Remote Control with the Huzzah + Adafruit.io

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Overview

This guide will show you how to send button press data to Adafruit IO from the HUZZAH ESP8266, then use that data to change the color of an LED connected to a second HUZZAH ESP8266.

If you haven't worked your way through the Adafruit IO feed and dashboard basics guides, you should do that before continuing with this guide so you have a basic understanding of Adafruit IO.

- Adafruit IO Basics: Feeds (https://adafruit.ioA)
- Adafruit IO Basics: Dashboards (https://adafruit.it/f5m)

You should also go through the setup guide associated with the HUZZAH ESP8266 for use with the Arduino IDE.

- Adafruit HUZZAH ESP8266 Setup Guide (https://adafruit.it/inB)

If you have completed all of the prerequisites listed above, you are now ready to move on to the Adafruit IO setup steps.

Let's get started!
Adafruit IO Setup

The first thing you will need to do is to login to your Adafruit IO account (https://adafruit.io/eZ8) and get your Adafruit IO Key if you haven't already. Click the AIO KEY button on the right hand side of the window to retrieve your key.

A window will pop up with your Adafruit IO. Keep a copy of this in a safe place. We'll need it later.

Creating the Buttons Feed

Next, you will need to create a feed called "Remote Buttons". If you need help getting started with creating feeds on Adafruit IO, check out the Adafruit IO Feed Basics guide (https://adafruit.io/ioA).
Adding the Gauge Block

Next, add a new Gauge block to a new or existing dashboard. Name the block whatever you would like, and give it a max value of 3. Make sure you have selected the Remote Buttons feed as the data source for the gauge.

If you need help getting started with Dashboards on Adafruit IO, check out the Adafruit IO Dashboard Basics guide (https://adafruit.io/f5m).

When you are finished editing the form, click Create Block to add the new block to the dashboard.

Next, we will look at how to connect an Arduino via WiFi to Adafruit IO.
Arduino Setup

Arduino Dependencies

The code in this guide are based off of the ESP8266 examples created by Tony DiCola and Todd Treece. You will need the following Arduino library installed to compile the sketch:

- Adafruit IO Arduino Library (https://adafruit.it/fpd)

The easiest way to install it is by using the Arduino IDE v.1.6.4+ Library Manager (https://adafruit.it/fCN). You will also need to have the ESP8266 board manager package installed. For more info about installing the ESP8266 package, visit the HUZZAH ESP8266 setup guide (https://adafruit.it/irC).


Adafruit IO Setup

To find your **IO_USERNAME**, navigate to your profile on Adafruit IO (https://adafruit.it/BmD) and click View AIO Key. Copy the Username field (ctrl+c or command+c)

![YOUR AIO KEY](image)

Your Adafruit IO key should be kept in a safe place and treated with the same care as your Adafruit username and password. People who have access to your AIO key can view all of your data, create new feeds for your account, and manipulate your active feeds.

If you need to regenerate a new AIO key, all of your existing programs and scripts will need to be manually changed to the new key.

Username: brubell

Then, in the **config.h** tab, replace the "**your_username**" text with your the username from your profile:
To find your **IO Key**, navigate to your profile, click View AIO Key, and copy the ACTI VE KEY field to your clipboard (ctrl+c or command+c).

In **config.h**, replace the IO_KEY with the IO Key copied to your clipboard.

**Wireless Setup**

In the **config.h** tab, replace "your_ssid" with your WiFi's SSID and "your_pass" with your WiFi's password:
First we will create a simple input controller that will let Adafruit IO know what button was pressed. For this project we will be adding buttons to represent each of the possible states to be passed to our output device.

- 0 will represent "OFF"
- 1 for Red
- 2 for Green
- 3 for Blue

There are a few things we will need to get started:

- 1 x HUZZAH ESP8266 (https://adafru.it/iDh)
- 3 x colored tactile push buttons (Red, Green, and Blue) (https://adafru.it/iDi)
- Six 470 Ohms resistors
- Jumper wires (https://adafru.it/iDj)
- Breadboard (https://adafru.it/erc)

Now let's get started with the wiring.
each button, but also setting the resistors up in series. When nothing is pressed, all of the resistors are used and we get a low number value when the analog pin is read. When we press a button, it shorts out the resistor string and we get another value when the analog pin is read. The higher the button is on the chain, the lower the analog value is. Ultimately, this means that we can add as many buttons as we want and only use up one PIN to do it.

We will now connect all of the components to match what is shown below. There should be just enough room to fit 3 of the colored push buttons and one of the 6MM buttons side by side.

1. Connect one of the GND pins to the - side of the breadboard.
2. The 3V pin should connect with the + side of the breadboard.
3. Connect one side of each button to its neighboring button.
4. The last button will connect to the A pin on the HUZZAH.
5. Now add one resistor connecting GND to the A pin.
6. Add the remaining resistors to the other side of each button in series with the last two connecting with the 3V pin.

