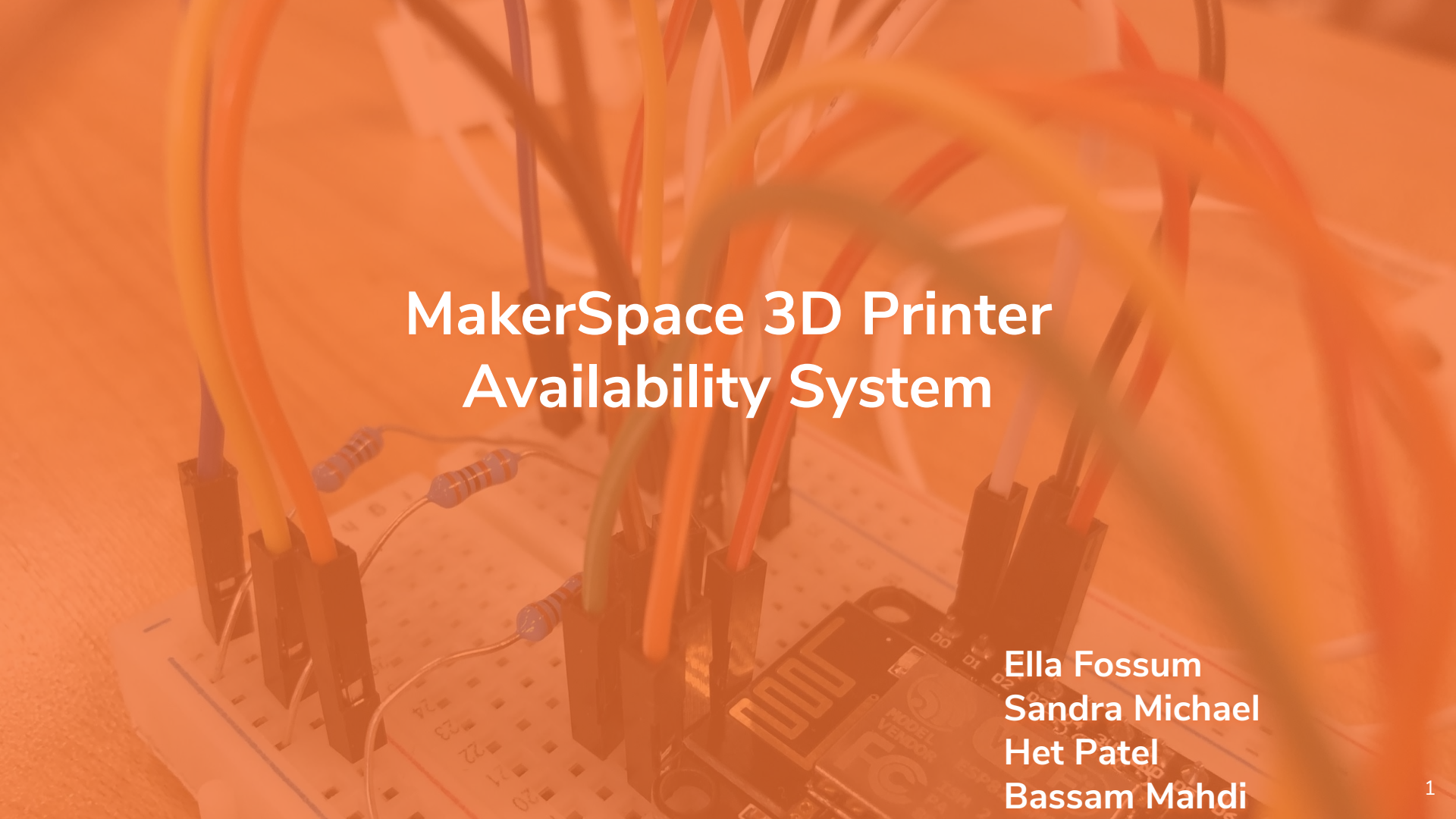


MakerSpace 3D Printer Availability System

Ella Fossum
Sandra Michael
Het Patel
Bassam Mahdi

Team 10

Who are we?

We are a team of first and second year students with focus in Electrical, Biomedical Mechanical, and Chemical Engineering.

Our goal is to create a product that will help students easily access information about the availability of 3D printers in the MakerSpace.

