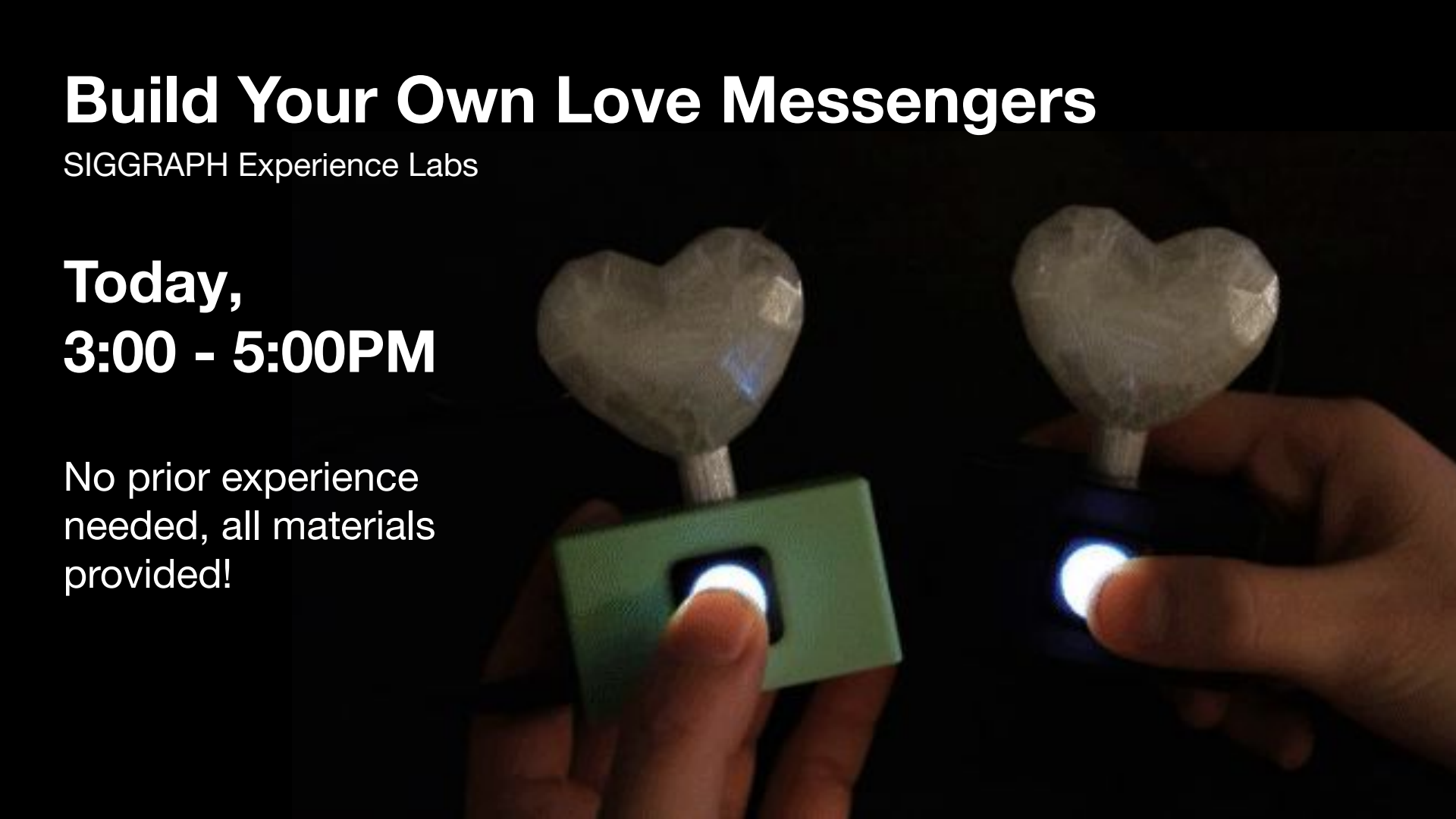
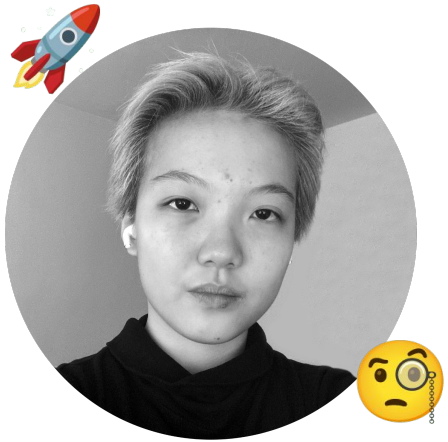
Build Your Own Love Messengers

SIGGRAPH Experience Labs



Today,
3:00 - 5:00PM

No prior experience needed, all materials provided!



Pepi Ng

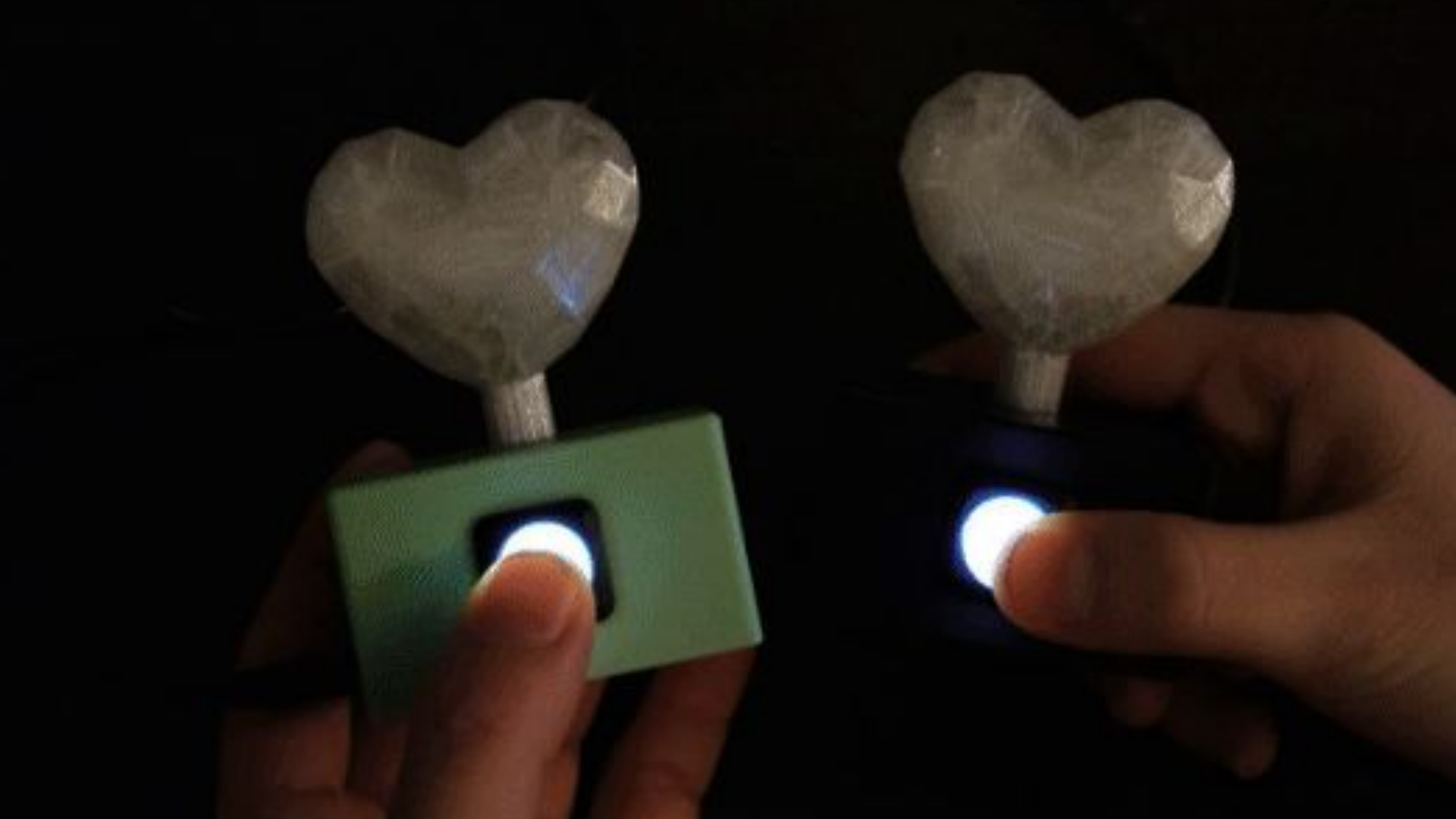
Julia Daser

We are **2 artists** from **NYC**, that make **fun electronics projects** on Youtube!

@WormiCollective

Who here has soldered before?

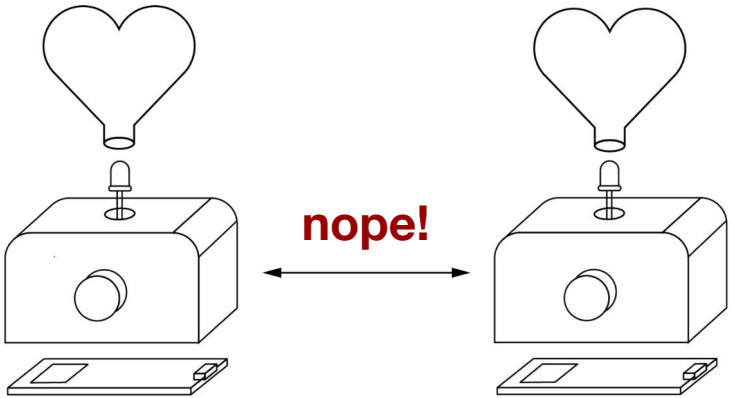
Who has written Arduino code before?



