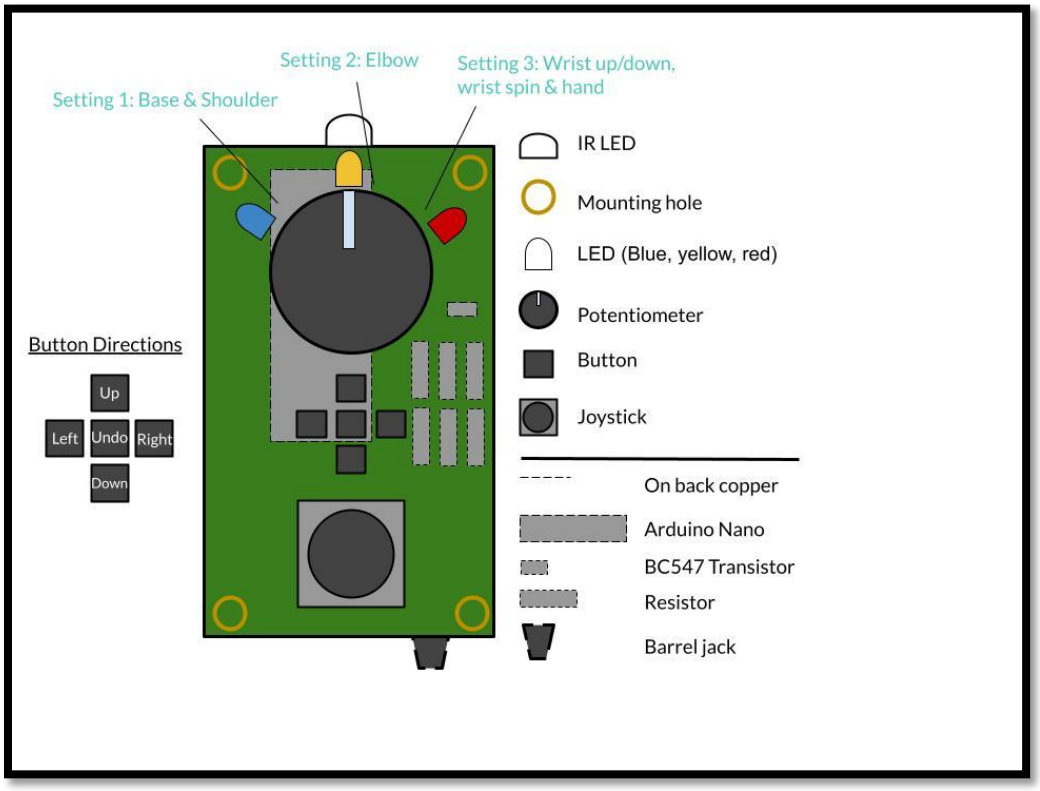
Robotic Arm Remote

Phase 2: Design Plan

A printed circuit board is going to be designed to be a remote that will control a robotic arm using an infrared LED.