RICHARD L'ABBÉ
MAKERSPACE

Problem Statement

The staff at CEED need an AFFORDABLE product which will OPTIMIZE and MONITOR machine use, REDUCE confusion, and ENSURE all projects are completed during the MakerSpace hours of operation.

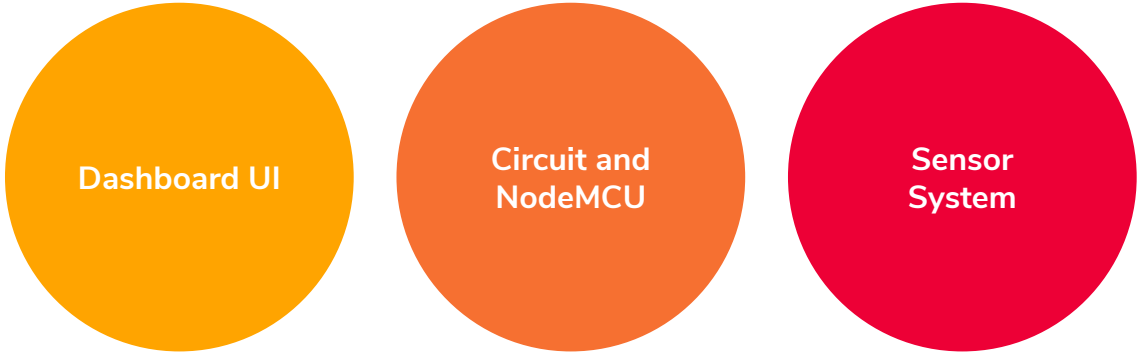
Constraints

- Cost
- Integrate DashBoard by Ross Video into the solution

Our Solution

Our team designed a user interface capable of indicating the availability and condition of the UltiMaker printers in MakerSpace.

3 Major Subsystems



- User Interface
- Listener function
- Real time information relay
- Arduino code

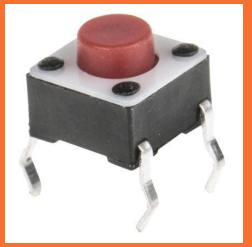
- Wiring and organizing
- Integration of multiple sensors
- Configuring external power supply

- Sensor type
- Physical support structure
- Manufacturing

Benchmarking

Ultrasonic Sensor

Tact Switch



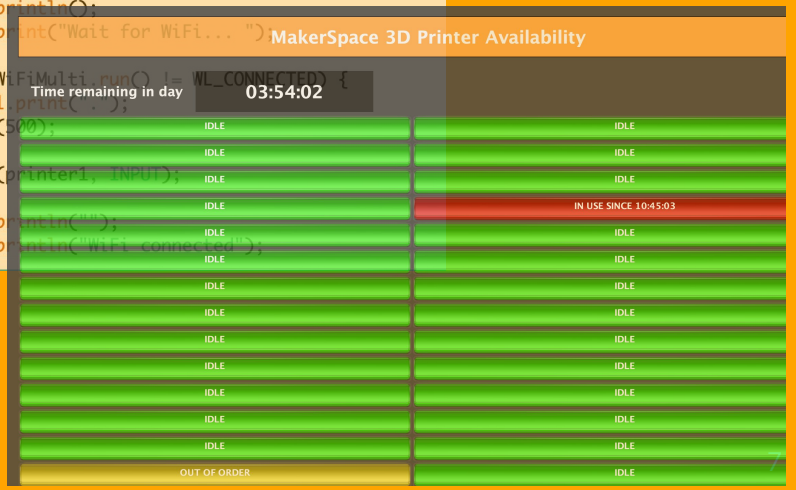
Magnetic Reed Switch

1.

USER INTERFACE

Dashboard, arduino program, and visual display

```
const char* ssid     = STASSID;
const char* password = STAPSK;

const char* host = "172.20.10.4";
const uint16_t port = 55555;

int printer1 = 16; // pin 16 connected to printer 1
int printer2 = 5;  // pin 5 connected to printer 2
int printer3 = 4;  // pin 4 connected to printer 3

int printerState =0 ;
char* sendToDash = "";

ESP8266WiFiMulti WiFiMulti;

void setup() { //connecting to wifi
  Serial.begin(115200);

  // We start by connecting to a WiFi network
  WiFi.mode(WIFI_STA);
  WiFiMulti.addAP(ssid, password);

  Serial.println();
  Serial.println();
  Serial.print("Wait for WiFi... ");

  while (WiFiMulti.run() != WL_CONNECTED) {
    Serial.print(".");
    delay(500);
  }
  pinMode(printer1, INPUT);

  Serial.println("");
  Serial.println("WiFi connected");
```