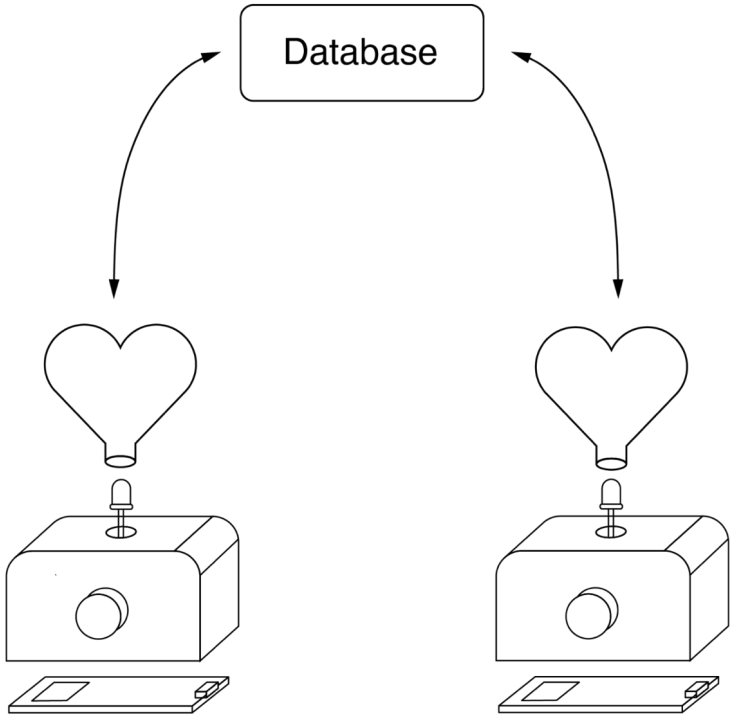
Love Messengers work over **any distance**!

How does that work?

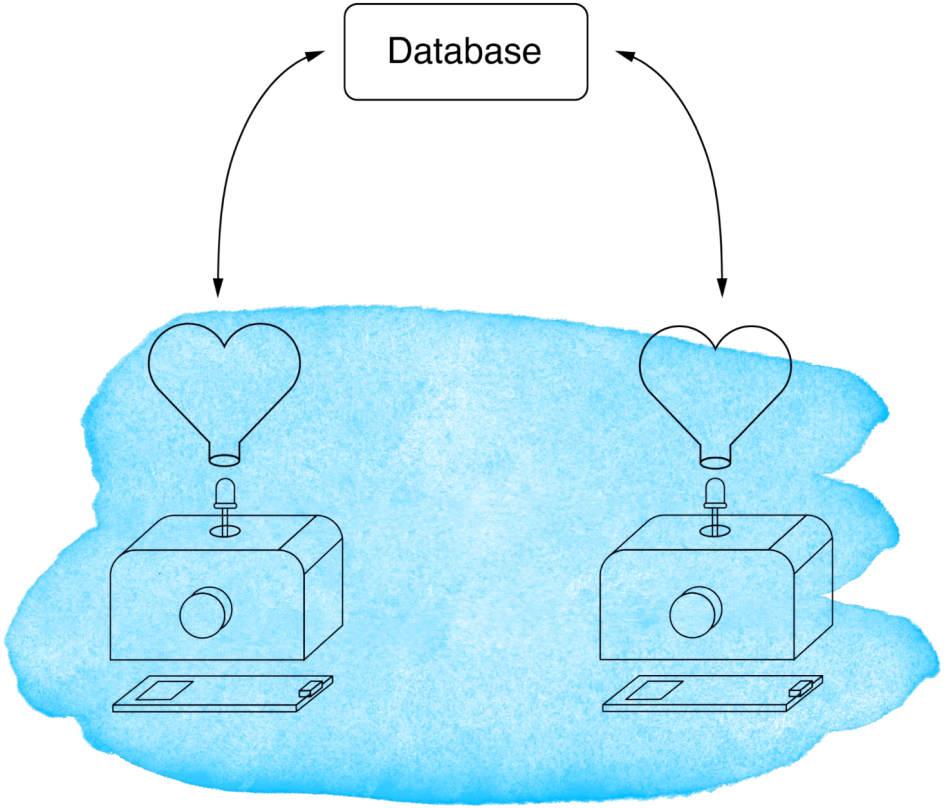
How do the Love Messengers work?



How do the Love Messengers work?



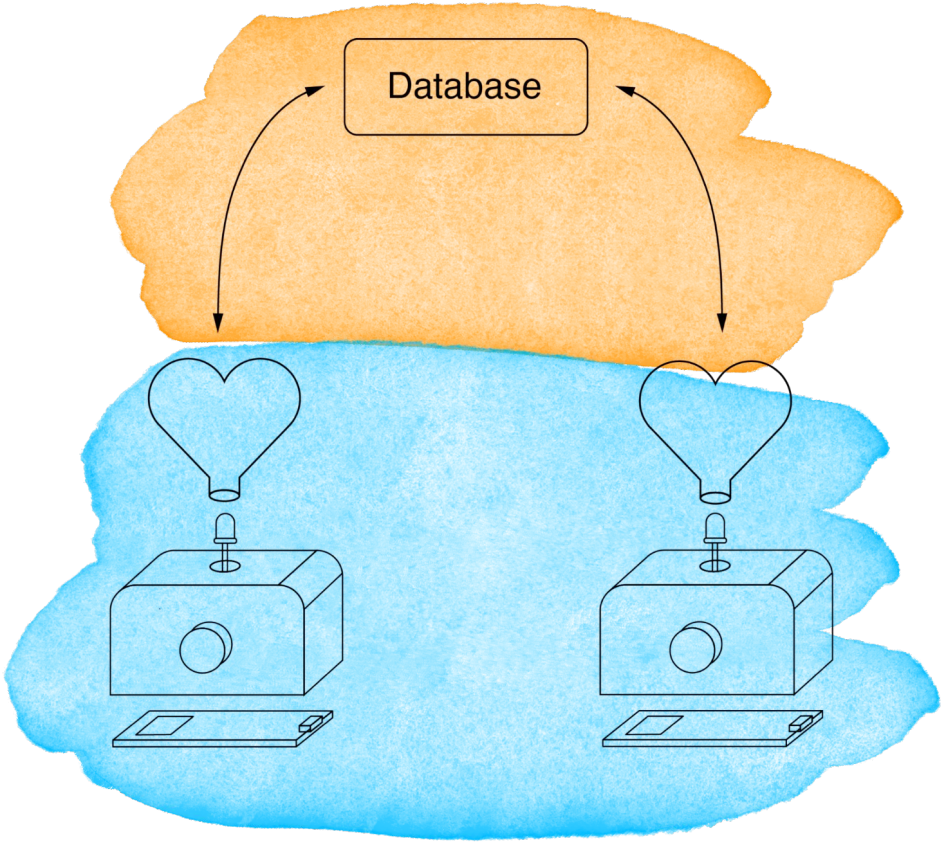
How do the Love Messengers work?



Physical Segment (50 mins)

- Soldering
- Assembling

How do the Love Messengers work?



Digital Segment (50 mins)

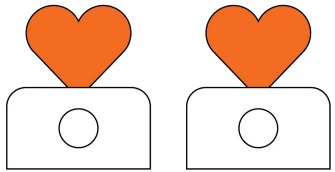
- Database
- Code

Physical Segment (50 mins)

- Soldering
- Assembling

Before we begin,

We need to download the libraries needed!

