Mr. Emmell Sept. 15, 2022

TEJ4M – Assignment 1

Arduino Whack-a-Mole PCB

Project is due Thursday Sept. 22nd at the start of class

You are designing a whack-a-mole game PCB.

The point of this circuit board is to create a Whack-a-Mole game. The idea here is there are LEDs associated with buttons. One LED would light up, and the user would try to hit the associated button before it turns off. You are not coding this, but this is the intended use.
Keep this in mind when designing your board layout.

Key items to note:

- The game will be designed around using the Arduino Nano (same as on your project board)
- You will not be coding this game
    - Only enough code to simulate and test prototyped connections
- You are designing the PCB only

Deliverables

- One email to Mr. Emmell containing:
    - A zip file containing your KiCAD project
    - A PDF of your documented screenshots
        - One screenshot of your tested and working prototype in TinkerCAD
        - One screenshot of your KiCAD schematic
        - One screenshot of your KiCAD PCB
        - One screenshot of your uploaded project to OSHPark (as seen below)
            - Be sure to include both sides of the board, board dimensions, and price

Considerations & Requirements

- There will be 9 buttons
- There will be 9 LEDs
- There will be a piezo buzzer
- In TinkerCAD, you will need to use the Arduino UNO for simulations, but in truth, the circuit will have the Arduino Nano
- **You will need to wire the components as shown below**. Specifically, we are using a resistor/capacitor combination for hardware debouncing
- **See rubric for size constraints**
- Notice there are no elements of the rubric involving code. DO NOT CODE THIS PROJECT. Use the provided example code to test the functionality of the buttons/lights only.

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Information, Examples and Samples

Components & Footprints (You must use these parts / footprints)

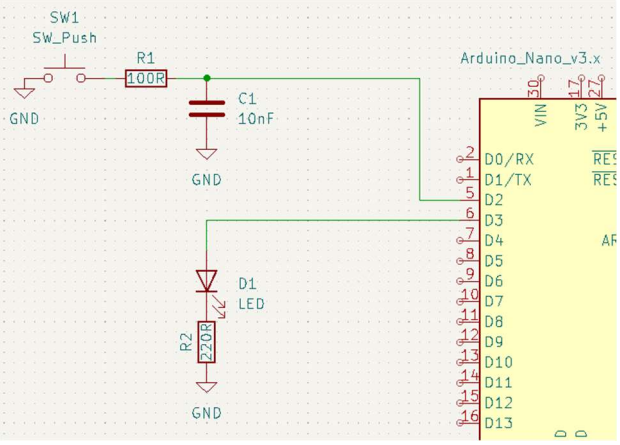
- LED
  - TinkerCAD: LED
  - KiCAD: LED
  - Footprint: LED_THT:LED_D5.0mm
- Resistor
  - TinkerCAD: Resistor
  - KiCAD: R
  - Footprint: Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P7.62mm_Horizontal
- Capacitor
  - TinkerCAD: Capacitor
  - KiCAD: C
  - Footprint: Capacitor_THT:C_Disc_D4.3mm_W1.9mm_P5.00mm
- Pushbutton
  - TinkerCAD: Pushbutton
  - KiCAD: SW_PUSH
  - Footprint: Button_Switch_THT:SW_PUSH_6mm
- Piezo Buzzer
  - TinkerCAD: Piezo
  - KiCAD: Buzzer
  - Footprint: Buzzer_Beeper:Buzzer_12x9.5RM7.6
- Arduino Nano
  - TinkerCAD: Use Arduino UNO
  - KiCAD: Arduino_Nano_v3
  - Footprint: Module:Arduino_Nano