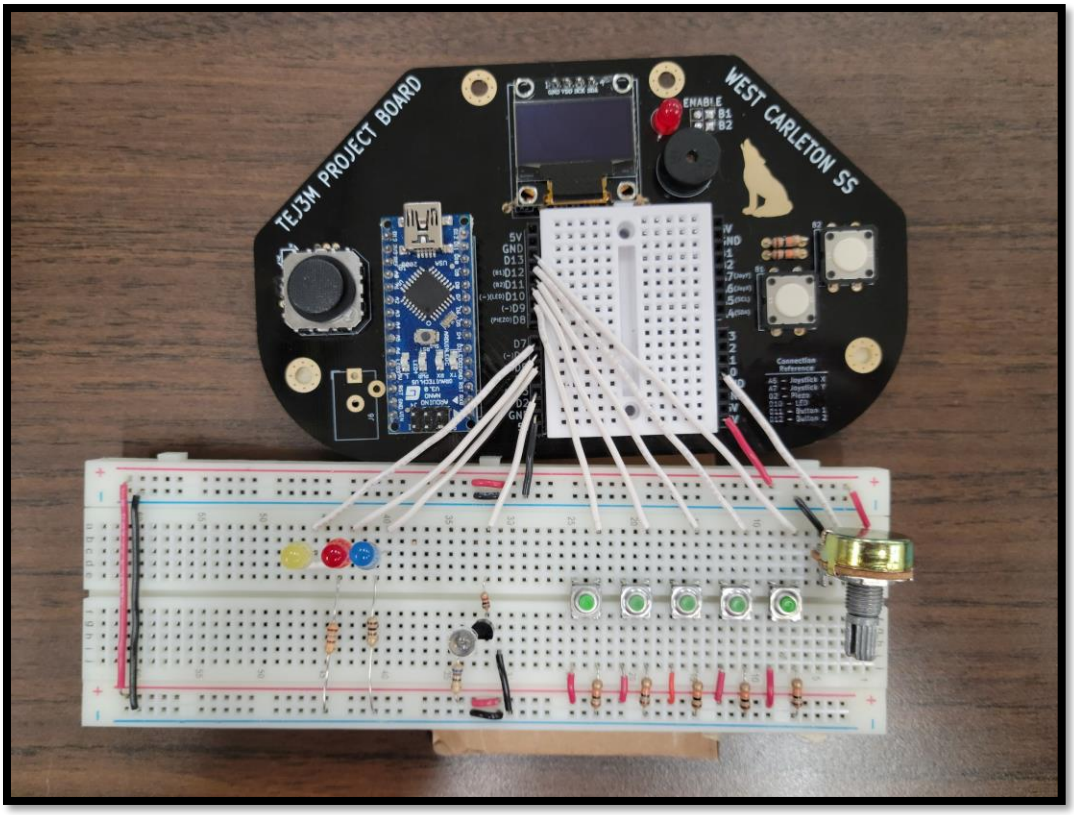
A rectangular board with curved edges, placed in portrait orientation will be built with the following description and diagram below. The PCB will have four 3mm mounting holes in each corner. On the front copper, a 5mm THT IR LED will be placed in the center, at the top of the PCB laying flat. Three 5mm THT-LEDs of various colours will be below in front of a 10k ohm resistor potentiometer. The potentiometer will have a plastic knob with a line that indicates the setting selected. The different settings of the remote will be labeled on the silkscreen (light blue text in diagram) with the motor(s) being controlled. Five 6mm THT-buttons will then be placed in a cross shape under the potentiometer. Lastly, a joystick is under the cross.

On the back copper, a barrel jack will be at the bottom right of the board and to the left of the mounting hole there. An Arduino Nano and THT BC547 transistor will also be on the back copper in a way that will avoid conflicting with components on the front copper. Any THT-resistors will also be on back copper.



The remote will function by having a line on the potentiometer knob select a setting of the three possible. The silkscreen will have written each setting and the motors controlled. The LED will be lit indicating the setting selected. The motors will then be controlled by the buttons. Each motor has two buttons controlling it, either the up and down buttons or the left and right buttons. Up/down button motors are shoulder, elbow and wrist up/down. Base and wrist spin motors are left/right buttons. In setting 3, the joystick will open the robotic hand with an up push and close with a down push. Some other notes; the elbow setting does not have a left/right button function and the joystick has no x-axis function . The middle button in the cross is an undo button, doing the opposite of what action was just done.

Phase 3: Physical Prototype



Pin and Wire Connections:

Normal LEDs

- PIN 7 - Yellow LED - 180 ohm resistor to ground
- PIN 6 - Red LED - 180 ohm resistor to ground
- PIN 5 - Blue LED - 100 ohm resistor to ground

Buttons

All are pulldown buttons

- PIN 13 - Button - 10k ohm resistor to ground **AND** PIN 13 - Button to 5V
- PIN 12 - Button - 10k ohm resistor to ground **AND** PIN 12 - Button to 5V
- PIN 11 - Button - 10k ohm resistor to ground **AND** PIN 11 - Button to 5V
- PIN 10 - Button - 10k ohm resistor to ground **AND** PIN 10 - Button to 5V
- PIN 9 - Button - 10k ohm resistor to ground **AND** PIN 9 - Button to 5V

IR LED

- 5V - 68 ohm resistor - IR LED - BC547 transistor to ground
- **AND** PIN 3 - 1k ohm resistor - BC547 transistor

