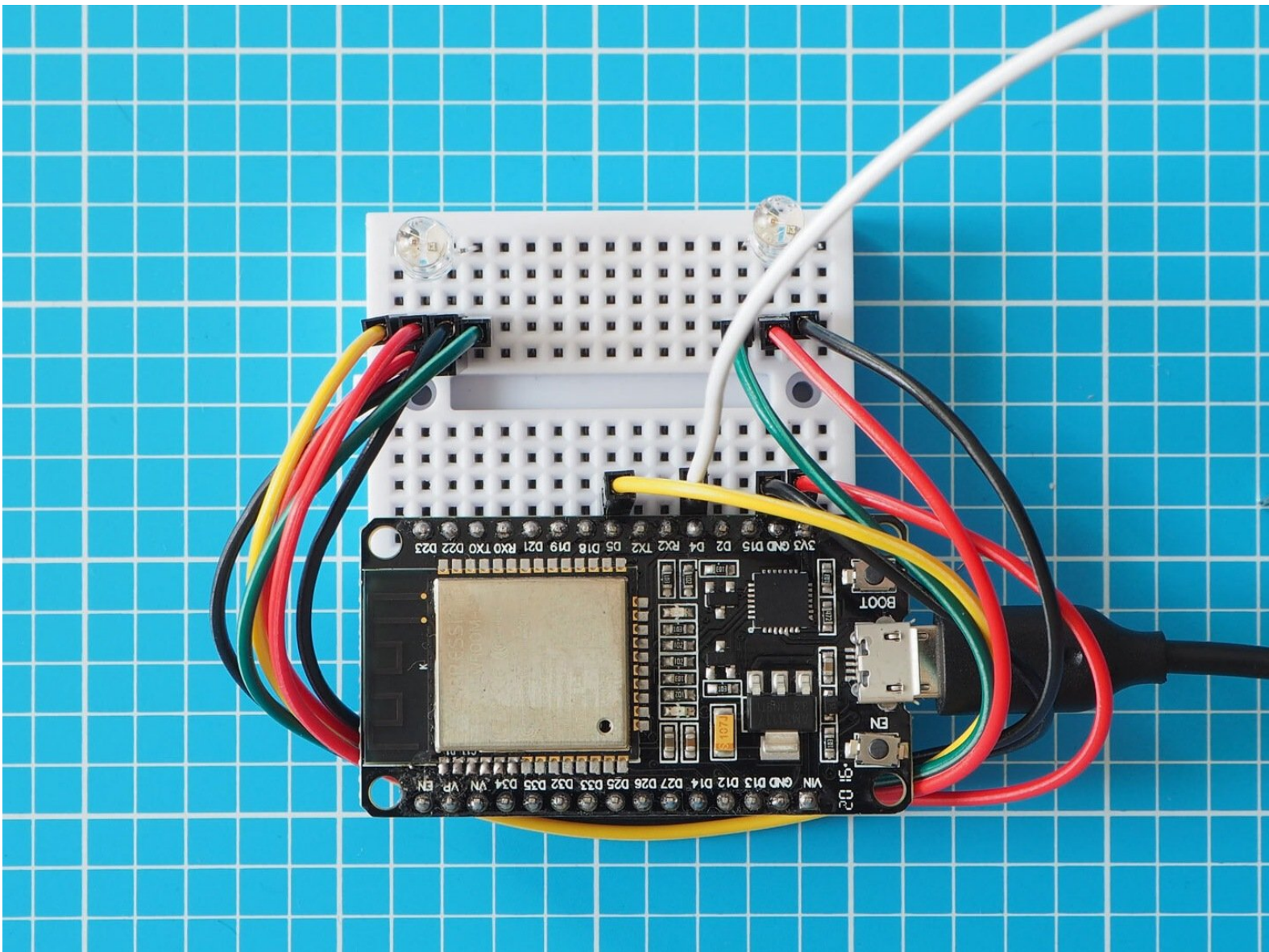Yo——Yo
Machines

Hardware Build Guide (Windows software)

This guide explains how to assemble the hardware, upload firmware, and network Light Touch devices for Windows users.

