

Scale +

Project : Internet of Things

Team E : Nice For What

Pauline TRUONG

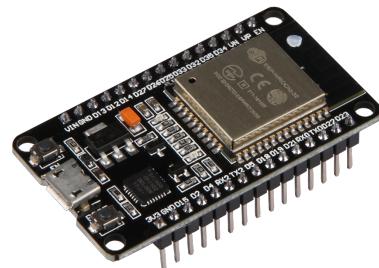
Billy CHHUON

- ## Description of Scale+

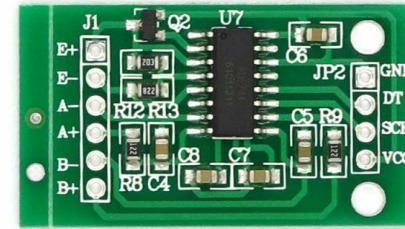
Scale+ is a connected body scale that reads the weight using sensors and will be able to send data in a dashboard

- Main components

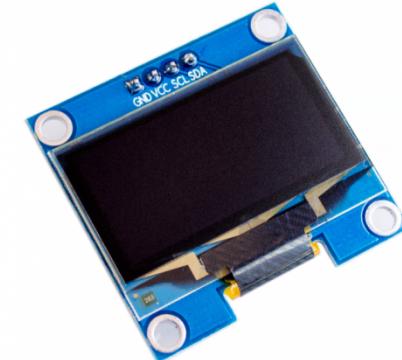
ESP 32



Load Cells



HX711



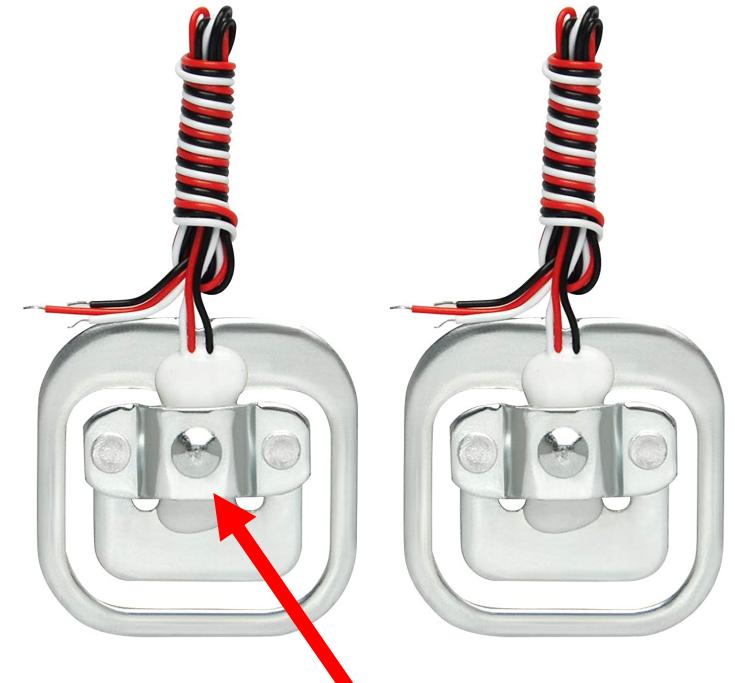
OLED display

- ## What is a Load Cells

For a body scale, we need to use 4 loads cells of 50kg each

A Load cell is a metal force transducer that have strain gauges glue to them

3 wires to provide power, ground and sensor reading



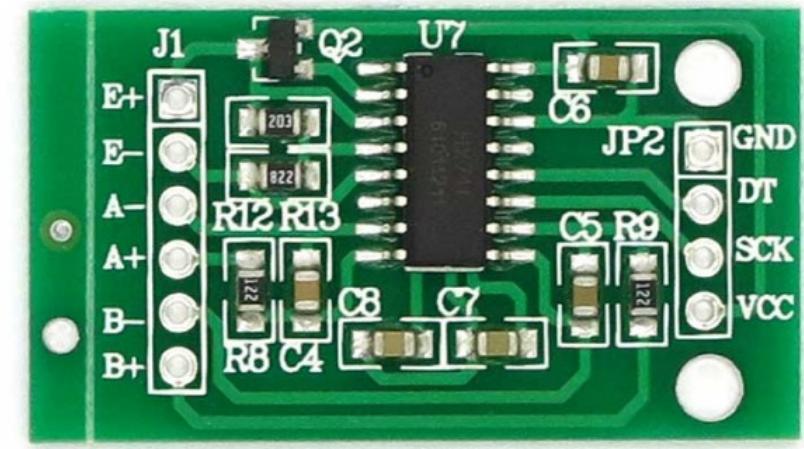
make the pressure here

- What is a HX711

A HX711 is a module amplifier transducer that reads analogue value and convert in a digital value