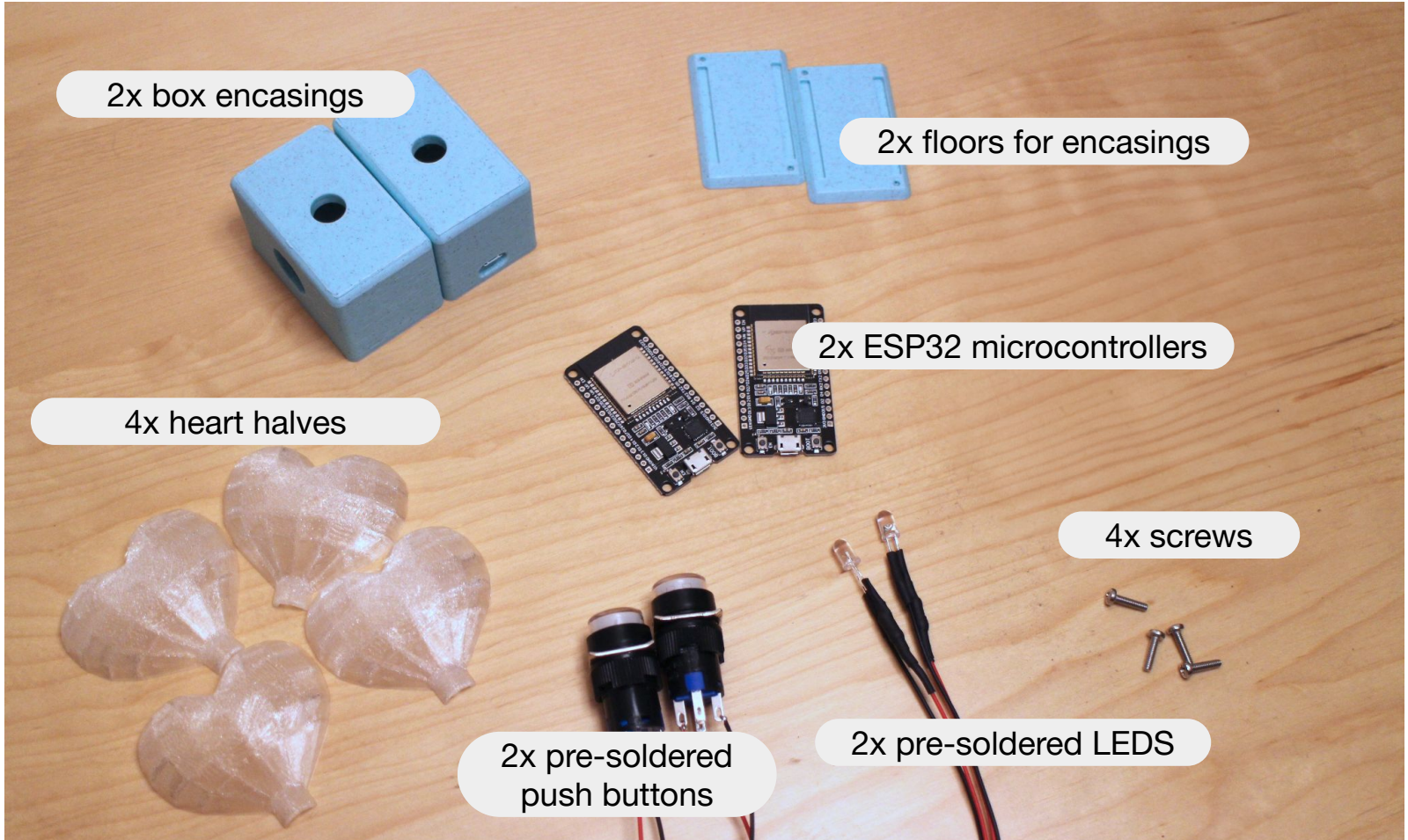


Come and collect your love messenger kits at the front

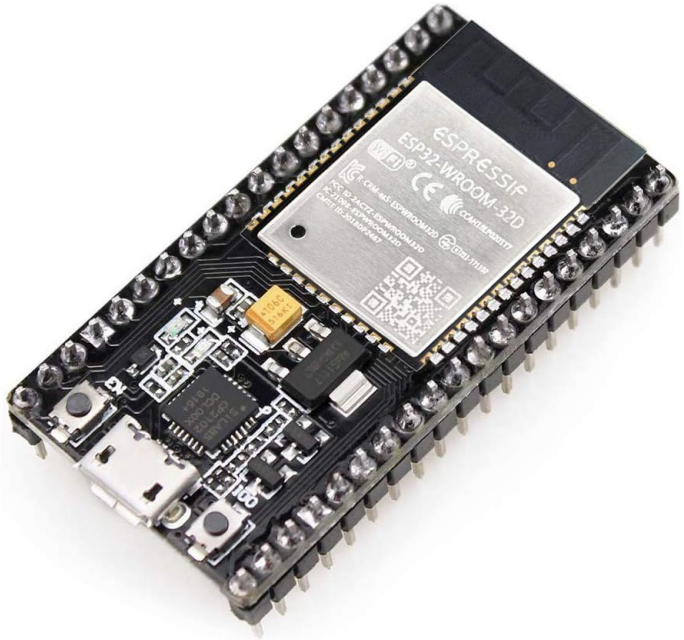
Settle at the soldering stations

Physical Segment

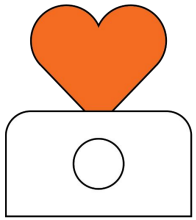
Materials provided for a pair of Love Messengers



Why use ESP32 microcontrollers?



- ✓ Wifi capabilities
- ✓ Higher clock speed
- ✓ More affordable

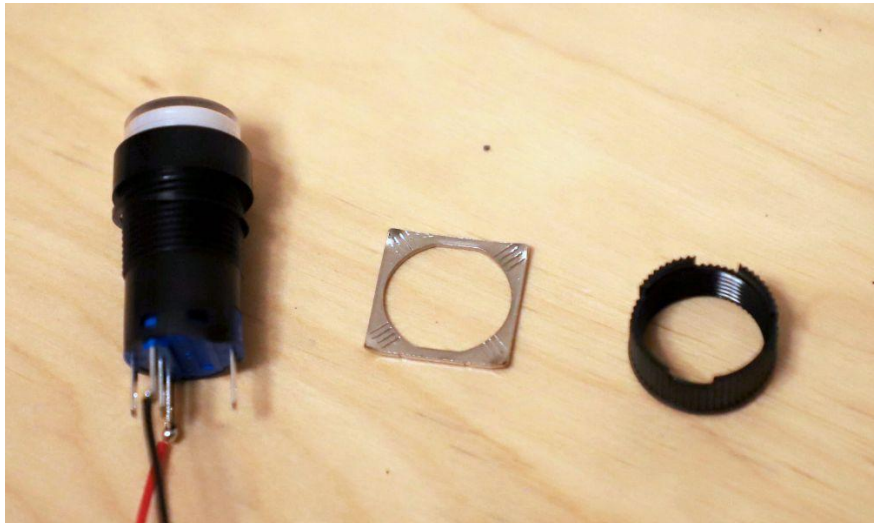


Let’s start with just one love messenger!

