day89 Arduino LDR
5/1/24

Today we're doing a new circuit using the LDR, a light dependent resistor.

A resistor controls how much electricity goes through a wire. So far, we have used resistors to limit the current through an LED to a safe value to prevent the LED from burning out. Today we will use a special kind of resistor to measure light. An LDR (light dependent resistor) changes how much resistance it has based on how much light hits it. It's a bit like you are trying to fill a tub with a hose and your friend squeezes the hose tight to lower how much water can go through depending upon how much light hits your friend. OK, that's a strange analogy, but I hope you see what I'm talking about.

1. Build the circuit to the right using a 10K resistor (see map) and an LDR (shown below). Here is the resistor key:

220   270   10K

The LDR looks like this:
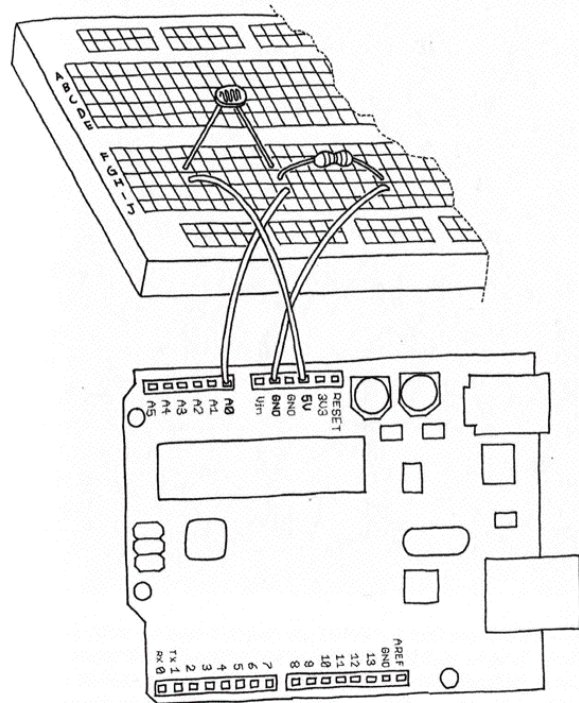
2. Insert an LED into pins 13 and GND (long leg into 13) on the Arduino board.

3. Each partner needs to write their own sketch for today even though you only have one circuit. Share the circuit and one Arduino by plugging and unplugging the USB cable on the PC end.

The task is this:

1. Start with a new blank sketch. Save it as Arduino_LDR. Put your name in a comment at the top.

2. In setup() set the pinMode for pin 13 to OUTPUT and do Serial.begin(9600) so we can print to the log for debugging.

3. In loop() start with the following code:

```
int val = analogRead(0);
Serial.println(val);
```

4. Type Control-T to make things pretty. Save and upload to your Arduino. Open the log. You should get different numbers when you cover and uncover the LDR. You should see numbers in the 800s or 900s when you aren't covering the LDR gently with your fingers and below 500 when you are covering it.

   If your program isn't working, first make sure that you are using a 10K ohm resistor. If you are and it's still not working, re-check your wiring per the diagram on the previous page. Finally, if you can't otherwise get it working peek at p. 62-64 in the Getting Started with Arduino book for help. Don't type in their program; read the text over and try to figure out how this all works, see if that helps. Obviously also call me over to help, but I expect you to try to help yourself if you have to wait for me.

   Once you get your program working (as defined by the numbers change when you cover and uncover the LDR, and they are smaller when you have it covered) you should move on to the next part.

5. Add code to blink the LED on and off using the variable val as the delay time. Save and upload. The light on pin 13 should blink faster when you have the LDR covered and more slowly when you have it uncovered.

6. Get a feel for the values you are seeing on your LDR when it is covered and when it is not covered (our LDRs seem to have a bit of individual personality.) Add code to your sketch to check if val is less than a personal threshold number (each person's number should be different). When val is less than this number, use a for loop to blink the light on and off from 10 milliseconds to 150 milliseconds. Choose a trigger value that is achievable (that is, don't say "if (val<5)" unless you can easily cover the LDR and get the value 5 to print in your log).

   The behavior of the program should be as follows: if the LDR is not covered the light blinks on and off with a delay of val milliseconds in each state. If the LDR is covered and val drops below a threshold that you have chosen the Arduino does a simple light show involving the light blinking from 10 to 150 milliseconds.

Both partners need to write their own program and make it work. Share the Arduino by unplugging it and then plugging it in to your partner's PC. Remember to upload YOUR code after you plug in the Arduino if it had been running on your partner's PC (the previous program stays loaded even when you unplug it and plug it in to a new computer.) Also, remember that you can check and compile your code even if you don't have an Arduino plugged in. Also remember that Control-T makes the code easier to read and debug.

If you finish the above with 30 or more minutes to go, you have an additional assignment on the next page.

Do a Save as and name your program Arduino_LDR_count.

Empty out your loop() function except for this:

```
int val = analogRead(0);
Serial.println(val);
```

Create a variable above the setup() function like this:

```
int count = 0;
```

Add an if statement in the loop function after the print line that checks if val is within a range that YOU pick, a value that you can fairly consistently make the LDR report:

```
if( val < 700 && val > 600 )
```

This line triggers if val is between 600 and 700. Please use different values.

Inside the if statement (that is, between a set of braces { }) add one to count each time through. Add another if statement that says "You win!" if count gets to 1000. Delay 5 seconds, then set count to 0 again, and it starts over.

The idea is that someone could try to cover the LDR to get within your range as a sort of contest. Is your setup too easy? Is it too hard? Make sure you can make it work before you call me over to check you off.