HX711 get small voltage variation from a sensor using **Wheatstone bridge principle**

Connecting HX711 to ESP32 will help to read changes in the resistance of the force transducer with precise calibration obtain very accurate weight measurements



Building the scale

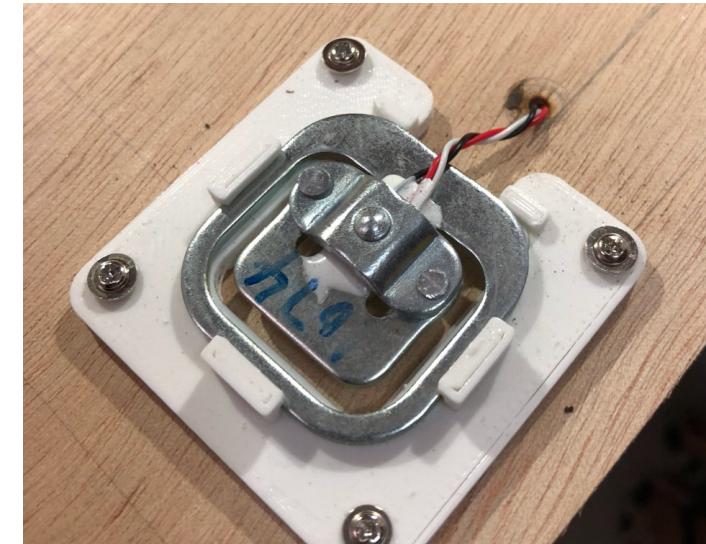
- Step 1 : Building the scale

List of materials to build the scale :

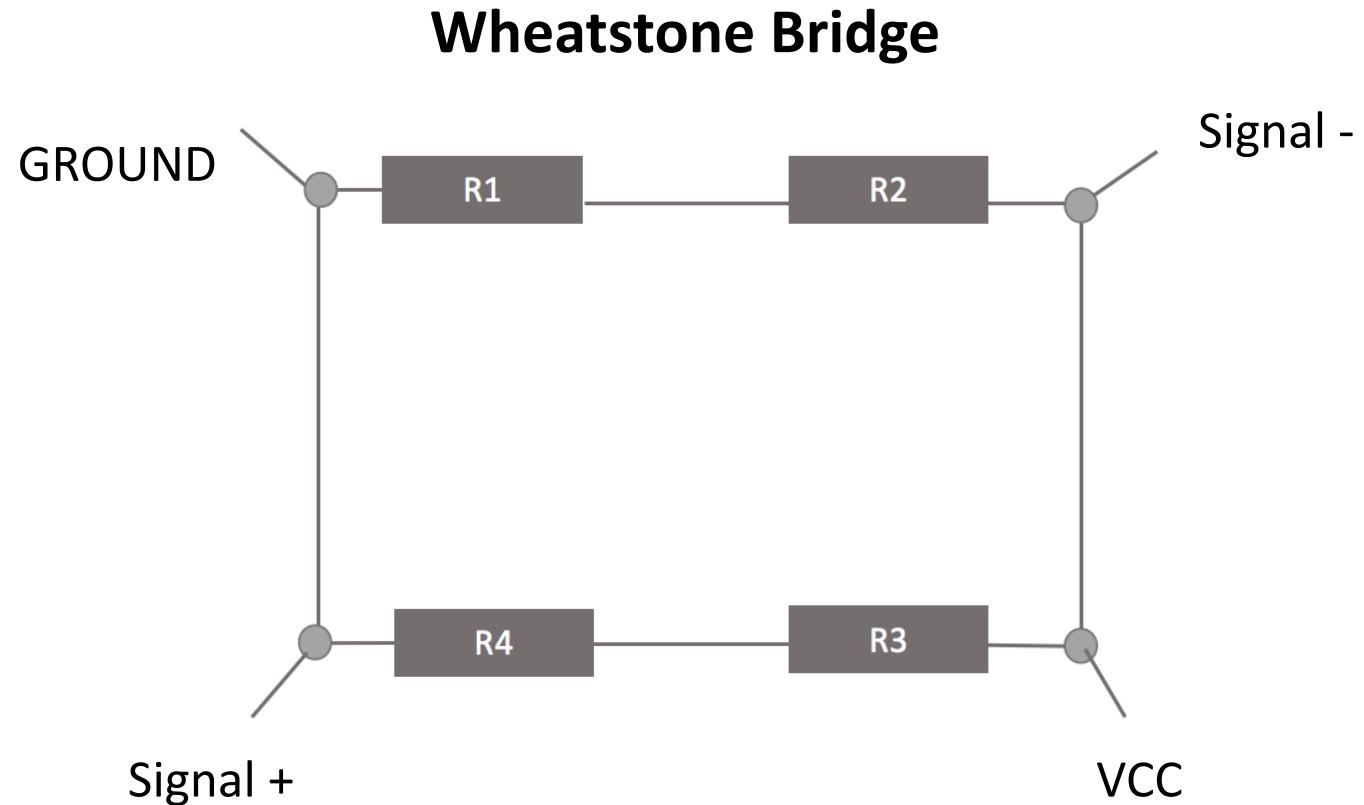
- Solid wooden plank (33cm x 33cm)
- 4 load cells of 50kg
- Tape
- Special resistant glue
- Solder iron