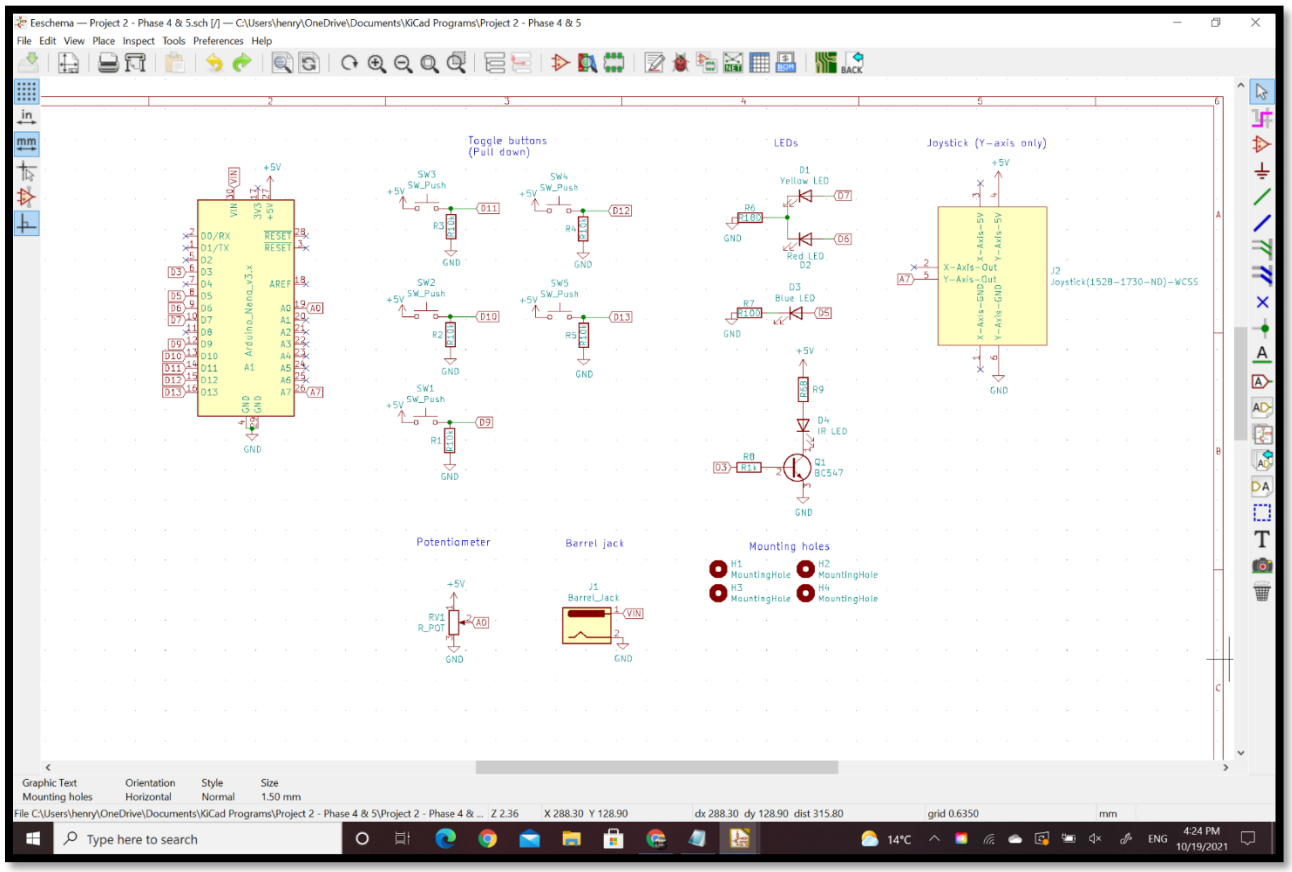
Potentiometer

- PIN A0 - Potentiometer
- 5V - Potentiometer to ground