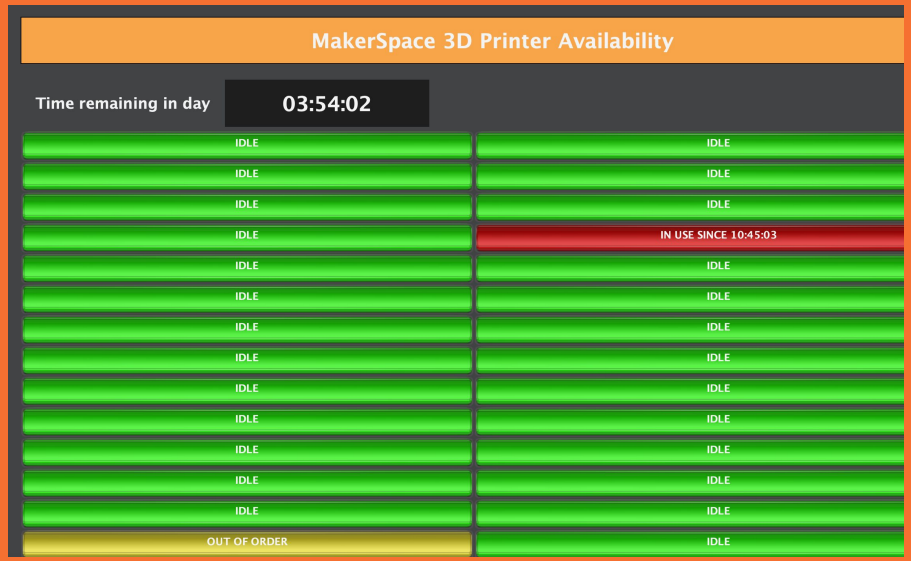


Prototype 1

Visual Representation

- Small text
- Crowded display

➔ Implement button functionality
➔ Adjust colours and layout

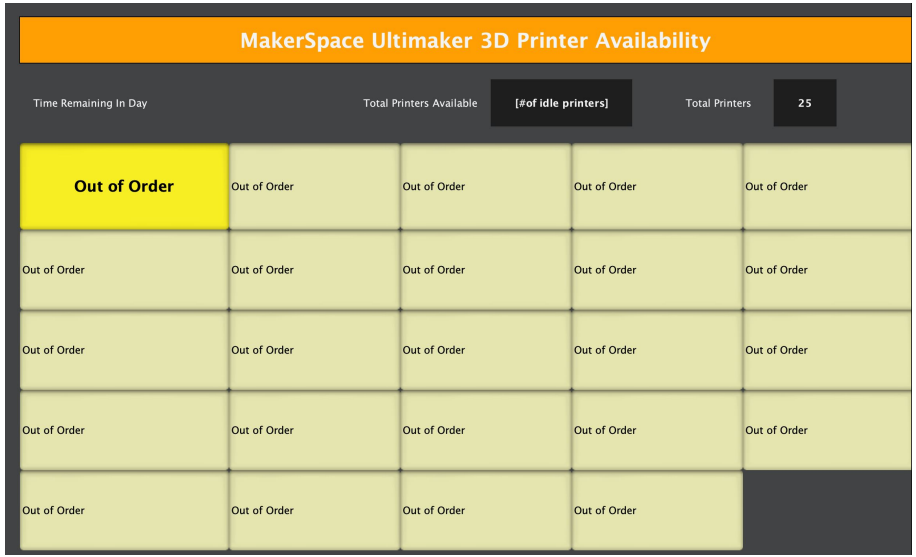


Prototype 2

Functional Representation