- Step 1 : Building the scale

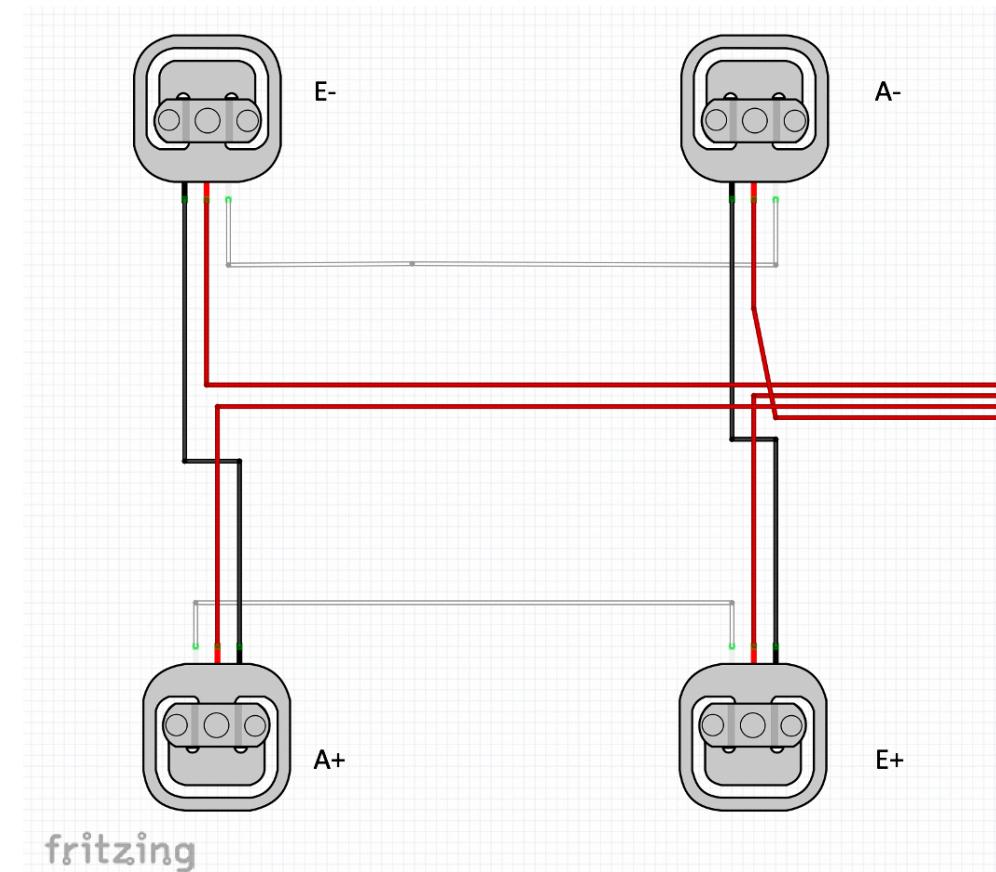
Make hole in all four corners of the scale and fix it with special resistant glue



