

Comp 1421 Foundations of Computing

Extension Activity Automatic Street Lights

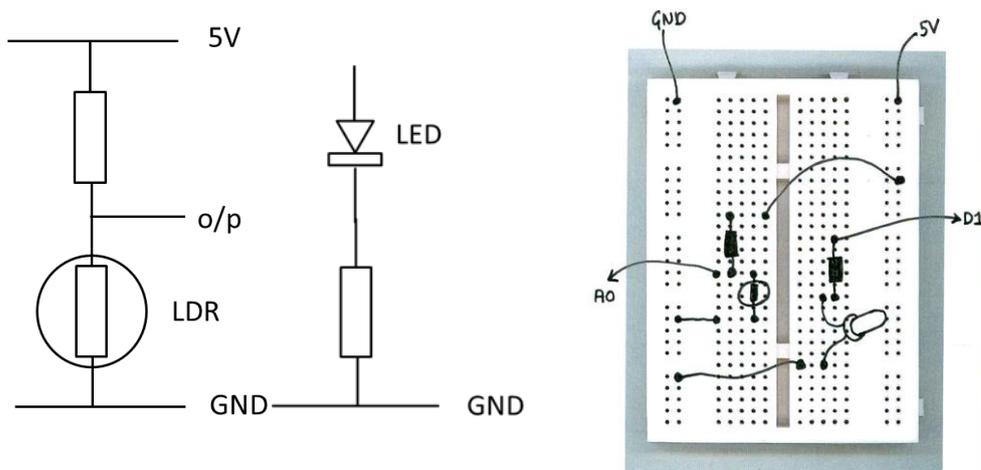
CBPrice September 2021

Color Coding for this Worksheet	
Information	
Instructed Learning	
Autonomous Learning	

Activities

1 Here we shall use a light-dependent resistor (LDR) to construct a working model of a street light; it comes on when the measured light drops below a certain threshold value.

(a) Build the following circuit. The resistor in series with the LED is 220 (red red brown) and the resistor in series with the LDR is 10k (black brown orange). The Arduino gets an analogue input (pin A0) from the LDR voltage divider, and it sends an output (digital pin 11) to the top of the LED.



(b) Open up the Arduino IDE. Download the sketchbook from the website. And set the Preferences to point to this. Now open the sketch LDR_1.

Now let's write some code to grab the input from analogue pin 0.

(c) Declare a variable of type **int** at the top of the file (before setup) to receive the input from the analogue pin 0. I shall call mine "sense".

(d) In the loop(), add a line of code like this to grab the input value
sense = analogRead(A0);

Now let's display the result on the "serial monitor"

(e) Add this line of code to setup() to start the monitor **Serial.begin(9600);**

(f) Add this line of code in loop() **Serial.println(sense);**

(g) Add a line of code after this to delay by, say 1 second (1000 ms)

(h) Run your sketch, then from the menu select Tools > Serial Monitor. Observe the numbers as you cover or uncover the LDR. The numbers represent the variable “sense” and should be in the range 0 to 1023.

You want the LED to come on when the light level is low, so you need to choose a “threshold” value somewhere between 0 and 1023 to make this happen.

(i) Declare a variable of type **int** and call it **threshold**.

(i) Now decide how to use this to make the LED come on when the light level is low. You have a choice for the decision, either **if(sense > threshold)** *then the LED comes on* or **if(sense < threshold)** *then the LED comes on*. So write the correct line of code.

(j) Now follow this with code to turn the LED on. **WAIT!** You first have to include a line of code to say which pin the LED is connected to and say that this is an OUTPUT.

2. Investigation into strange behaviour.

Bend the legs of the LDR and/or the LED so the LED is shining into the LDR and little ambient light is leaking in. You may get some strange behaviour. You may need to change the value of the threshold in your code so it is quite close to the centre of the range of LDR measured voltage. Can you think why this behaviour is happening?