- Needs colour
- Format changes needed for clarity

➔ Add two more functional display boxes
➔ Add countdown timer



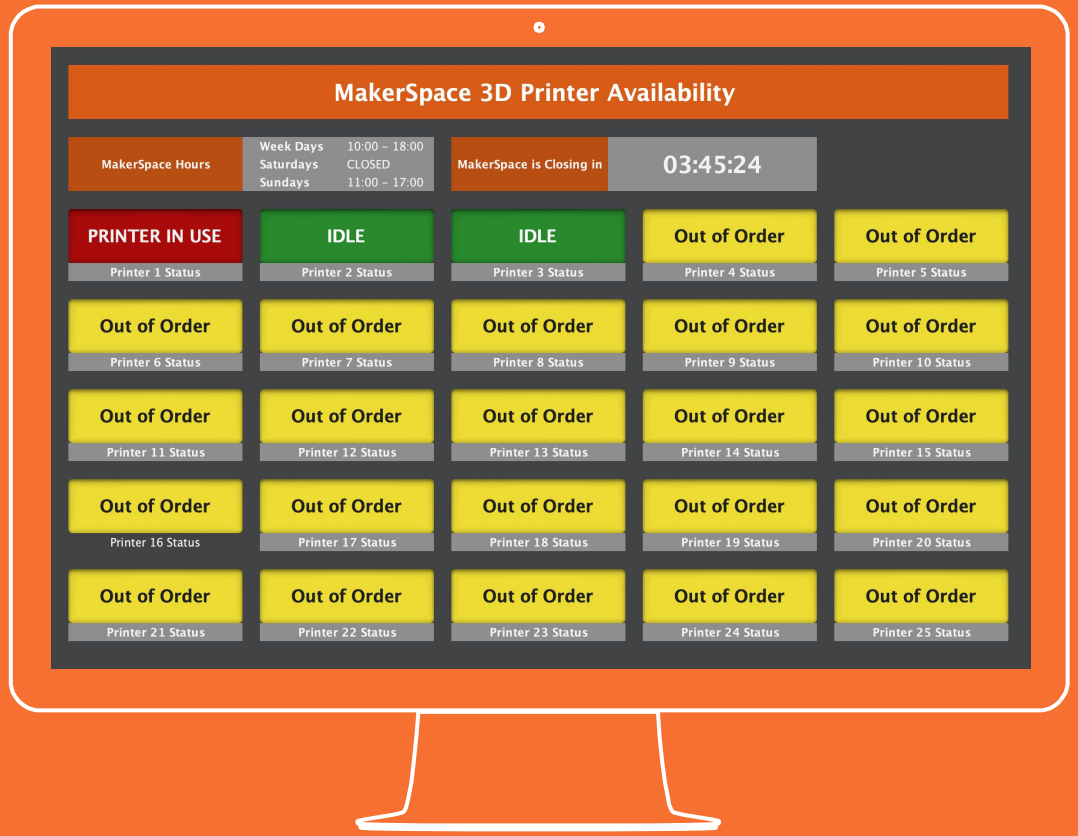
Prototype 3

Features

- 3 functional buttons
- Countdown timer

Next Steps

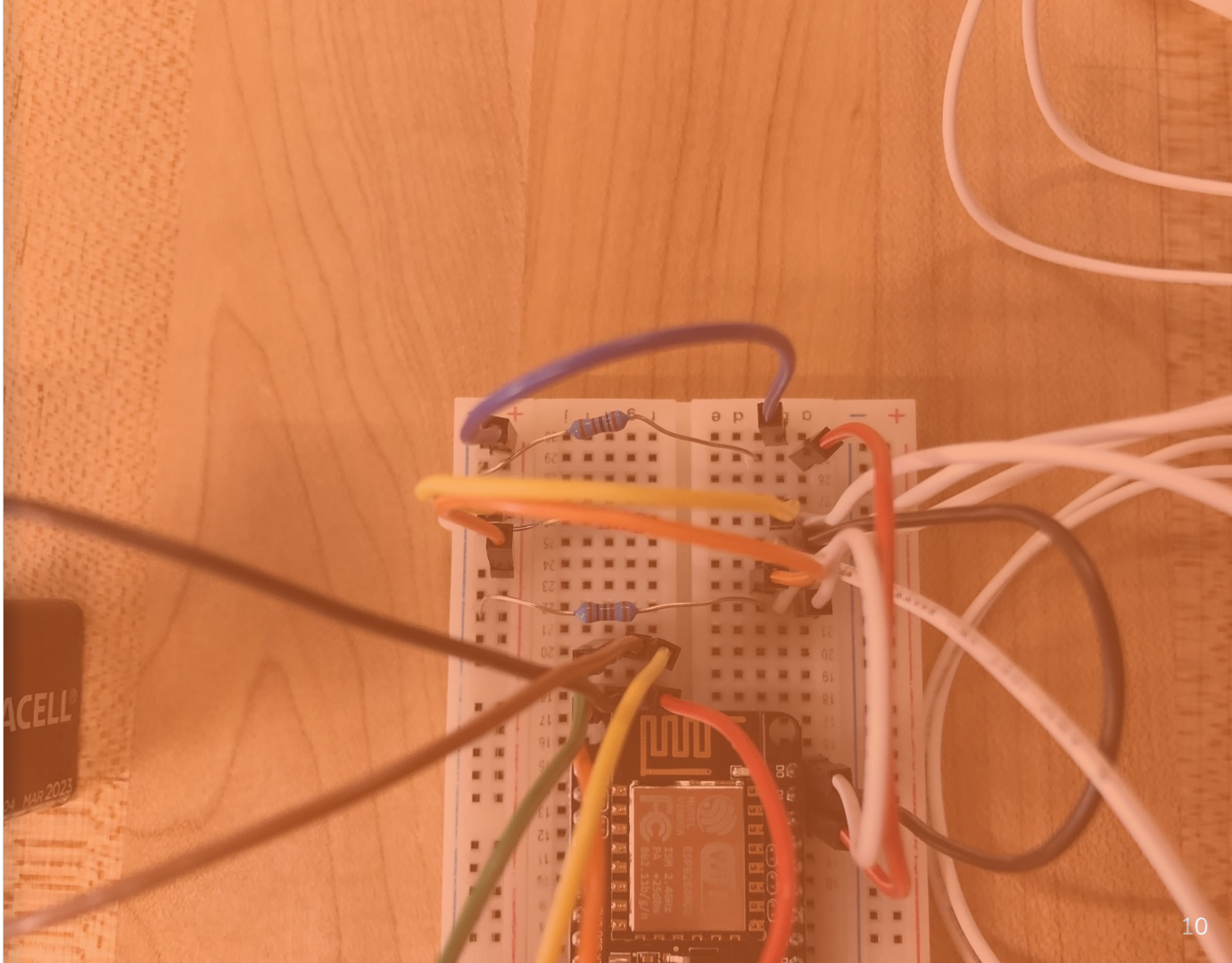
