Project 5: Distance Sensor

Due date: <mark>February 2nd, 2022 11:59 PM</mark>
**Link to Slides:** [Lecture 5: Transistors](#)

1 | About the Project

In this project, you will be making a distance sensor using a phototransistor (IR receiver), IR emitter, and an LED whose brightness will be adjusted based on the distance from an object to the IR receiver and IR emitter pair.

2 | Parts Needed

x1	Arduino Nano
x1	Mini USB Cable
x1	Breadboard
x1	IR Receiver (Phototransistor)
x1	IR Emitter (IR LED)
x2	130 Ohm Resistor
x1	10k Ohm Resistor
x1	LED

3 | Schematics
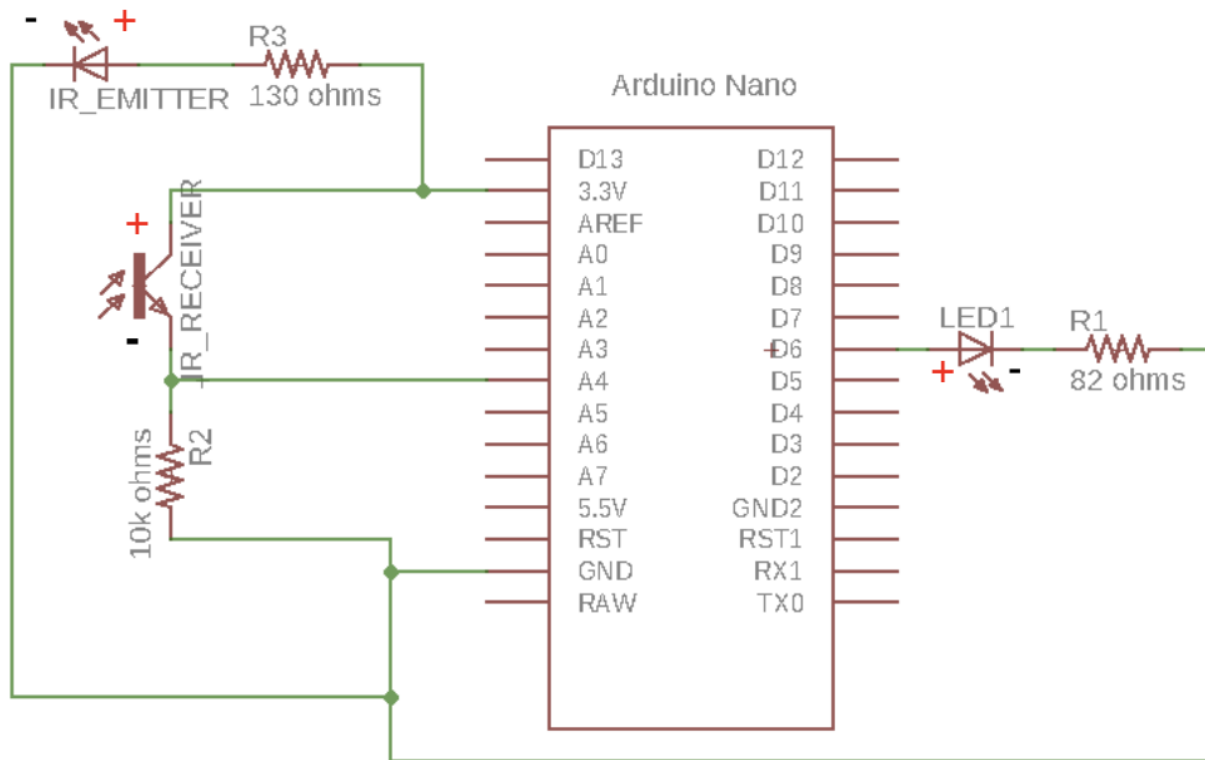
Use 130 Ohm resistor for R1

4 | How to Approach

1. Build the circuit for the distance sensor on your breadboard. In order to get best results, make sure your IR LED and IR Receiver are located as close as possible to each other. Another thing to be wary of is the polarity of these various components, as they differ from regular LEDs.
2. Read IR values. Print out the value read by the IR Receiver to the serial monitor. As the object gets closer, the value that is read should increase.
3. Noise calibration. There is noise, ambient IR light that is picked up despite no object being present. In order to account for this, we would like to get a new "zero" value by taking the average background value from our IR Receiver over 100 samples.
4. LED output.
   a. Take raw IR receiver reading using `analogRead()`.

    b. Constrain the value to the new calibrated range (0, 1023). Use `constrain()`.

    c. Use `map()` to scale the value to 0-255, the range accepted by `analogWrite()`.

5 | Deliverables

- Upload sketch (code)
- Video of LED changing brightness in response to distance from an object