- Step 1 : Building the scale

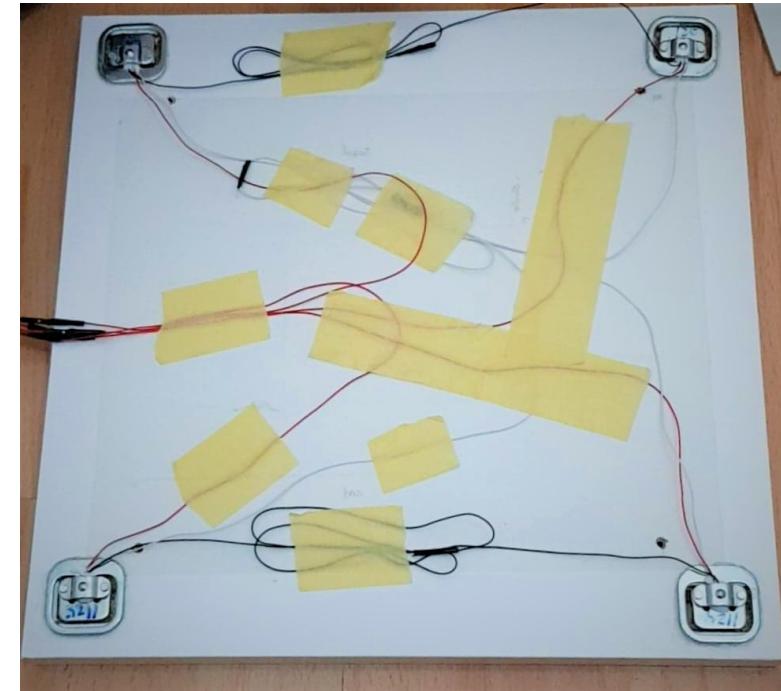
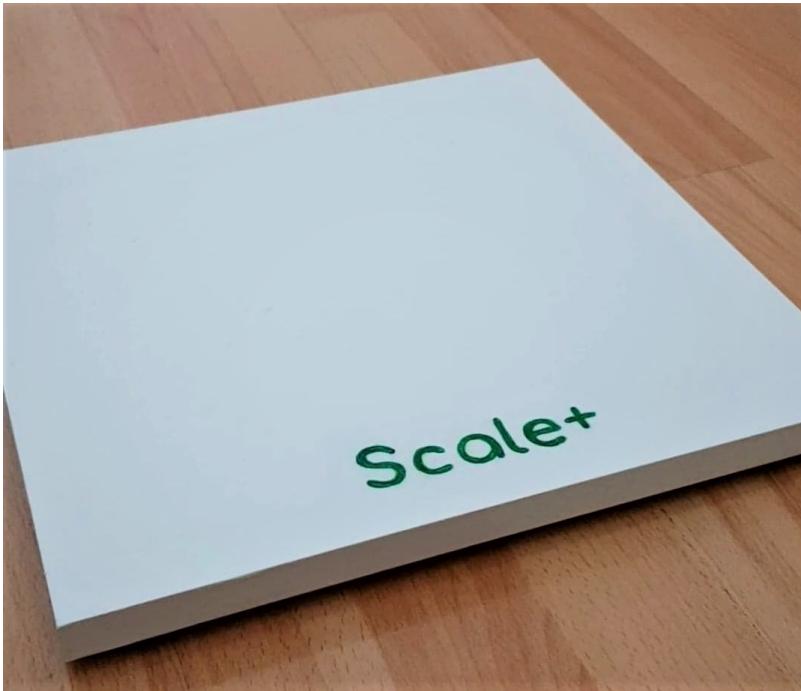