- Refine visual display
  - Simplicity
  - Colour
- Test and debug timer
- Research notification feature



2.

CIRCUIT

NodeMCU, multiple sensor integration and external battery

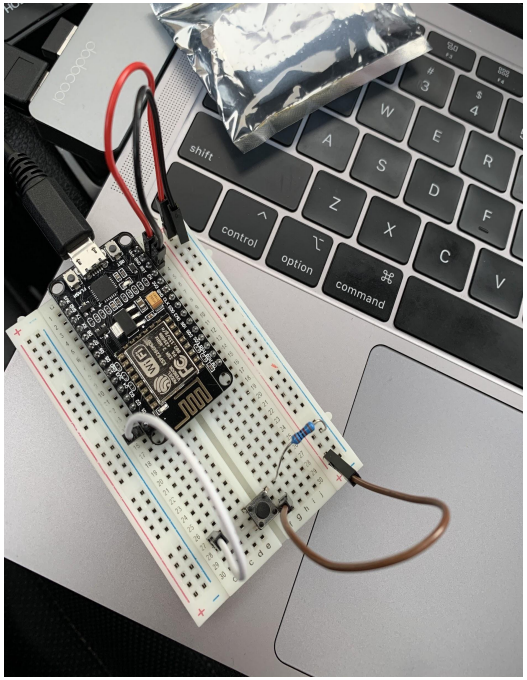


Prototype 1 :