Part 1: Pre-assembly

STEP 1

- Unscrew the button cap and metal piece

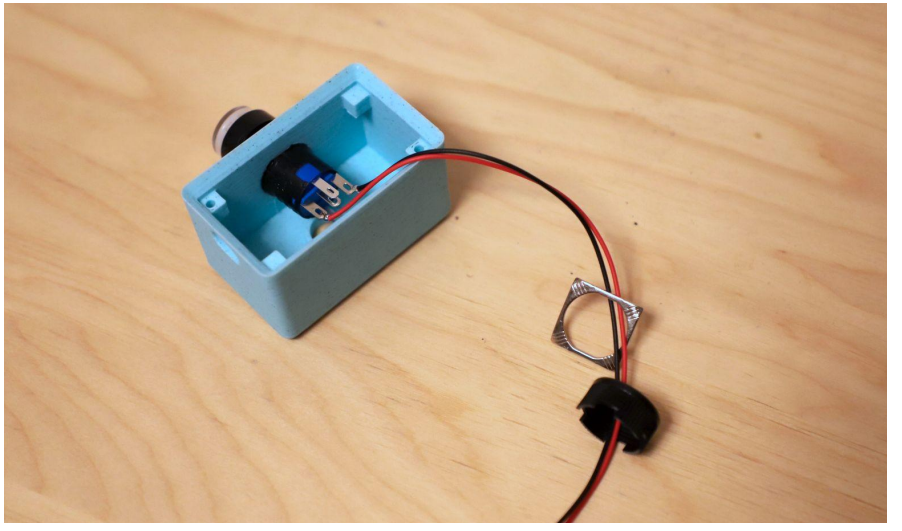


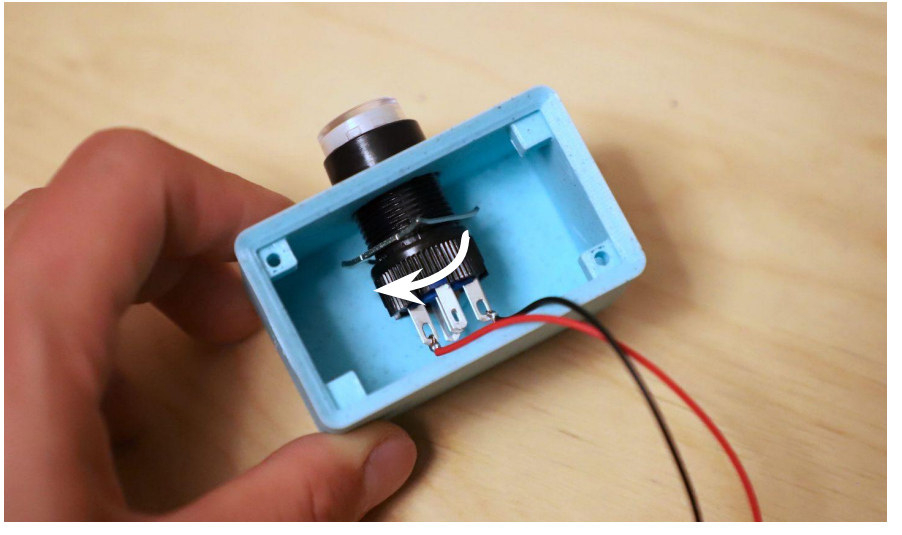
Part 1: Pre-assembly

STEP 2

Insert button

Screw button into the encasing

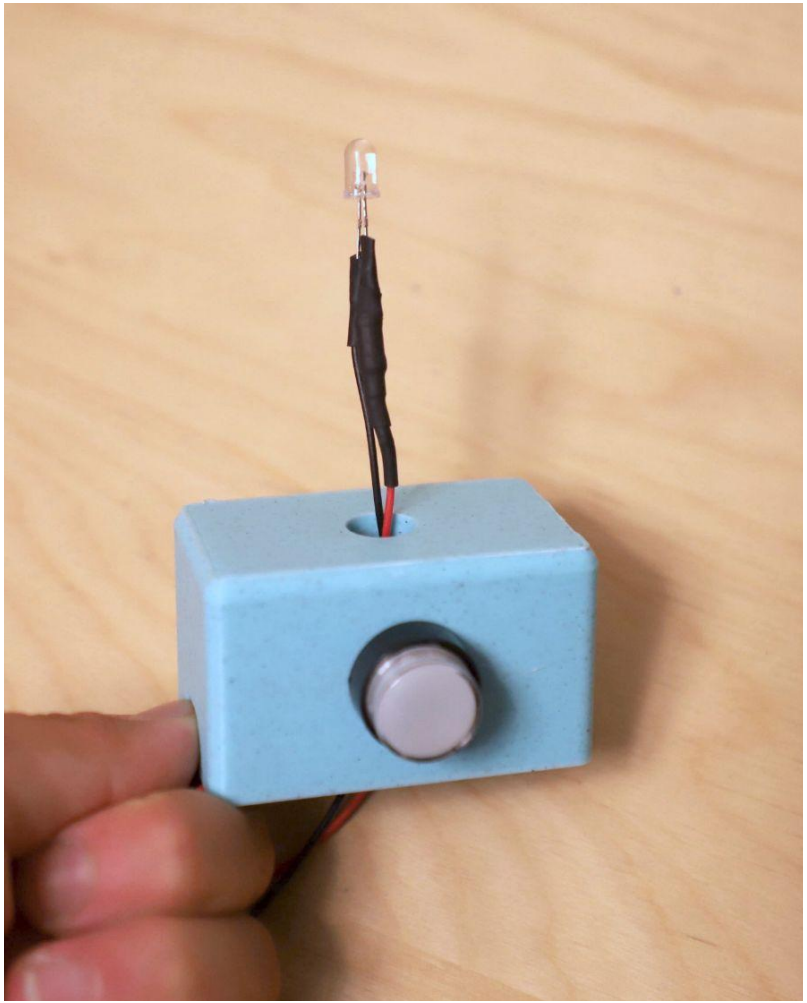




Part 1: Pre-assembly

STEP 3

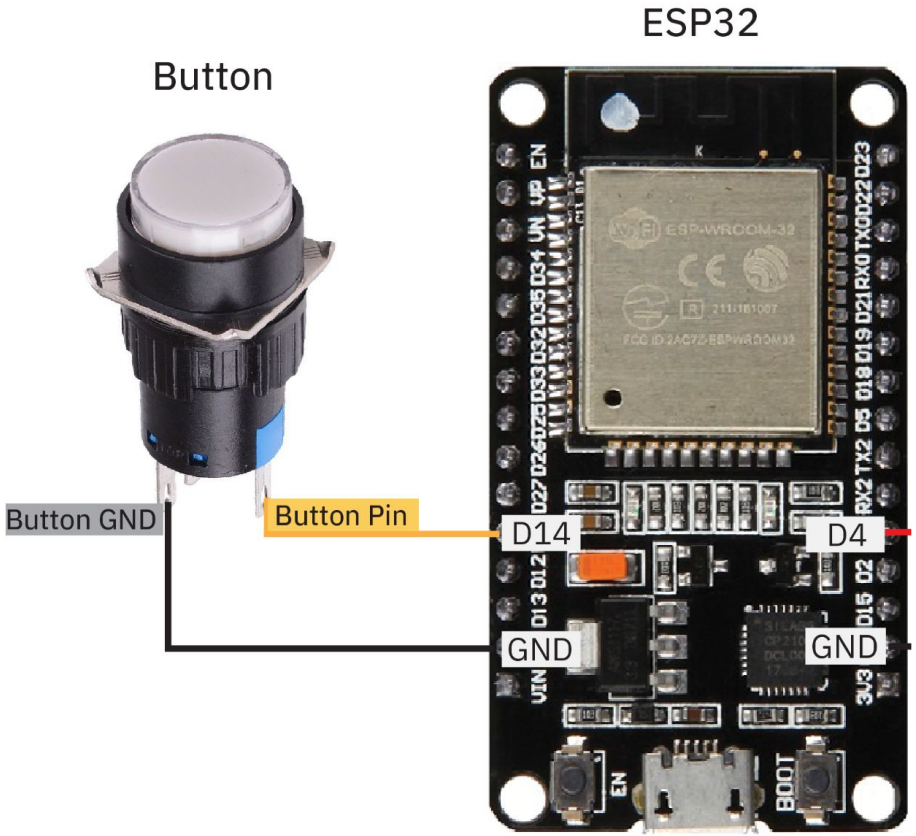
Stick the pre-soldered LED through the hole at the top of the box encasing.

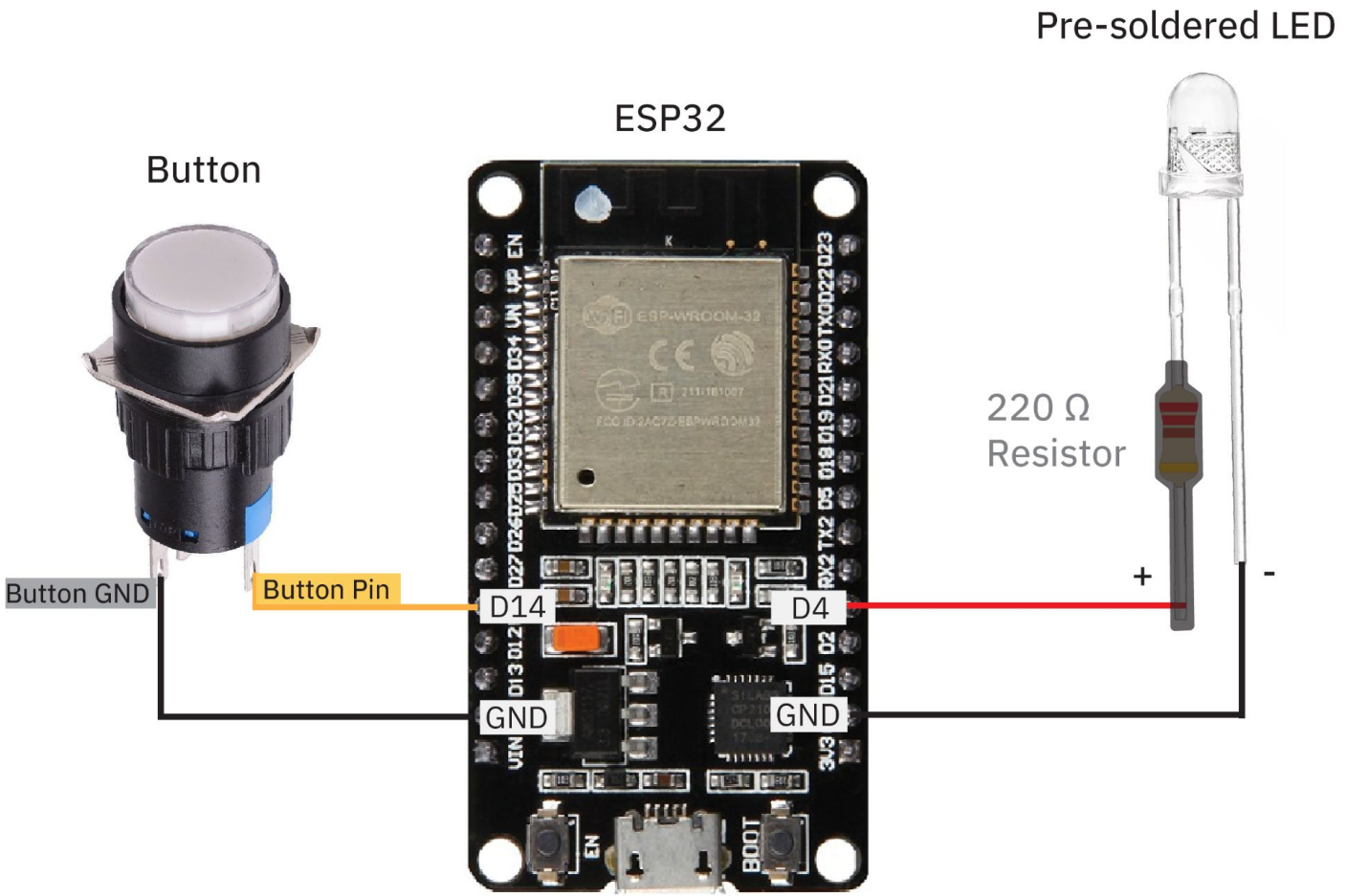


Part 2: Soldering

Live demo of soldering 🧰

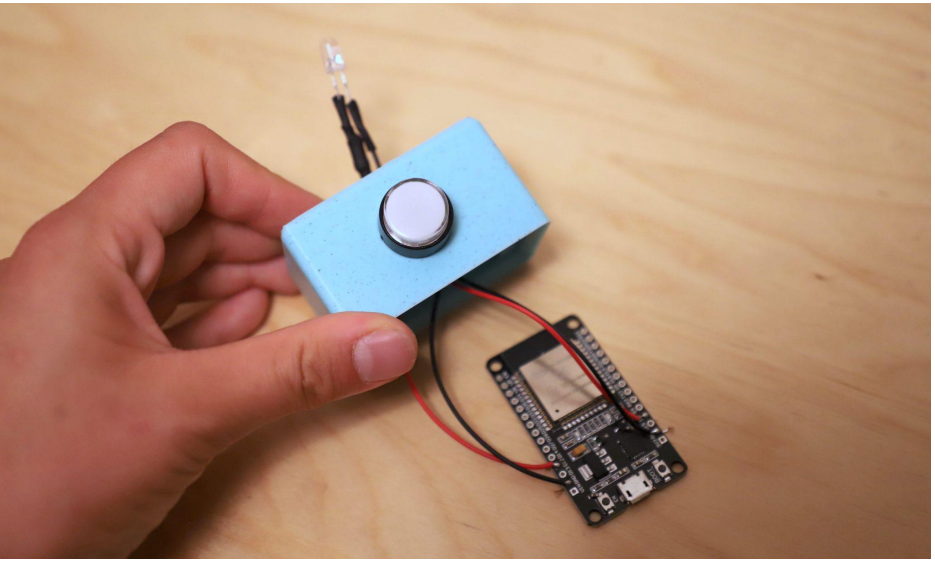
Split into groups:
Each group is assigned to one soldering station