Written By: andy

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 1 of 24

INTRODUCTION

This guide takes you through the steps to building your Light Touch devices. In this stage we will show you how to:

- upload firmware to the ESPS32S board
- set up a network between two Light Touch devices
- assemble the hardware

Do take your time to go through each the steps. If you have any problems or need support you can visit our FAQs pages.
Once you have finished the assembly you can move to Stage 2 and build your own enclosures.

🔧 TOOLS:

- A computer running OSX 10.13 or later or Windows 10 with a spare USB port and Internet connection. Note: The ESP32S board will only connect to 2.5GHz Wi-Fi networks and with names less than 32 characters in length. (1)

### ⚙ PARTS:

- Micro USB cable (1)
- USB power supply (1)
- ESP32S board (1)
- Addressable RGB Leds (2)
- Breadboard (1)
- Male to Male Jumper Wires (7)

This document was generated on 2022-01-24 05:47:42 PM (MST).

## Step 1 — Download the USB driver
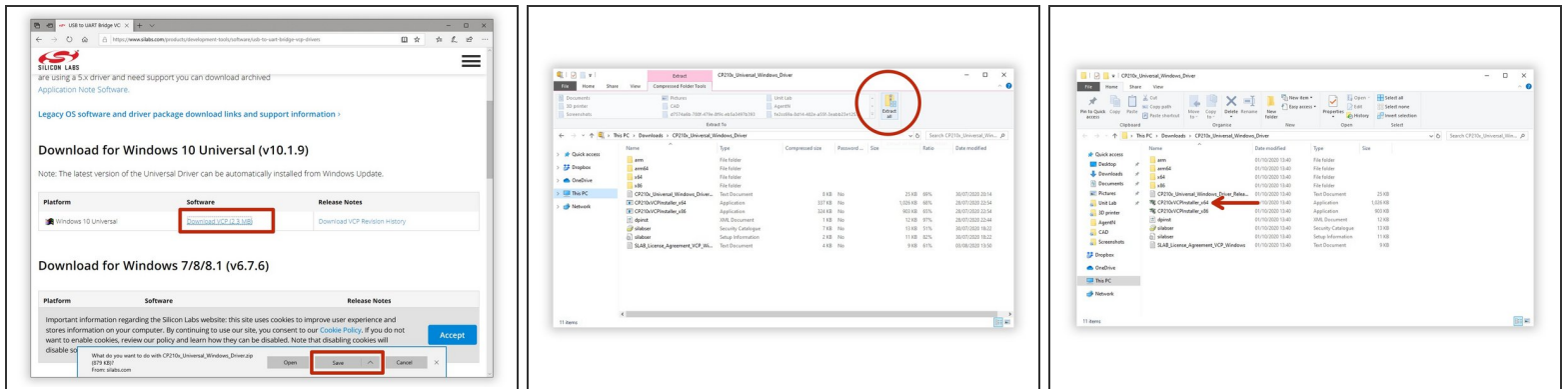
- Download the USB driver so the ESP32 board can communicate with your computer. The Windows version can be found [here](#).

- Unzip the download and open the installer **CP210xVCPInstaller_x64**.

- (i) You may have to accept the Windows Defender warning so that the driver can be installed successfully.

