Skill Demo 2: Photoresistors and Resistors

NAME_____ GTID_____

Goals:

Understand how to use digital input/output lines to interface with a variable resistance sensor.

Tools/supplies:

- Microcontroller board
- Photoresistor
- Various resistors
- Laptop
- Breadboard
- Micro-USB cable

Background:

From previous Skill Demos:

CS 3651 Videos:

1. Intro to Multimeters
2. Using Multimeter in a Circuit
3. https://youtu.be/oiqNaSPTI7w
4. Introduction to Circuit Schematics
5. Introduction to Resistors
6. Introduction to Capacitors
7. How (and WHY) to Solder Correctly
8. NASA Splice
9. CS 3651 Protoboards
10. IntroToLED.mov
11. pullupdown1.mov

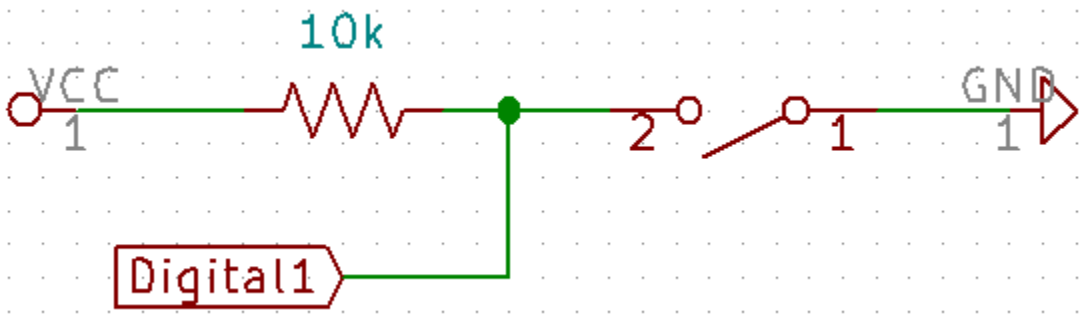
New for Skill Demo 2:

1. CS 3651 Pull-up resistors
2. CS 3651 APIA - Sensing a Switch
3. CS 3651 APIA - Pull down resistors
4. CS 3651 APIA - Sensing: Photoresistor

Practical Electronics for Inventors (2000 edition): pages 1-19 (basic laws), 59-66 (wires and connectors), 76-84 (batteries), 93-98 (resistors), 193-201 (LEDs), 434-435 (soldering), 437-441 (multimeters), **201-203 (photoresistors)**

1. Create the following circuit and create a program that shows the state of the switch (open or closed) on your laptop screen. Use only digital I/O pins. How much current flows through the circuit when the switch is closed? (Remember that you will probably have to change the lead positions on your meter. Is current measured in parallel or series? Avoid connecting power to ground through your meter when measuring current).

Current = _____ mA



Sign-off initials:_____ Date:_____ Time:_____

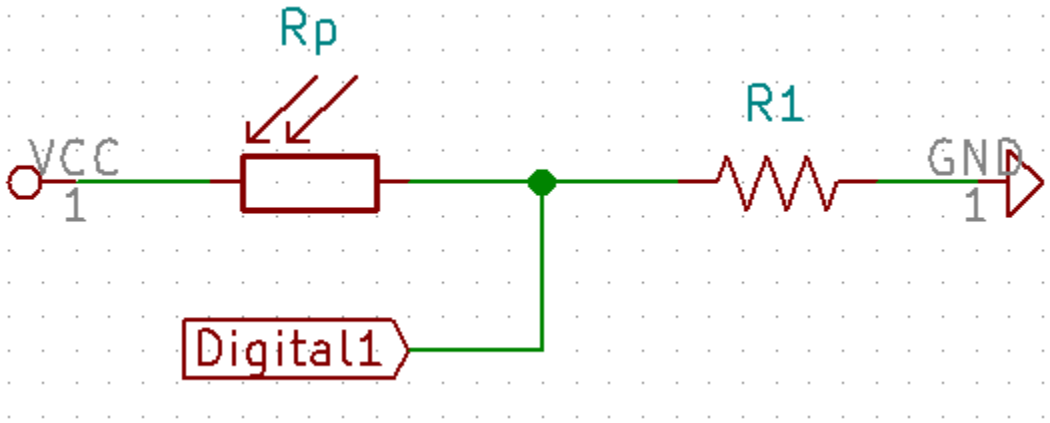
3. Attach an LED to a different digital pin "Digital2" (do not use the built-in LED if your microcontroller board has one). Write a program which uses the circuit from the previous step to monitor the state of the switch and turn the LED off when the switch is closed and on when the switch is open. Use only digital I/O pins.

Sign-off initials:_____ Date:_____ Time:_____

3. Find a photoresistor. Determine the range in ohms of the photoresistor.

Minimum _____ Maximum _____

5. Construct the circuit below and then determine the value of R1 that allows you to detect 2 states of the sensor, no light exposure and full light exposure. Use only digital I/O pins.

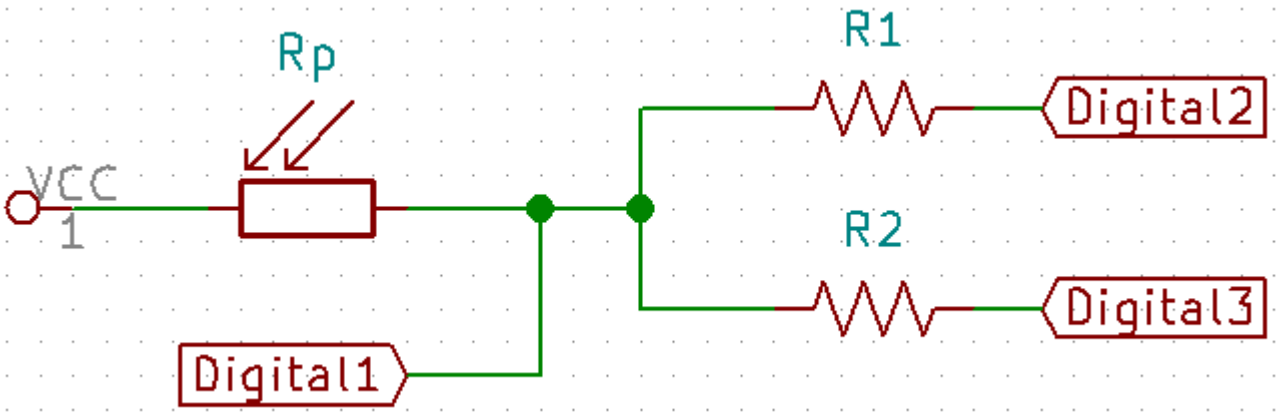


R1 = _____

Sign-off initials:_____ Date:_____ Time:_____

6. Construct the circuit below and then determine the value of R1 and R2 that allows you to detect at least **5 (five)** levels of light. Use only digital I/O pins. Hint: Remember that your microcontroller can set its pins to input or output! And you can change between input and output quickly!

Use the table below to indicate what your settings are for each of the digital I/O pins for each light level you detect.



R1 = _____ R2 = _____

Light level	Digital 1	Digital 2	Digital 3
0			
1			
2			
3			
4			

Sign-off initials:_____ Date:_____ Time:_____