

Physics 37100 Advanced Physics Laboratory I

Lab #2

(PART I: Analog Output)

- 1) Connect a resistor R and LED in series to pin 9 and GND on your arduino. Remember the LED is polarized so make sure the + is connected to the pin 9 side. The long pin is usually the + side.
- 2) Make a sketch to turn on the LED using `digitalWrite`.
- 3) Observe the brightness of the LED with $R=100\text{K}$, 10K , 1K , 500 ohm , 300 ohm , 200 ohm , and 100 ohm . The R values do not need to be exact. (e.g., 330 instead of 300). You can use two 100 ohm resistors in series to get 200 ohms . You could use two 1K resistors in parallel to get 500 ohm .
 - a. Which one is brightest?
 - b. Why?
- 4) Repeat 3) with a few other LED colors to find the combination that seems brightest.
- 5) Using the brightest combination adjust your sketch to use `analogWrite` to turn on the LED.
 - a. Make a loop to cycle the `analogWrite` values through $0,1,2,4,8,16,32,64,128,255$. Use a delay of 1-2 seconds between each change.
 - b. Observe the brightness at each level.
 - c. Does the brightness seem to double each time?

(PART II: Analog Input)

- 6) Connect a photoresistor and a regular resistor R in series to the 5V and GND on your arduino. Connect R to the GND side. Then connect the Analog input 0, A0, to the point between the photoresistor and R.
- 7) Make a sketch using `analogRead` to measure the voltage V_0 at A0 once every second.
- 8) Use `Serial.begin(9600)`; in `setup()` and `Serial.println(V0)`; in `loop()` to print out the value of V_0 .
- 9) Record the value of V_0 and convert to Volts for 3 repeatable lighting conditions and 3 values of $R=100\text{ Ohms}$, 1K , 10K (nine combinations).
 - a. Covered.
 - b. Uncovered (Room light).
 - c. Bright light (flashlight).
- 10) From these values determine the resistance of the photo resistor for each case.
- 11) Turn in the ino-file and a short description of what you did, the answers to the questions, data, and analysis in PDF.