This can be powered through the FTDI cable, but you may want to add a battery or other power supply by connecting it to the GND and VBat pins.

Now it's time to code.
Buttons Code

This guide has been updated to use the Adafruit IO Arduino Library

The previous version of this guide used the Adafruit MQTT Arduino Library, but we suggest using the Adafruit IO Arduino Library. If you’d like to use this library, we suggest following the [MQTT, Adafruit IO & You! Learn Guide](https://adafruit.io/Bor)

The Arduino sketch for this project is fairly straightforward. Copy the following code into a new Arduino sketch. You'll need to modify your `config.h` file to reflect your Wireless Network and Adafruit IO configuration.

If you do not know how to do this, follow the steps on the the [Arduino Setup](https://adafruit.io/Bos) page.

```c
// Remote Control with the Huzzah + Adafruit IO
// // Button Board
// // Adafruit invests time and resources providing this open source code.
// // Please support Adafruit and open source hardware by purchasing
// // products from Adafruit!
// // Written by Richard Albritton, based on original code by Tony DiCola for Adafruit Industries
// // Licensed under the MIT license.
// // All text above must be included in any redistribution.

/************************** Configuration ***********************************/

#include "config.h"

/************************ Example Starts Here *******************************/
#include <ESP8266WiFi.h>

// Analog Pin on ESP8266
#define Buttons A0

// remote-buttons state
int ButtonRead = 0;
int current = 0;
int last = -1;

// set up the 'remote-buttons' feed
AdafruitIO_Feed *RemoteButtons = io.feed("remote-buttons");

void setup () {
    // start the serial connection
    Serial.begin(115200);

    // wait for serial monitor to open
    while(! Serial);
}
```

©Adafruit Industries
// connect to io.adafruit.com
Serial.print("Connecting to Adafruit IO");
io.connect();

// wait for a connection
while(io.status() < AIO_CONNECTED) {
  Serial.print(".");
delay(500);
}

// we are connected
Serial.println();
Serial.println(io.statusText());

void loop() {

  // io.run(); is required for all sketches.
  // it should always be present at the top of your loop
  // function. it keeps the client connected to
  // io.adafruit.com, and processes any incoming data.
  io.run();

  ButtonRead = analogRead(Buttons);
delay(1);
  // grab the current state of the remote-buttons
  if (ButtonRead &gt; 500 &amp;&amp; ButtonRead &lt; 600) {
    current = 1;
  }
  if (ButtonRead &gt; 600 &amp;&amp; ButtonRead &lt; 750) {
    current = 2;
  }
  if (ButtonRead &gt; 750 &amp;&amp; ButtonRead &lt; 900) {
    current = 3;
  }
  if (ButtonRead &gt; 900) {
    current = 0;
  }

  // ret if value hasnt changed
  if(current == last)
    return;

  int32_t value = current;

  // let's publish stuff
  Serial.print("Sending RemoteButtons Value: ");
  Serial.print(value);
  Serial.print("...");

  RemoteButtons-&gt;save(value);
delay(3000);
}

When you are finished reviewing the sketch and have finished making the necessary config changes, upload the sketch to your HUZZAH using the Arduino IDE. You should also open up your Adafruit IO dashboard so you can monitor the button gauge.
If everything goes as expected, you will see the gauge update on Adafruit IO. You should make sure to open the Arduino IDE's serial monitor if you are having issues with the sketch. It will provide valuable debugging info.

To add more buttons, just copy one of the conditional (if) statements and place it in with the others. Each of the conditional statements represents a button that registers a press if the analog value is within a certain threshold. You will need to set a minimum and maximum threshold for all but the last button. The last button just needs to be greater than the maximum value of the button before it.

```cpp
// grab the current state of the remote-buttons
if (ButtonRead > 500 && ButtonRead < 600) {
  current = 1;
}
if (ButtonRead > 600 && ButtonRead < 750) {
  current = 2;
}
if (ButtonRead > 750 && ButtonRead < 900) {
  current = 3;
}
if (ButtonRead > 900) {
  current = 0;
}
```

This sketch is set up to output the analog value of whatever button is pressed. You could figure out what the value of each button is with some math, but it is easier to just look at what the reading is using the serial monitor. Give each button a wide birth to accommodate for any fluctuations.

Don't forget to add a new number to be set as the current value. Also be sure to set the Gauge so that it can accommodate the extra numbers.

Next, we will set up another HUZZAH to output the feed data to an RGB LED.
Now it is time to connect an RGB LED to Adafruit IO so that it can display the color of the button that was pressed.

There are a few things we will need to get started:

- 1 x HUZZAH ESP8266 (https://adafruit.it/iDh)
- 1 x RGB LED (https://adafruit.it/iDk)
- Jumper wire (https://adafruit.it/iDj)
- Breadboard (https://adafruit.it/erc)
- 3 x 470 ohm resistors (not shown)

Now let's get started with the wiring.