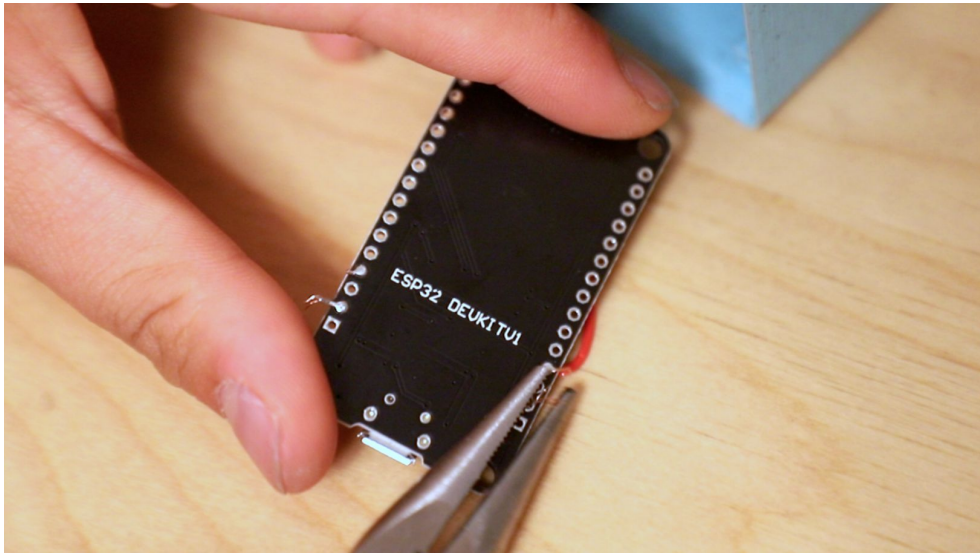

Button
ESP32
Button GND
Button Pin
D14
D4
GND
GND


Pre-soldered LED
ESP32
Button
220 Ω
Resistor
+
-
Button GND
Button Pin
D14
D4
GND
GND
EN
BOOT