Load cells schematic



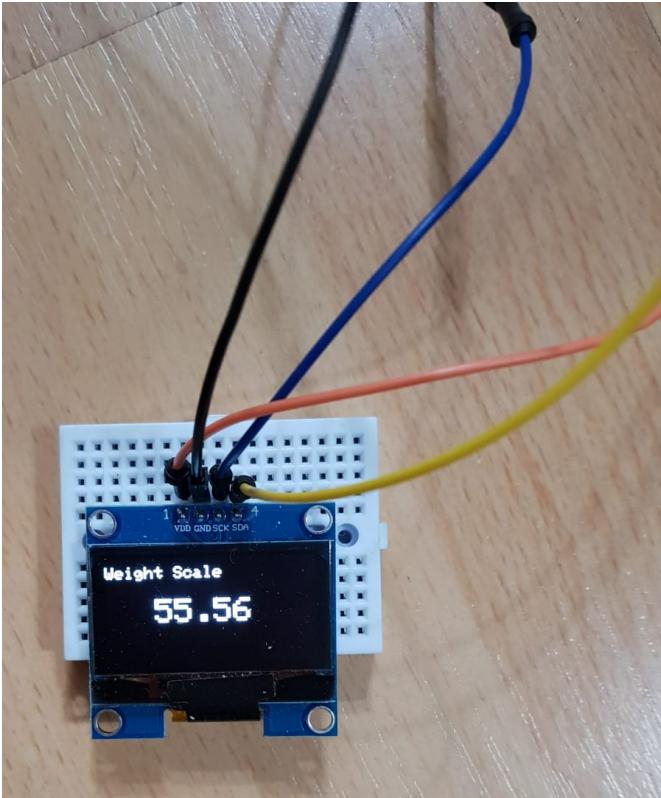
- Step 1 :Building the scale

Result of the building part

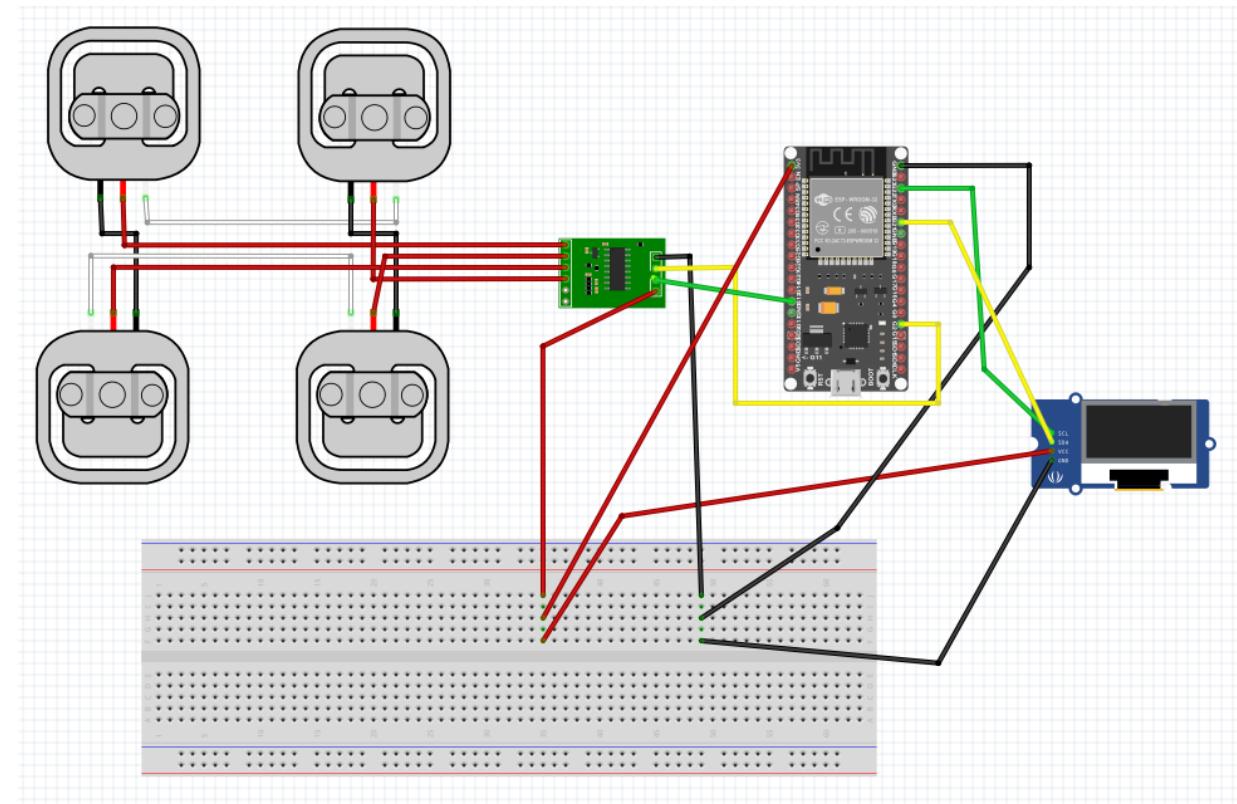


OLED Display

- Step 2 :
OLED display



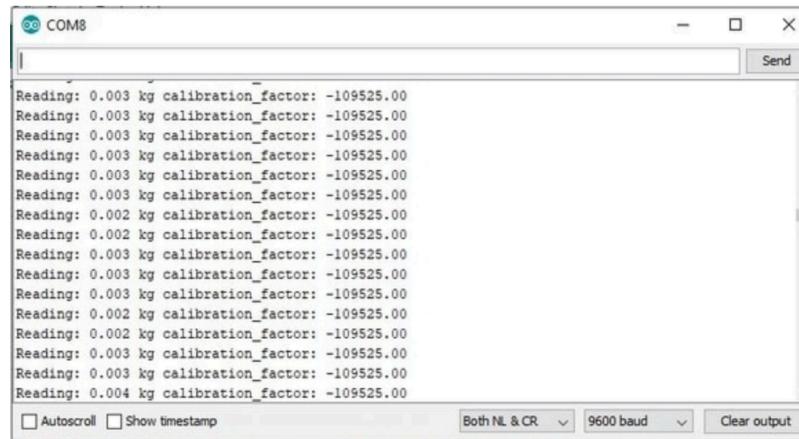
OLED display schematic



Scale calibration

- Step 3 : Scale calibration

1. Compile the code
2. Look at the value on the serial monitor