LED Wiring

We will now connect all of the components to match what is shown below.
Connect the 3V pin to the + side of the breadboard. The longest pin of the LED needs to connect with the 3V pin. Pin #2 will connect to the Red pin on the LED. The Blue pin should connect with pin #4. Connect pin #5 to the Green pin.

This can be powered through the FTDI cable, but you may want to add a battery or other power supply by connecting it to the GND and VBat pins.

Now it's time to code.

**LED Code**

This guide has been updated to use the Adafruit IO Arduino Library

The previous version of this guide used the Adafruit MQTT Arduino Library, but we suggest using the Adafruit IO Arduino Library. If you'd like to use this library, we suggest following the [MQTT, Adafruit IO & You!](https://adafruit.it/Bor) Learn Guide

The Arduino sketch for the LEDs is also fairly straightforward. Copy the following code into a new Arduino sketch. You'll need to modify your `config.h` file to reflect your Wireless Network and Adafruit IO configuration.
// Remote Control with the Huzzah + Adafruit IO
//
// Adafruit invests time and resources providing this open source code.
// Please support Adafruit and open source hardware by purchasing
// products from Adafruit!
//
// Written by Richard Albritton, based on original code by Tony DiCola for Adafruit
// Industries
// Licensed under the MIT license.
//
// All text above must be included in any redistribution.

/************************** Configuration ***********************************/
// edit the config.h tab and enter your Adafruit IO credentials
// and any additional configuration needed for WiFi, cellular,
// or ethernet clients.
#include "config.h"

/************************ Example Starts Here *******************************/

#include <ESP8266WiFi.h>

// RGB LED Pins
#define Blue  5
#define Green 4
#define Red   2

// set up the 'digital' feed
AdafruitIO_Feed *AssistiveCallButtons = io.feed("assistive-call-buttons");

void setup() {

    // set power switch tail pin as an output
    pinMode(Blue, OUTPUT);
    pinMode(Green, OUTPUT);
    pinMode(Red, OUTPUT);

    digitalWrite(Red, HIGH);
    digitalWrite(Blue, HIGH);
    digitalWrite(Green, HIGH);

    // set up serial monitor
    Serial.begin(115200);

    // wait for serial monitor to open
    while(! Serial);

    // connect to io.adafruit.com
    Serial.print("Connecting to Adafruit IO");
    io.connect();

    // set up a message handler for the 'digital' feed.
    // the handleMessage function (defined below)
    // will be called whenever a message is
    // received from adafruit io.
    AssistiveCallButtons -> onMessage(handleMessage);

    // wait for a connection
    while(io.status() &lt; AIO_CONNECTED) {
        Serial.print(".");
    }
}
void loop() {

    // io.run(); is required for all sketches.
    // it should always be present at the top of your loop
    // function. it keeps the client connected to
    // io.adafruit.com, and processes any incoming data.
    io.run();

    // this function is called whenever an 'digital' feed message
    // is received from Adafruit IO. it was attached to
    // the 'digital' feed in the setup() function above.
    void handleMessage(AdafruitIO_Data *data) {

        Serial.print("received <- AssistiveCallButtons");
        switch(data-&gt;toInt()) {
            case 0: // your hand is on the sensor
                digitalWrite(Red, HIGH);
                digitalWrite(Blue, HIGH);
                digitalWrite(Green, HIGH);
                break;
            case 1: // your hand is close to the sensor
                digitalWrite(Red, LOW);
                digitalWrite(Red, HIGH);
                digitalWrite(Red, HIGH);
                break;
            case 2: // your hand is a few inches from the sensor
                digitalWrite(Red, HIGH);
                digitalWrite(Red, HIGH);
                digitalWrite(Red, LOW);
                break;
            case 3: // your hand is nowhere near the sensor
                digitalWrite(Red, HIGH);
                digitalWrite(Red, LOW);
                digitalWrite(Red, HIGH);
                break;
        }

        // delay in-between reads for stability
        delay(1);
    }

    // delay(500);
}

// we are connected
Serial.println();
Serial.println(io.statusText());
// recv. the assistive-call-buttons feed
AssistiveCallButtons-&gt;get();

You will then need to check that the name of your feed matches the feed defined in
the sketch:

    AdafruitIO_Feed *AssistiveCallButtons = io.feed("assistive-call-buttons");

When you are finished reviewing the sketch and have finished making the necessary
config changes, upload the sketch to your HUZZAH using the Arduino IDE. You should
also open up your Adafruit IO dashboard so you can monitor the Remote Buttons
gauge.
Let's test this thing out now.

Test it out

Now that we have things constructed, power on the Buttons controller as well as the LED boards.

When ever you press one of the buttons on the first Huzzah board, that should change the color of the LED on the second board. So long as they are both connected to the Internet, they can be used together. The status of the buttons that were pressed can also be seen on your Adafruit.IO dashboard.