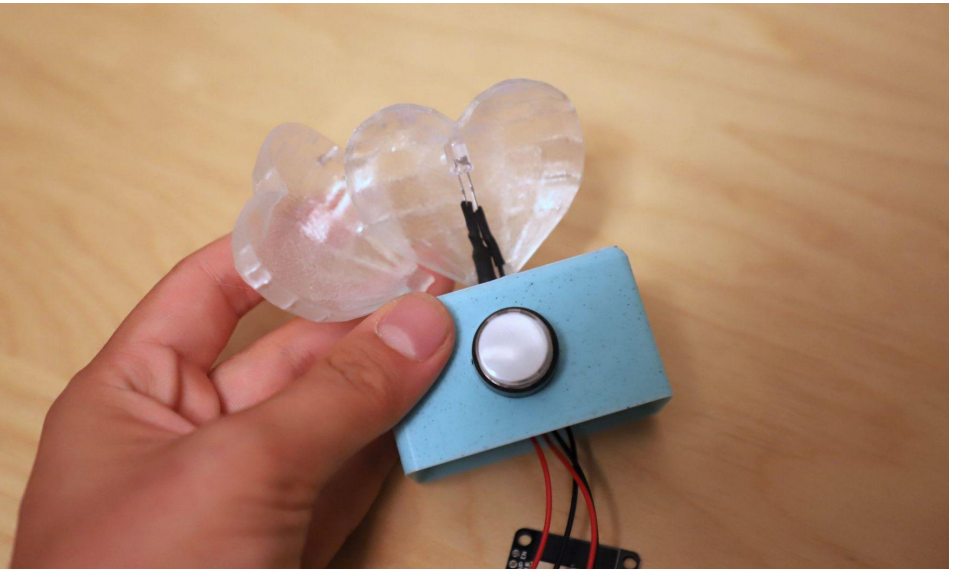
Part 2: Soldering

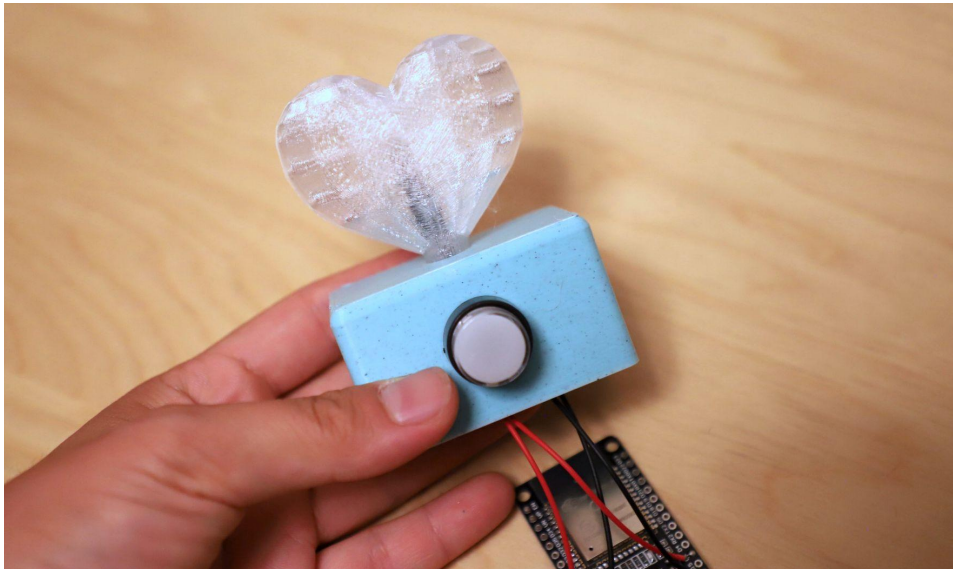
Use pliers to cut off any excess wires



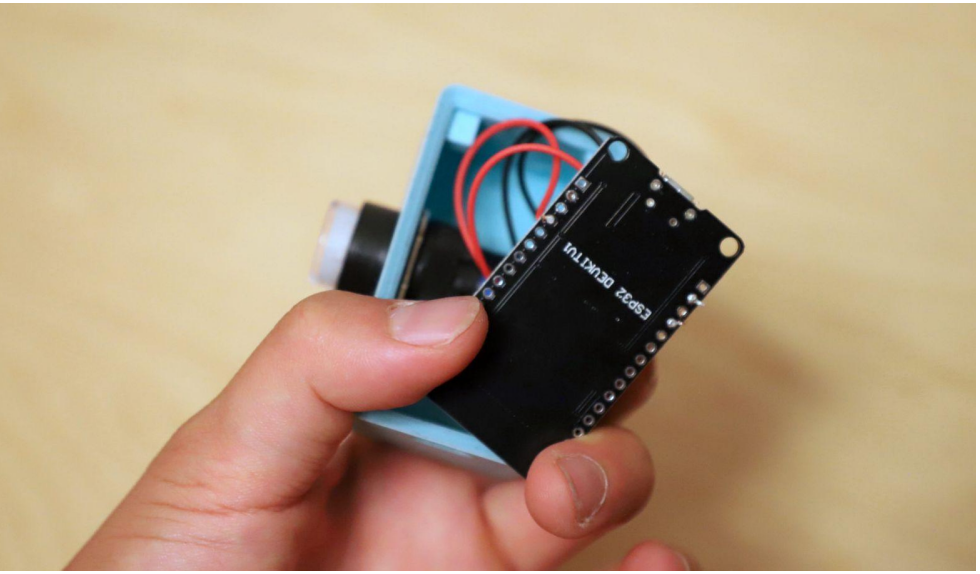


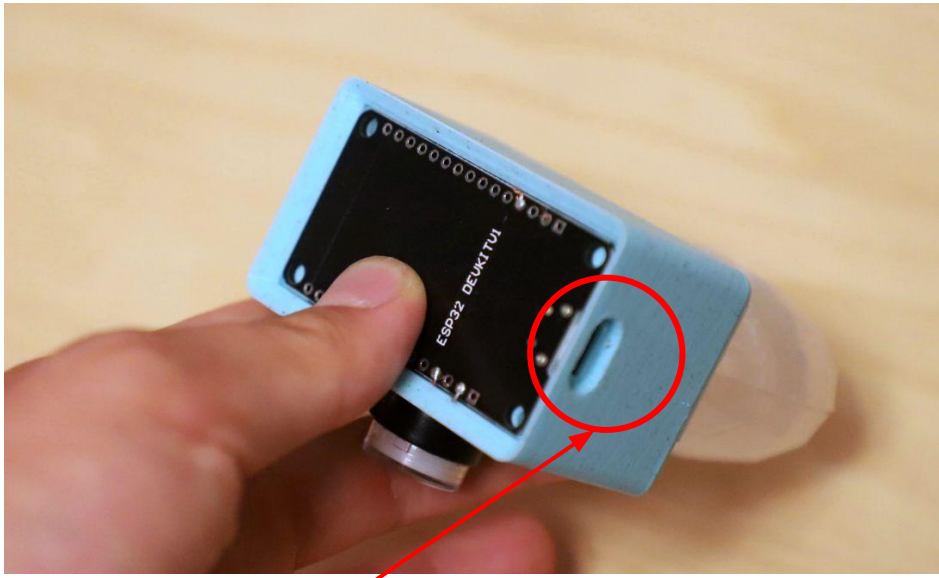
Part 3: Putting everything together! 🤩





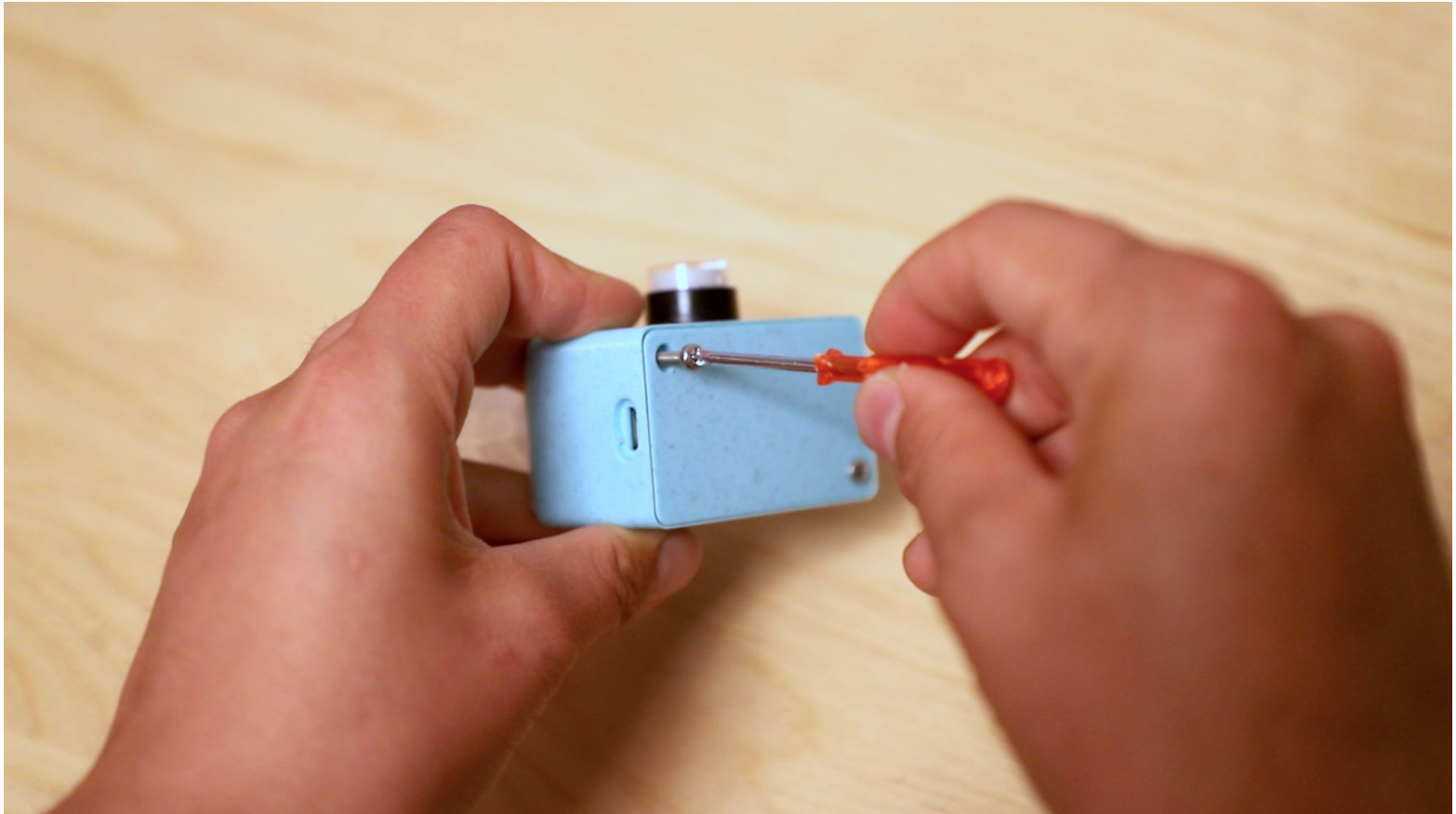
Part 3: Putting everything together! 🤩

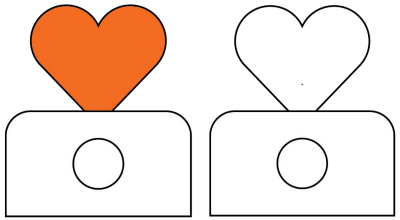




MicroUSB output of the microcontroller faces the hole on the encasing.

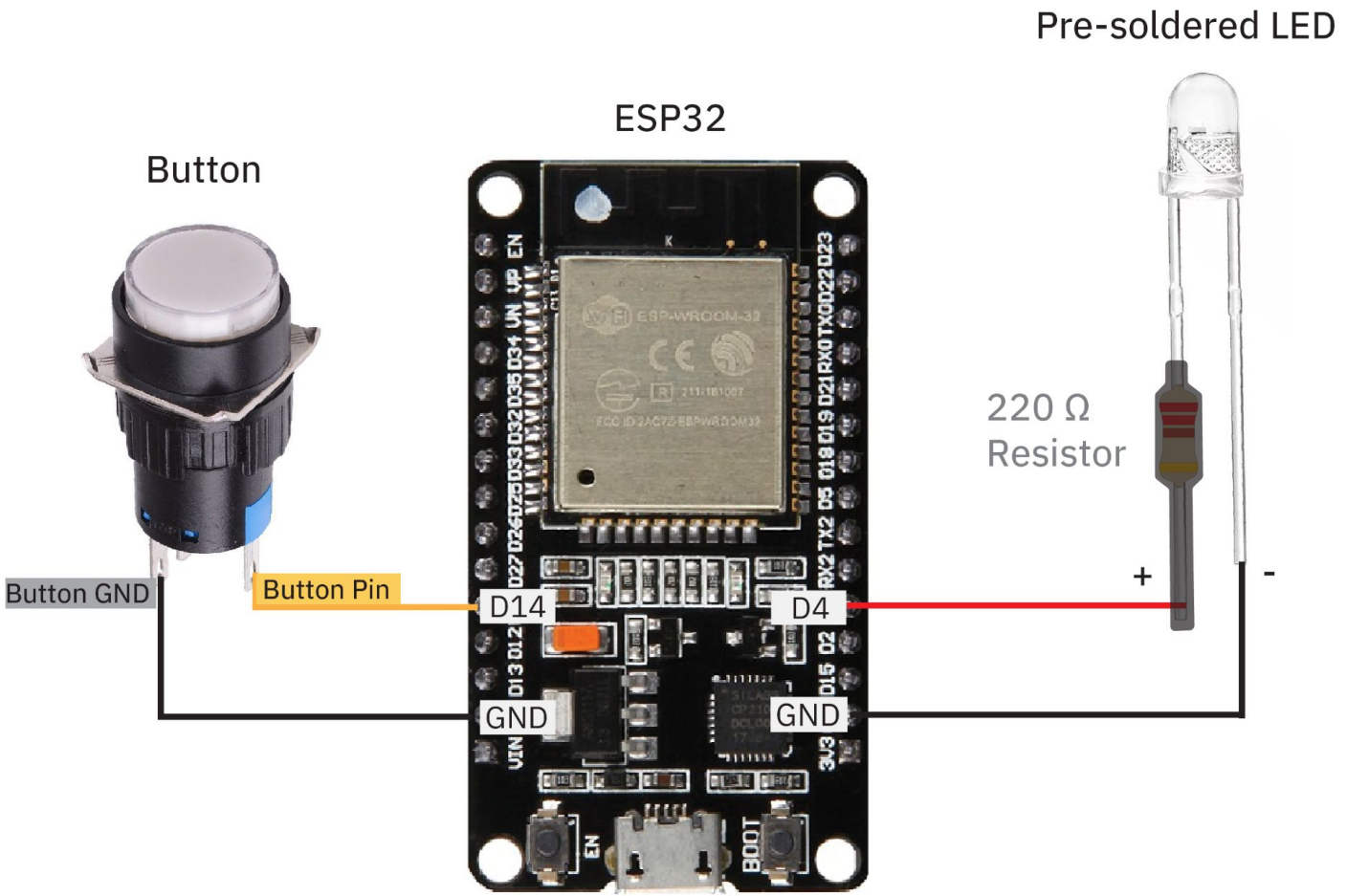
Part 3: Putting everything together! 🤩





You’re all done with one love messenger!

Let’s now make the second one!

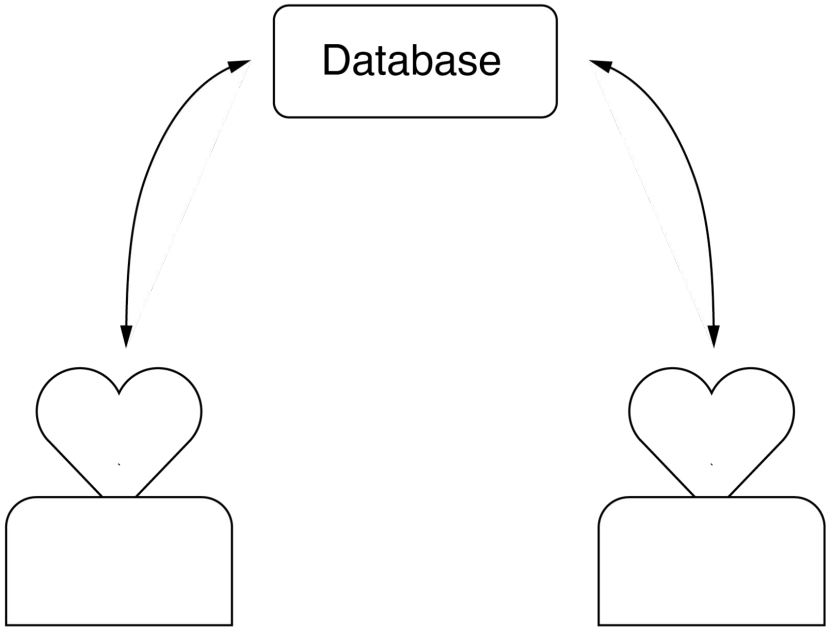

Pre-soldered LED
ESP32
Button
220 Ω
Resistor
+
-
Button GND
Button Pin
D14
D4
GND
GND
EN
BOOT