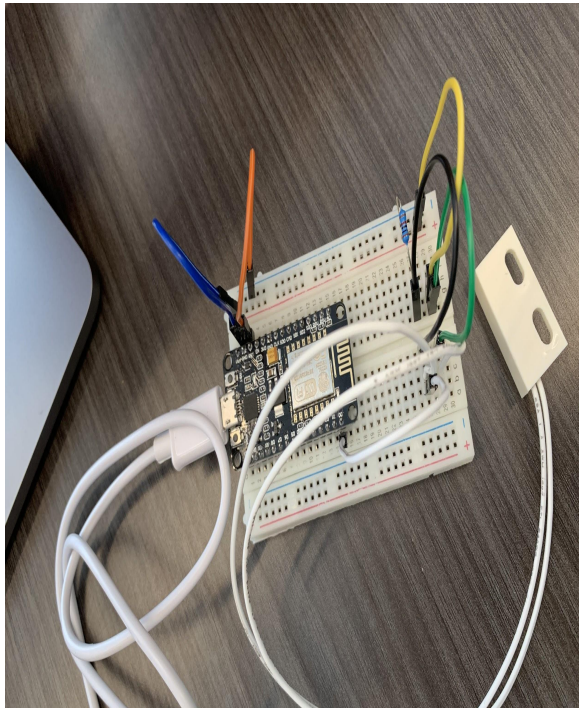
- 1 functional sensor (Tact switch)

Prototype 2:

- 1 functional sensor (magnetic reed switch)



Prototype 1



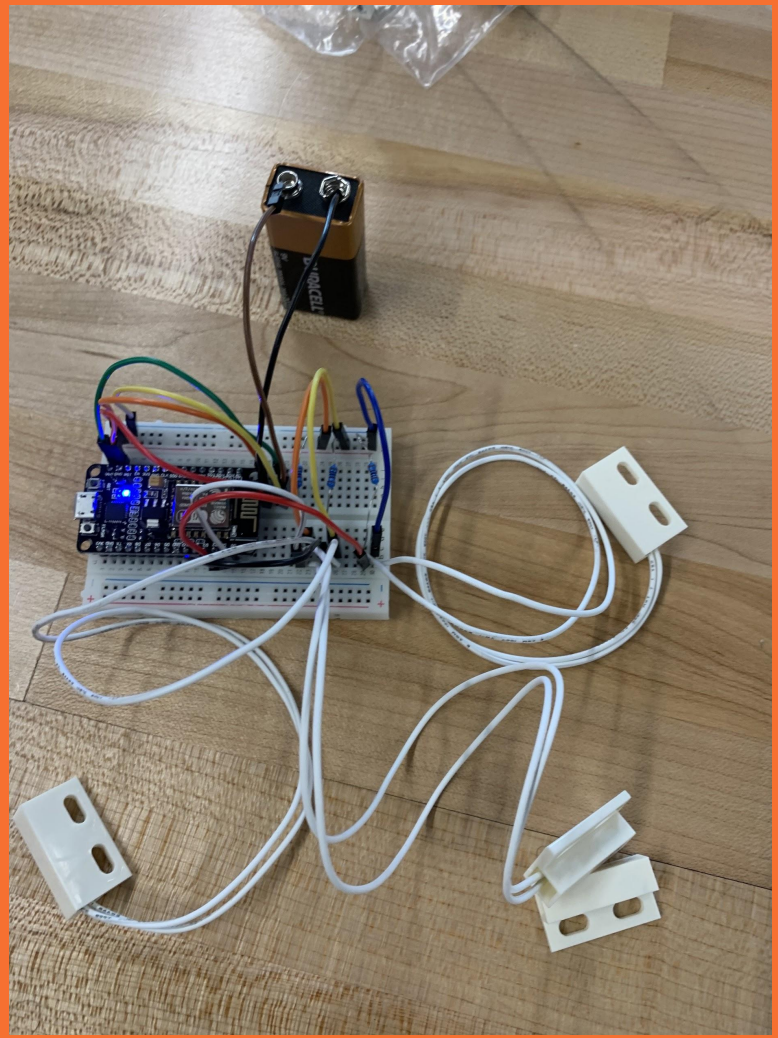
Prototype 2

Prototype 3:

- 3 functional sensors
- An external battery

Next steps :