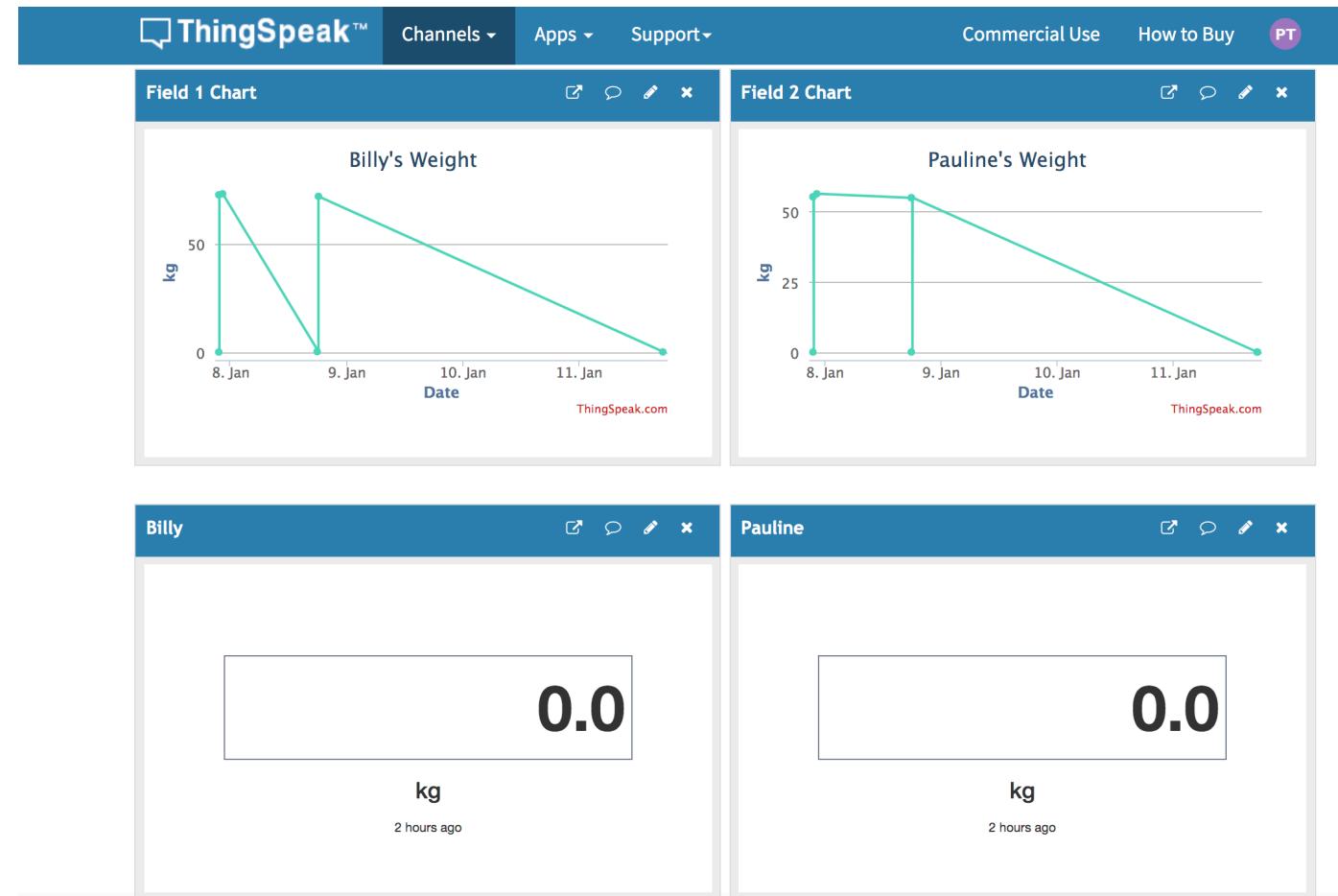
3. Increase and decrease the reading value to obtain 0.000 kg

Connection with Thingspeak

• Step 3 : Connection with Thingspeak

COM5
2

Connected.
Reading: 0.0 kg
Reading: 0.0 kg



Main difficulties encountered

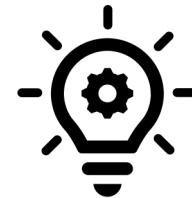
- Main difficulties encountered



Scale not working (it does not read the weight)