Digital Segment

1. Deep-dive: How do the Love Messengers work?
2. Setting up our Real Time Database
3. Writing Arduino Code for the Microcontroller

1. Deep-dive: How do the Love Messengers work?
2. Setting up our Real Time Database
3. Writing Arduino Code for the Microcontroller

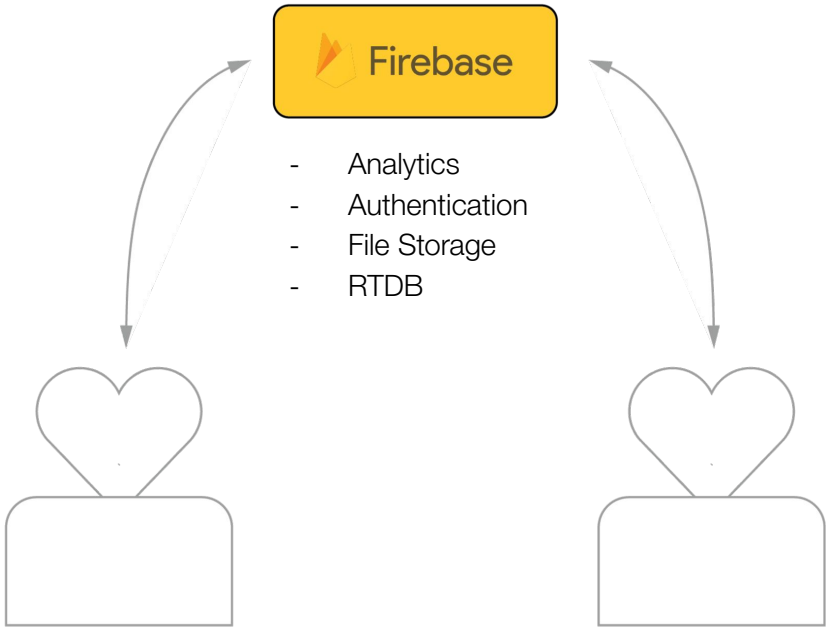
How does it work?



Database

Love Messengers need to know each other’s button states!

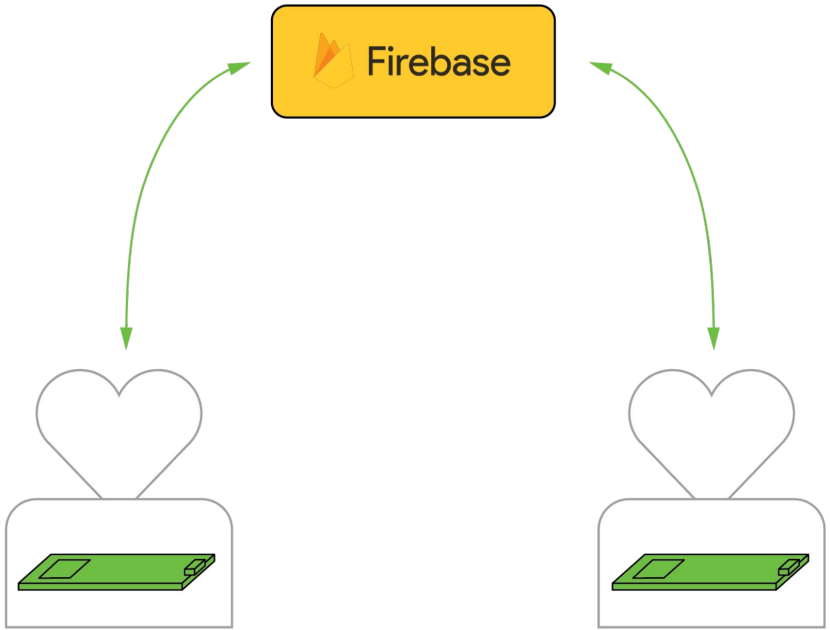
How does it work?



Database

1. Create Firebase Login
2. Create RTDB (= Real Time Database)

How does it work?



Database

1. Create Firebase Login
2. Create RTDB

Code

3. Understand Code
4. Upload Code

1. Deep-dive: How do the Love Messengers work?
2. Setting up our Real Time Database
3. Writing Arduino Code for the Microcontroller

Let’s set up Firebase

Go to **console.firebase.google.com**

1. How do the Love Messengers work?
2. Setting up our Real Time Database
3. Writing Arduino Code for the Microcontroller

Pepi will also now distribute the wires

Pseudo Code

Setup-code:

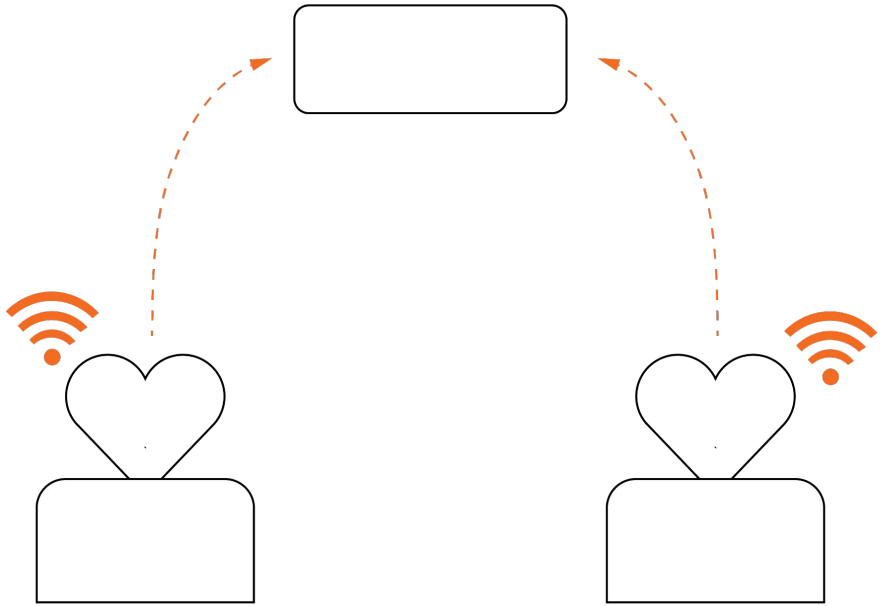
Main Code (runs in a loop):

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):



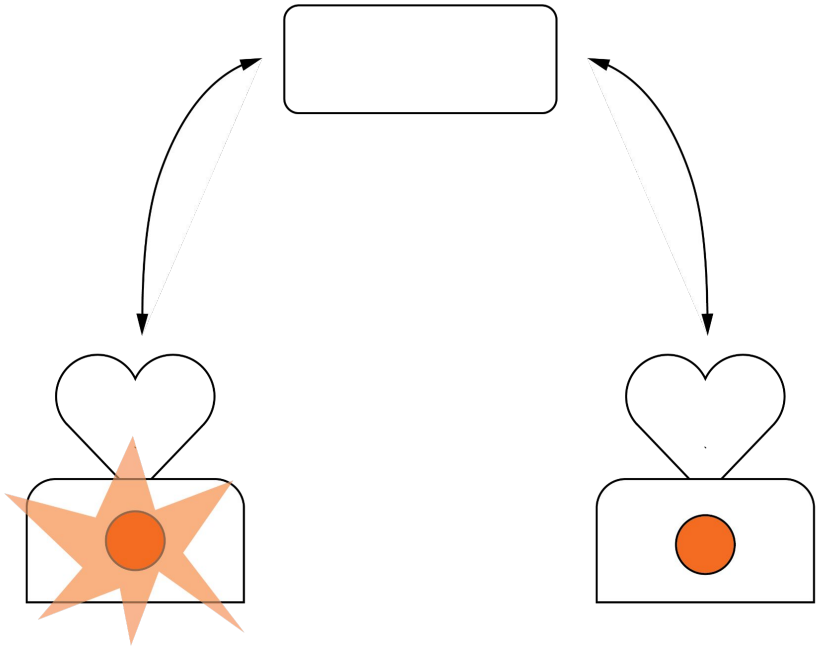
Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**



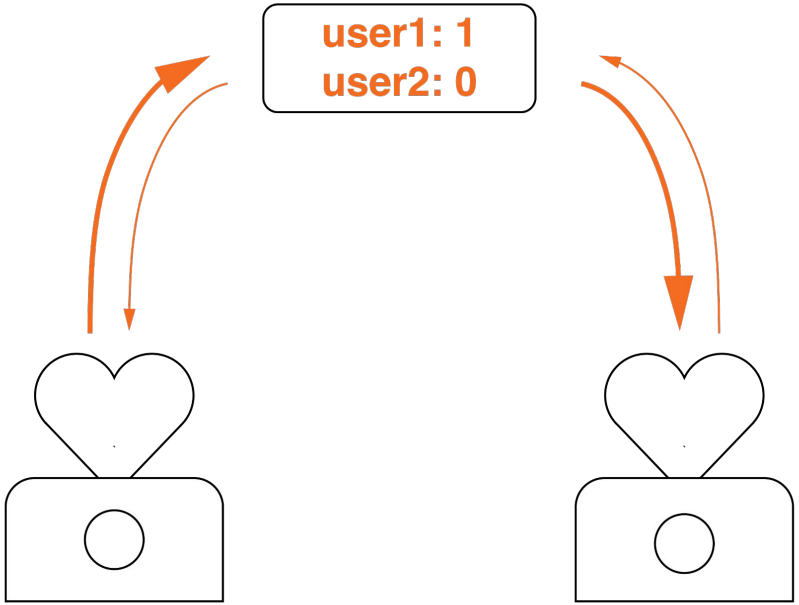
Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase