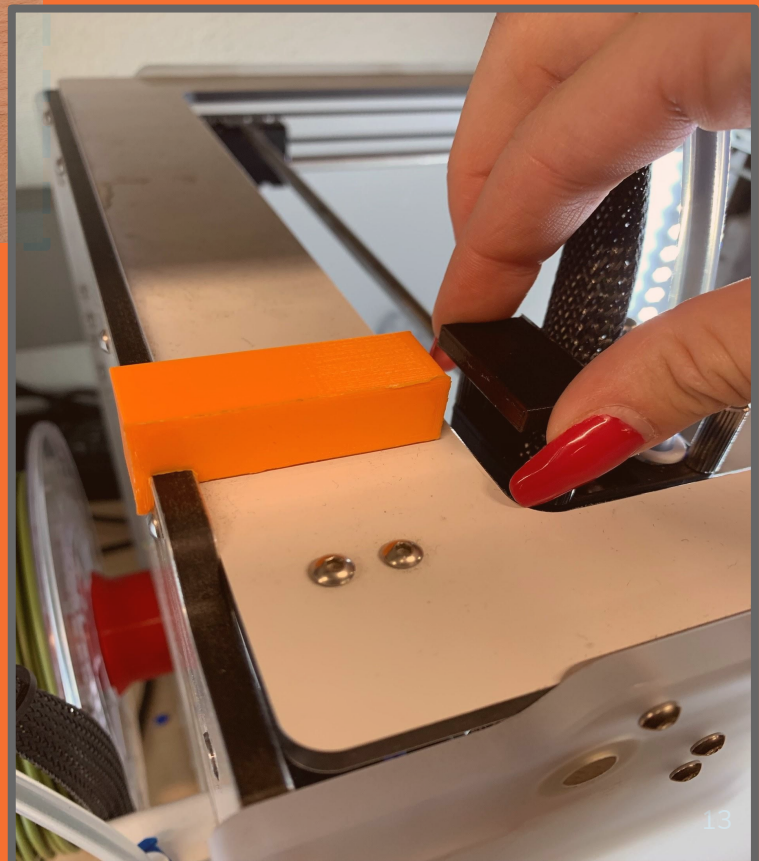
- Place all the components on the perfboard and then solder.
- Testing the circuit.



3. SENSOR SUPPORT STRUCTURE

PROTOTYPE 1

PROTOTYPE 2

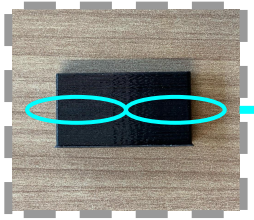


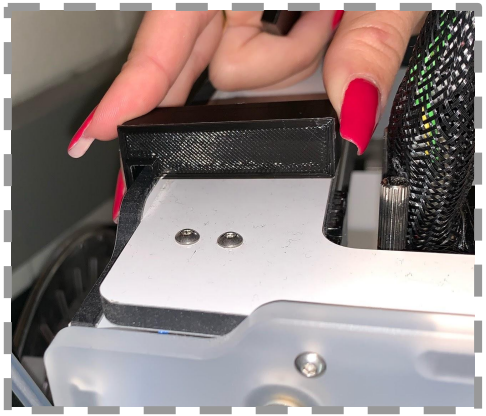
WHY US?

- Cost-effective
- Simple
- Efficient
- Easily installed & removed
- Minimal interference

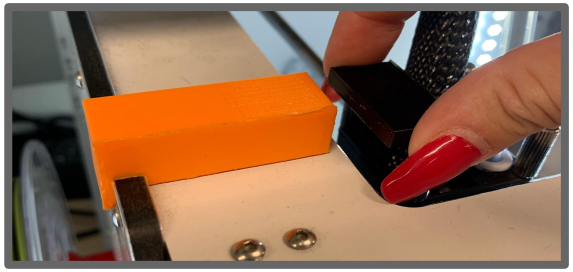
NEXT STEPS:

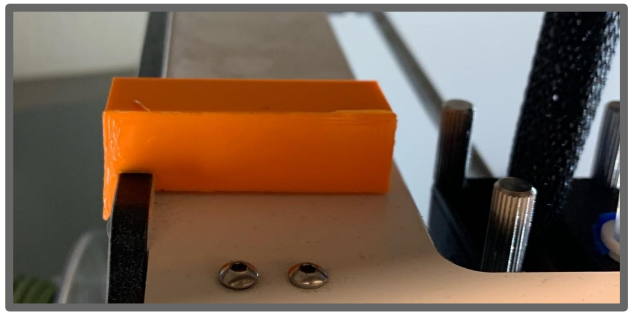
- Stabilize Part B on thumb screws → elastics
- Find method of sensor attachment on both Parts.