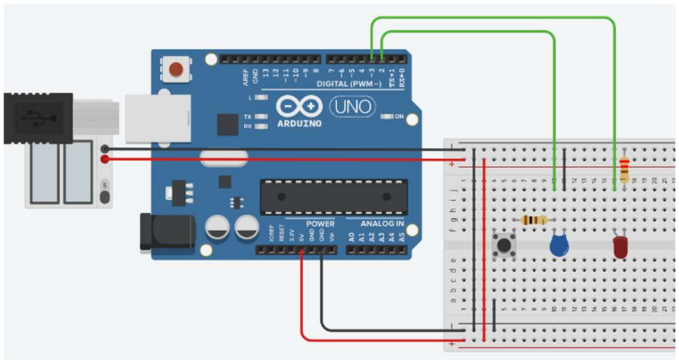
Example Arduino Code to use for confirming wiring:

//This code sets pin 2 as input for the button, attaches a pull-up resistor internally, and sets pin 3 as output
// In the loop() function, it continuously sets the reverse of digitalRead of the button to the led

```
void setup()
{
  pinMode(3, OUTPUT);
  pinMode(2,INPUT_PULLUP);
}
void loop()
{
  digitalWrite(3,!digitalRead(2));
  delay(20);
}
```

Required Wiring for buttons





Example of OSHPark Screenshot

We detected a 2 layer board of 5.51 x 3.35 inches (140.0 x 85.0mm)
3 boards will cost $92.20

Board name

3mGameBoard.kicad_pcb

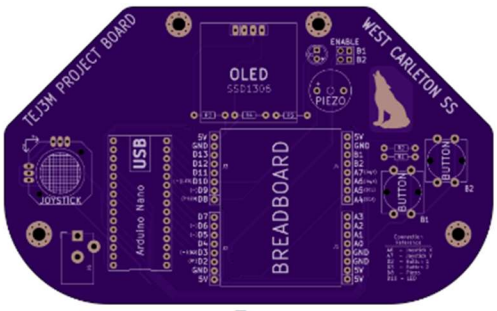
Email

Enter your email address (required)

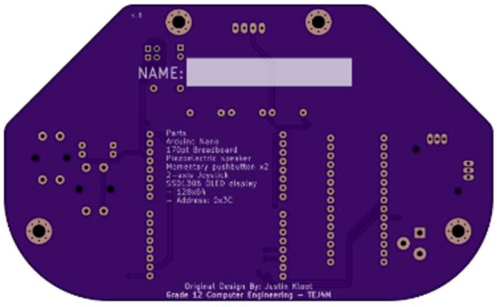
Notes

Processing information

- Processing 3mGameBoard.kicad_pcb as KiCad CAM job.
- Kicad processing does not update fill zone.s. . See help page.
- Noting blank layer: Top Paste.ger
- Noting blank layer: Bottom Paste.ger
- 2 layer board of 5.51x3.35 inches.



Top



Bottom

Marking Rubric

Expectation	R	1	2	3	4
TinkerCAD	Prototype has significant errors	Prototype has some minor errors	Prototype is fully functional	Prototype is fully functional, all wiring is visible, no double use of breadboard holes	Prototype is fully functional, cleanly wired and thoughtfully laid out
KiCAD *Schematic*	KiCAD schematic has significant errors in design	KiCAD schematic is functional and not missing any connections	KiCAD schematic is functional and connections are clear	KiCAD schematic is mostly clear and well laid out	KiCAD schematic is clear and very well laid out
KiCAD *PCB*	KiCAD PCB layout is missing key components / connections	KiCAD PCB layout has all connections wired.	KiCAD PCB layout has functional layout	KiCAD PCB layout has functional layout, has some symmetry and elegance.	KiCAD PCB layout has a good layout, has much symmetry and elegance. Attention paid to silk screen.
PCB *Size (Either orientation is acceptable)*	More than 120mm x 120mm (14400 mm^2)	Less than 120mm x 120mm (14400 mm^2)	Less than 120mm x 80mm (9600 mm^2)	Less than 100mm x 80mm (8000 mm^2)	Less than 75mm x 75mm (5625 mm^2)