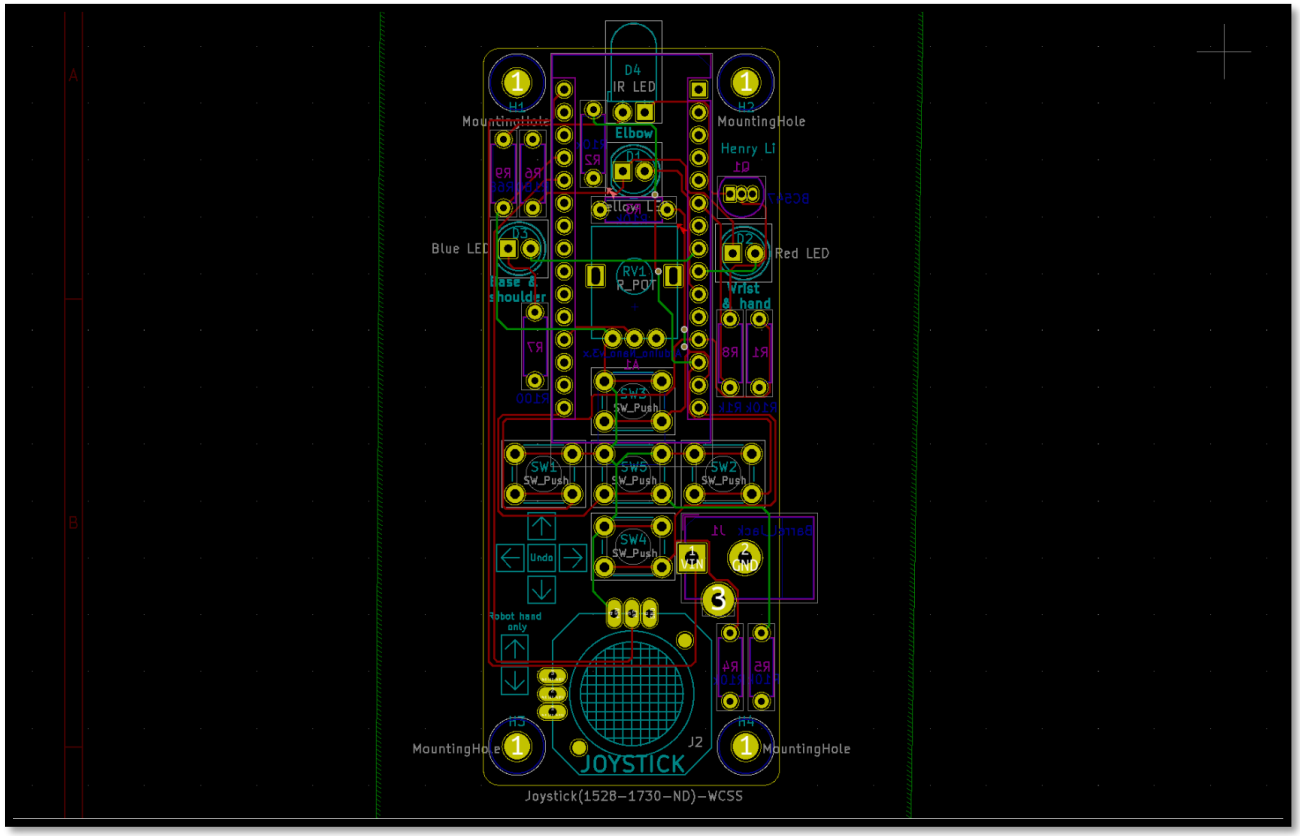
Joystick

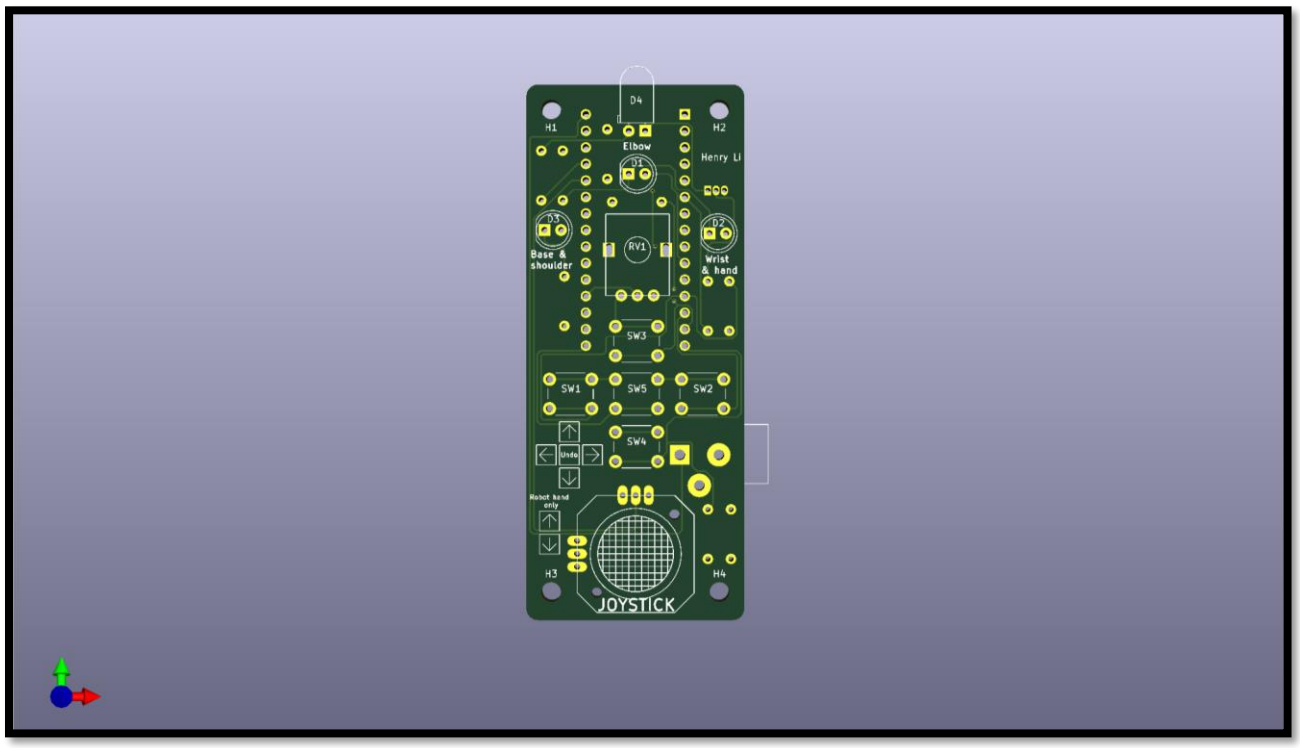
- PIN A7 - Joystick (Wired internally)