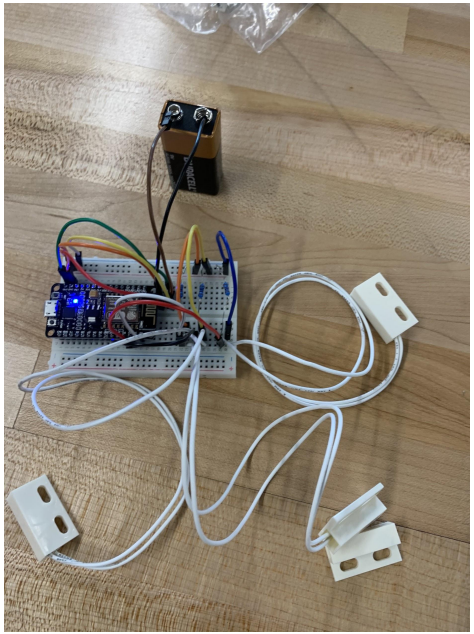
PROTOTYPE 1

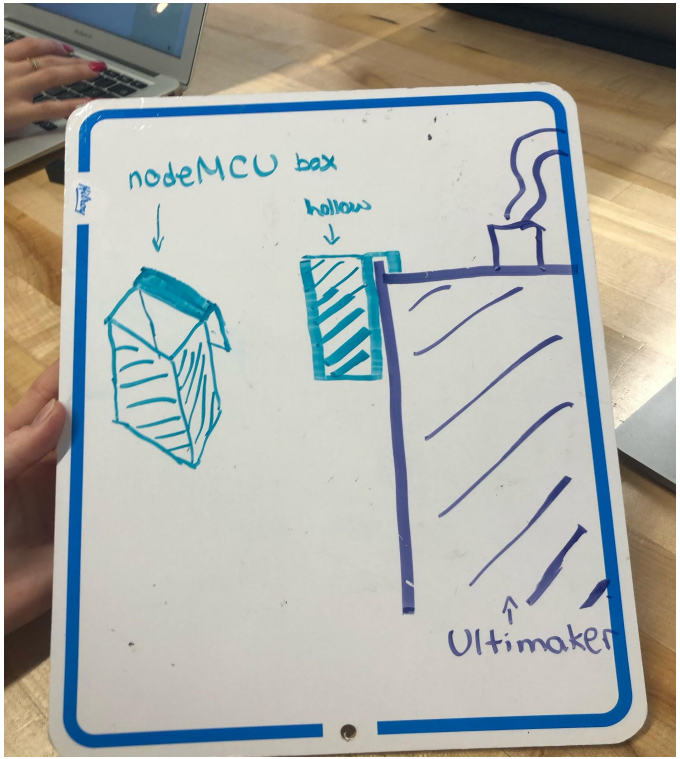




PROTOTYPE 2

WHAT'S NEXT: NodeMCU BOX SUPPORT STRUCTURE





The Final Prototype

MakerSpace 3D Printer Availability

MakerSpace Hours	Week Days	10:00 – 18:00
	Saturdays	CLOSED
	Sundays	11:00 – 17:00

MakerSpace is Closing in **03:45:24**

IDLE	PRINTER IN USE	IDLE	Out of Order	Out of Order
Printer 1 Status	Printer 2 Status	Printer 3 Status	Printer 4 Status	Printer 5 Status
Out of Order	Out of Order	Out of Order	Out of Order	Out of Order
Printer 6 Status	Printer 7 Status	Printer 8 Status	Printer 9 Status	Printer 10 Status
Out of Order	Out of Order	Out of Order	Out of Order	Out of Order
Printer 11 Status	Printer 12 Status	Printer 13 Status	Printer 14 Status	Printer 15 Status
Out of Order	Out of Order	Out of Order	Out of Order	Out of Order
Printer 16 Status	Printer 17 Status	Printer 18 Status	Printer 19 Status	Printer 20 Status
Out of Order	Out of Order	Out of Order	Out of Order	Out of Order
Printer 21 Status	Printer 22 Status	Printer 23 Status	Printer 24 Status	Printer 25 Status

MakerSpace 3D Printer Availability

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Printer 11 Status	Printer 12 Status	Printer 13 Status	Printer 14 Status	Printer 15 Status
Out of Order	Out of Order	Out of Order	Out of Order	Out of Order
Printer 16 Status	Printer 17 Status	Printer 18 Status	Printer 19 Status	Printer 20 Status
Out of Order	Out of Order	Out of Order	Out of Order	Out of Order
Printer 21 Status	Printer 22 Status	Printer 23 Status	Printer 24 Status	Printer 25 Status

QUESTIONS?