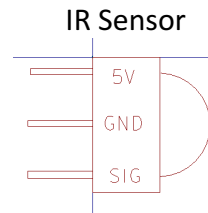


The goal of this project is to construct a shield that can enable two Arduinos to communicate and play a game with each other. You will be constructing an **Arduino Shield** with the following parts:

- 3 buttons
- 3 LEDs (1 red, 1 yellow, 1 green)
- 1 RGB LED
- 1 IR LED
- 1 IR sensor
- 7 resistors (for the LEDs)



Suggestions:

- The three buttons could be paired with the three single colour LEDs
- The IR sensor and IR LED should be at the extreme edge of the board to enable communication out the side.

You will have many phases of design and construction:

Parts & Prototyping

- Familiarize yourself with the parts and their function
- Prototype (breadboard) the individual parts of this circuit to determine the appropriate wiring.
 - o Ex:
 - Buttons wired to ground (Arduino will use 'pinMode(PIN,INPUT_PULLUP)')
 - Confirm basic LED wiring and resistor values
 - Confirm RGB LED function (be sure to wire these to PWM pins)
 - Wire and test IR receiver (use my example to confirm that you can understand the output from my transmitter)
 - Wire and test IR LED (use my example to confirm that you can be understood by my receiver)
 - <https://learn.adafruit.com/using-an-infrared-library/hardware-needed>
 - <https://learn.sparkfun.com/tutorials/ir-communication>
 - Wire all functions together at the same time
 - Construct a circuit diagram on paper as you do this, documenting which parts you are wiring to different pins, etc
- Move to the next phase once you have a complete and wholly functional breadboard with all functions working.

Circuit Design and PCB design

- Using KiCAD, construct a schematic diagram that represents your functional prototype
 - o Be sure to use Mr. Emmell's provided libraries for the Arduino Shield and button components.
- Associate parts to prepare your PCB footprints
 - o Be sure to use Mr. Emmell's provided libraries for the Arduino Shield and button footprints.
- Layout your PCB. Be sure to set the following tolerances under **Design Rules** before you begin
 - o Default track clearance of 0.6mm
 - o Default track width of 0.25mm
- Once you have a confirmed layout and wiring (See Mr. Emmell to confirm), your circuit will be etched onto a copper board and cut to size.

Enclosure Design

- While waiting for your finished circuit board, begin outlining a possible container / enclosure design to model in Solidworks.
- This model should contain your Arduino and attached shield, and should be something that can be opened to allow for the removal of the Arduino.
- The IR LED, IR receiver, Arduino power jack, top buttons and top LEDs should all be exposed.
- This will be 3D printed.

Soldering and final assembly

- Solder your final printed circuit board, assemble with your enclosure, and test!