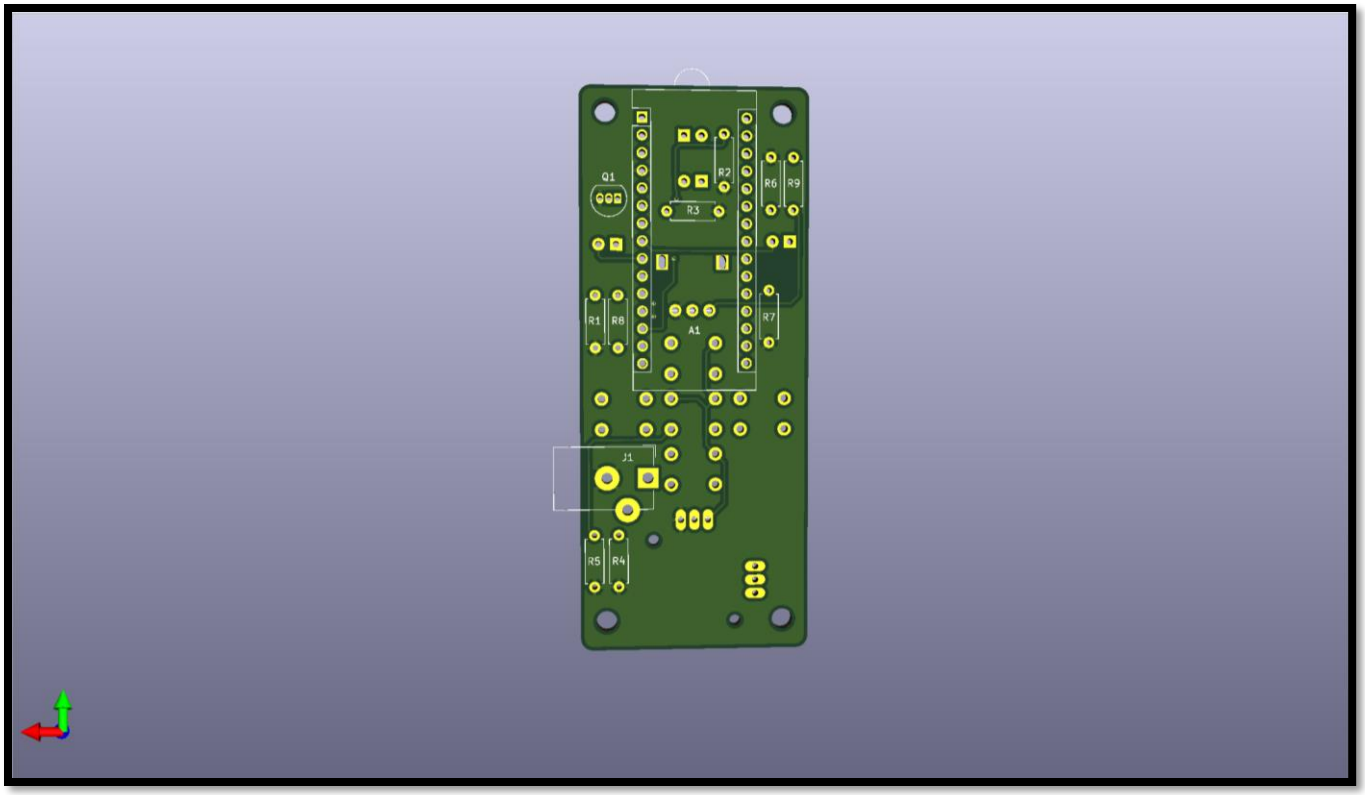
Phase 4: KiCAD Schematic



Phase 5: KiCAD PCB






Q1
R2
R3
R6
R9
R1
R8
A1
R7
J1
R5
R4