensors are the simplest of all of the sensors. They consist of two emitters that are constantly left on and two detectors. The emitters are specially aligned so that only the left or right detectors will pick up the infrared signal if there is a IR reflective material under the detector. Since we will always leave the line emitters on they are tied to one pin, this is pin 3. The left and right detectors are pins 4 and 5 respectively. Like the object sensors the detector will read as a '0' if it is picking up a reflection and a '1' if it doesn't detect anything.

**Exercises**

1. Program your robot to output the sensor values from the three light sensors to the debug window. Write down the values that you get when your robot is under a table, and on the ground but in the light.
2. Program your robot to seek out the brightest area it can find, incorporate the stall sensors so that it doesn't get stuck looking for it.
3. Program your robot to seek out a dark area (e.g. under the table), and have it stop once it gets there. The behavior is supposed to imitate that of a cockroach.
4. Program your robot to output the sensor values for the line sensors, have it output 'black' for when it doesn't see a reflection, and 'white' otherwise.
5. Program your robot to follow a line!