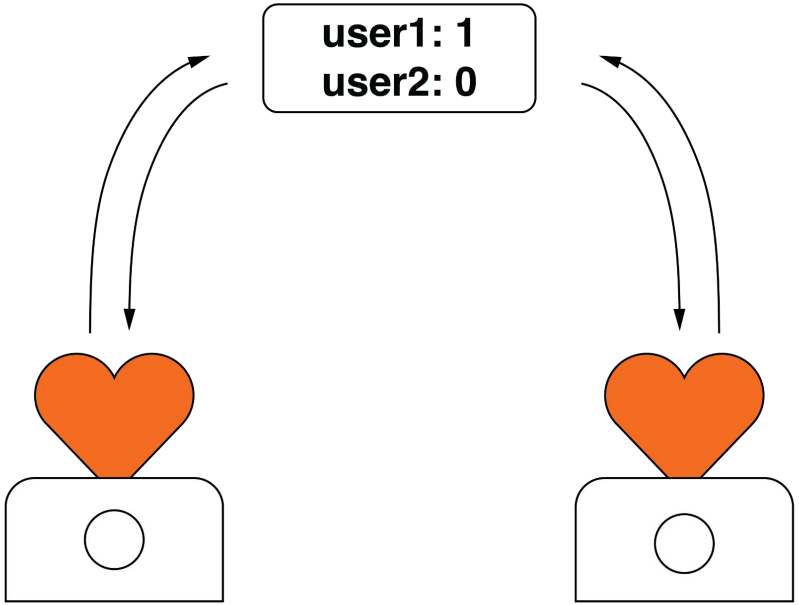
Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)



Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}
```

```
void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Pseudo Code

Setup-code:

1. Connecting to **Wifi**
2. Connecting to **Firebase**

Main Code (runs in a loop):

1. Reading the **Button State**
2. **Uploading** Data to Firebase
3. **Downloading** Data from Firebase
4. Manage **LED** (turn on/off)

Arduino Code (C++)

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK && (millis() -
lastFirebaseUpdate > 2000)) {
    lastFirebaseUpdate = millis();

    buttonState = digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    manageLED(buttonState, firebaseData);

  }
   delay(5);
}
```

Arduino Code

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK &&
(millis() - lastFirebaseUpdate > 100))
{
    lastFirebaseUpdate = millis();

    buttonState =
digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    ManageLED(buttonState,
firebaseData);

  }
}
```

```
void uploadData(int buttonstate) {
  if (Firebase.RTDB.setInt(&fbdo, "/user_1",
buttonstate)) {
    Serial.printf("Data UPLOAD successful,  ");
  } else {
    Serial.println("Data UPLOAD failed,  ");
  }
}
```

Arduino Code

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK &&
(millis() - lastFirebaseUpdate > 100))
{
    lastFirebaseUpdate = millis();

    buttonState =
digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    ManageLED(buttonState,
firebaseData);

  }
}
```

```
void downloadData() {
  if (Firebase.RTDB.getInt(&fbdo, "/user_2")) {
    firebaseData = fbdo.intData();
    Serial.println("Data DOWNLOAD successful");
  } else {
    Serial.println("Data DOWNLOAD failed");
  }
}
```

Arduino Code

```
void setup() {
  Serial.begin(115200);

  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT_PULLUP);

  connectWiFi();
  connectFirebase();
}

void loop() {
  if (Firebase.ready() && signupOK &&
(millis() - lastFirebaseUpdate > 100))
{
    lastFirebaseUpdate = millis();

    buttonState =
digitalRead(buttonPin);
    uploadData(buttonState);
    downloadData();
    ManageLED(buttonState,
firebaseData);

  }
}
```

```
void manageLED(int buttonState, int
firebaseData) {
  if (buttonState == LOW or firebaseData ==
LOW) {
    digitalWrite(ledPin, HIGH);
    delay(2000);
    digitalWrite(ledPin, LOW);
  } else {
    digitalWrite(ledPin, LOW);
  }
}
```

Some last bits

```
#include "addons/TokenHelper.h"
#include "addons/RTDBHelper.h"

#define WIFI_SSID "Insert SSID"
#define WIFI_PASSWORD "Insert Wifi Password"

#define API_KEY "Insert API Key"
#define DATABASE_URL "Insert Database URL"

const int ledPin = 2;
const int buttonPin = 12;

bool firebaseData = false;
int buttonState = 1;

FirebaseData fbdo;
FirebaseAuth auth;
FirebaseConfig config;
unsigned long lastFirebaseUpdate = 0;
int count = 0;
bool signupOK = false;
```

Wi-Fi credentials:

Name and Password of current WiFi

Some last bits

```
#include "addons/TokenHelper.h"
#include "addons/RTDBHelper.h"

#define WIFI_SSID "Insert SSID"
#define WIFI_PASSWORD "Insert Wifi Password"

#define API_KEY " Insert API Key"
#define DATABASE_URL " Insert Database URL"

const int ledPin = 2;
const int buttonPin = 12;

bool firebaseData = false;
int buttonState = 1;

FirebaseData fbdo;
FirebaseAuth auth;
FirebaseConfig config;
unsigned long lastFirebaseUpdate = 0;
int count = 0;
bool signupOK = false;
```

Firebase Credentials:

They need to be adjusted to **your own unique API Key** and **Database URL**

Let’s Upload the Code!

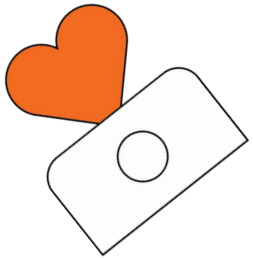
Access Code from Github:

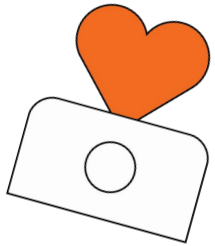
https://github.com/juliadaser/Siggraph-Workshop

Time for…

Troubleshooting

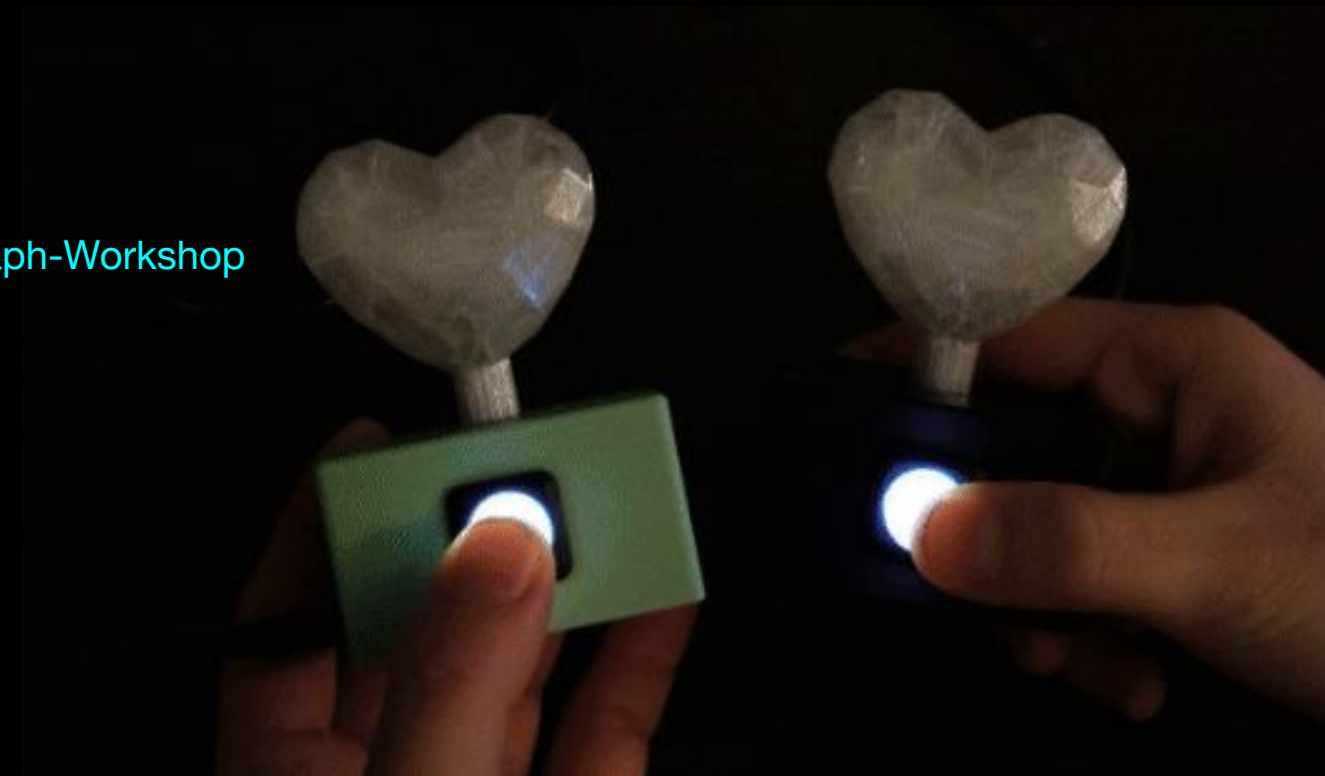
Help us fill out this feedback form!





Open to Questions!

SIGGRAPH Experience Labs



@wormicollective

Access the code:
github.com/juliadaser/Siggraph-Workshop

Contact us:
yiqing.ng@gmail.com