Data reading unstable

Adding many users to our scale



Soldered HX711 component

Make hole in all four corners of the scale + special glue

IoT platform : Thingspeak

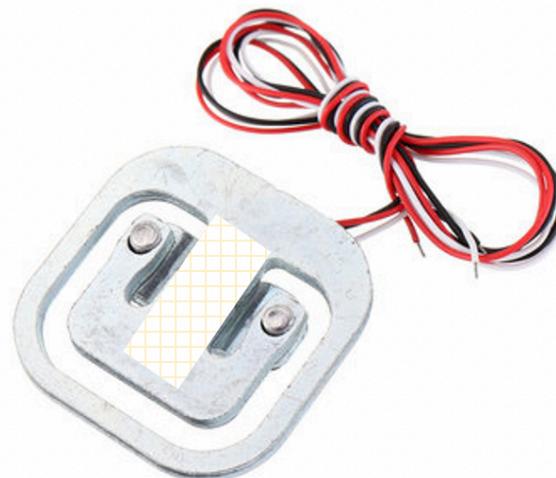
- Main difficulties encountered



Scale does not detect
any pressure

Weight reading is unstable

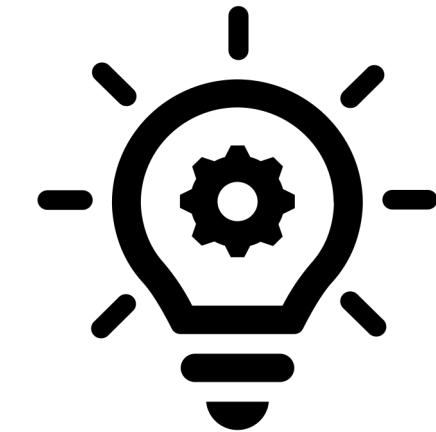
Fixation 1



Fixation 2

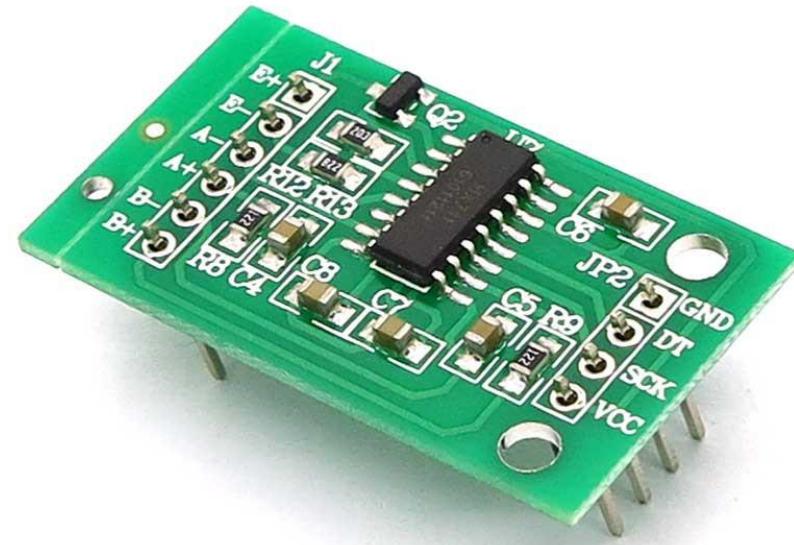


- Solution



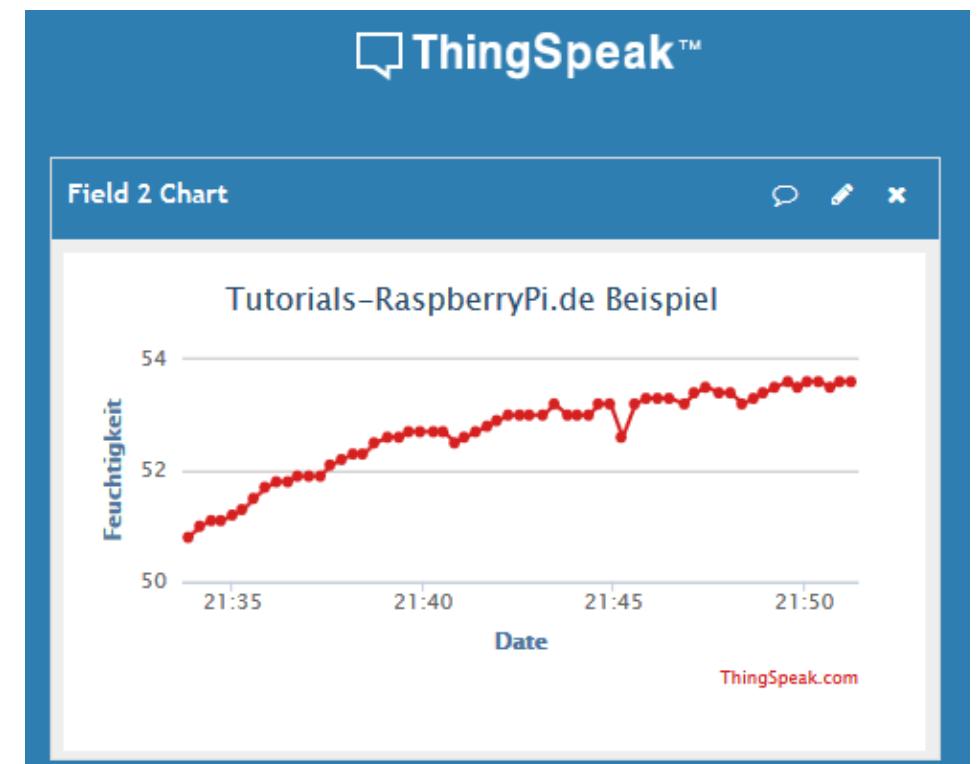
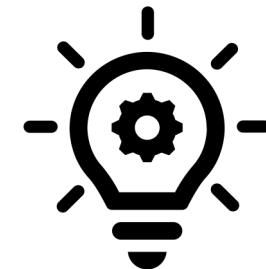
Make hole in all four corners of the scale
Fix with special glue

Soldered HX711 component



- Main difficulties encountered

Adding many users to our scale



Coding part

Coding part

Include library

```
#include "ThingSpeak.h"
#include "HX711.h"
#include <Adafruit_GFX.h>
#include <Adafruit_SH1106.h>
#include <Adafruit_SSD1306.h>
#include <WiFiClient.h>
#include <WiFi.h>

#define DOUT 2
#define CLK 12
```

Internet and ThingSpeak information

```
char ssid[] = "Billy";    // your network SSID (name)
char pass[] = "billy123"; // your network password

unsigned long myChannelNumber = 1279151;
const char * myWriteAPIKey = "PLRAMVJRKKOXIOMP";
```

Variable definition

```
HX711 scale(DOUT, CLK);
float weight = 0;
float calibration_factor = - 22500; // the calibration factor can be different depending on your sensors
```

Coding part

Setup part

```
void setup() {  
    Serial.begin(9600);  
    display.begin(); // initialize oled display  
    display.clearDisplay(); // clear the display
```

```
WiFi.mode(WIFI_STA);  
ThingSpeak.begin(client); // Initialize ThingSpeak  
Serial.println("HX711 calibration sketch");  
Serial.println("Remove all weight from scale");  
Serial.println("After readings begin, place known weight on scale");  
scale.set_scale();  
scale.tare(); //Reset the scale to 0
```

ThingSpeak initialization
Scale initialization

Coding part

```
// Connect or reconnect to WiFi
if(WiFi.status() != WL_CONNECTED)
{
    Serial.print("Attempting to connect to SSID: Billy");
    while(WiFi.status() != WL_CONNECTED)
    {
        WiFi.begin(ssid, pass); // initialize wifi connection
        delay(2000);
        Serial.print(".");
    }
    Serial.println("\nConnected.");
}
```

Connection process

Reading weight

```
void loop() {

    scale.set_scale(calibration_factor);
    Serial.print("Reading: ");
    weight = scale.get_units();
    Serial.print(weight, 1);
    Serial.print(" kg"); //
    Serial.print(" calibration_factor: ");
    Serial.print(calibration_factor);
    Serial.println();
```

Coding part

OLED display

```
display.setCursor(0, 5);
display.setTextColor(WHITE);
display.setTextSize(1);
display.println("Weight Scale");

display.setCursor(30, 25);
display.setTextColor(WHITE);
display.setTextSize(2);
display.println(weight);

display.display();
delay(1500);
display.clearDisplay();
display.display();
delay(1500);
```

ThingSpeak User 1 & 2

```
if(Serial.available())
{
    char temp = Serial.read();
    if(temp == '1')
    {
        int x = ThingSpeak.writeField(myChannelNumber, 1, weight, myWriteAPIKey);
        delay(2000);
    }
    else if (temp == '2')
    {
        int x = ThingSpeak.writeField(myChannelNumber, 2, weight, myWriteAPIKey);
        delay(2000);
    }
}
```

Demonstration of Scale+