Step 2 — Install the USB driver
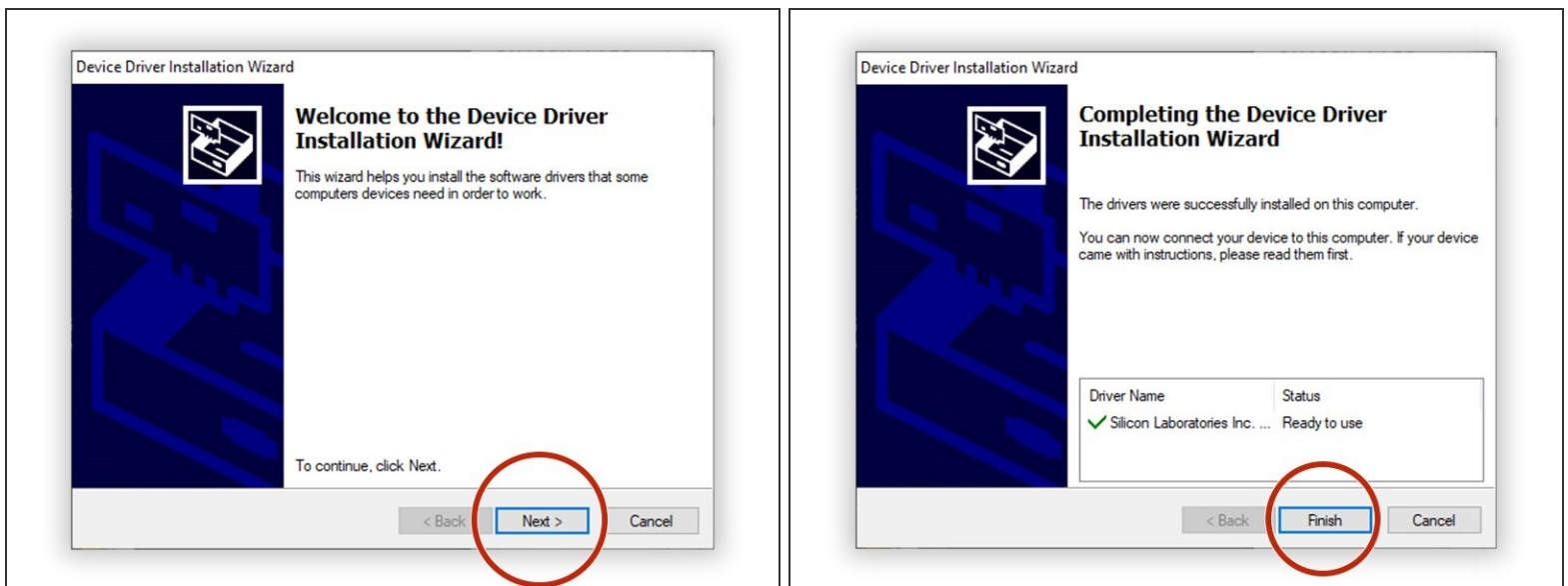
- Click **Next** to go through the installation wizard.

- After installing successfully, the wizard should report that the driver is ready to use. Click **Finish** to exit the wizard.
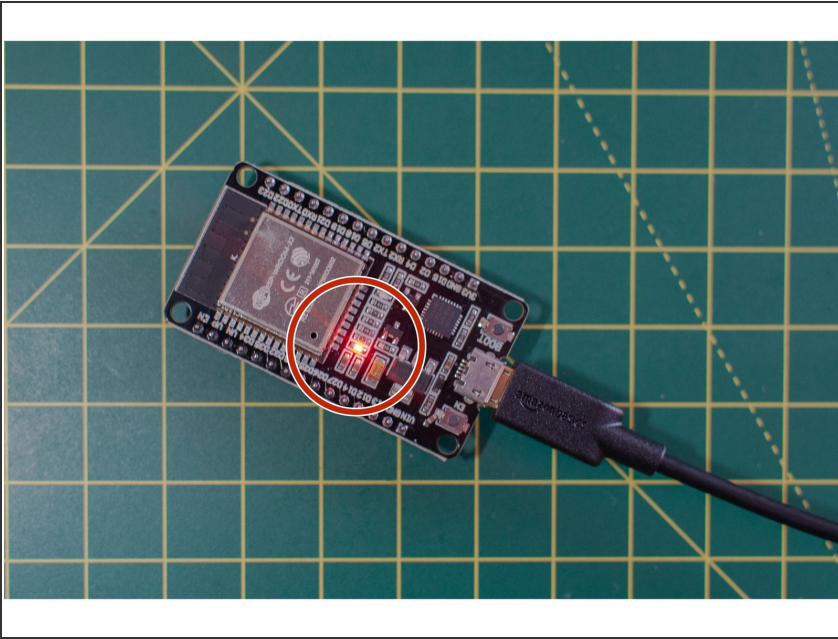
This document was generated on 2022-01-24 05:47:42 PM (MST).

Step 3 — Download the Yo-Yo Firmware Uploader
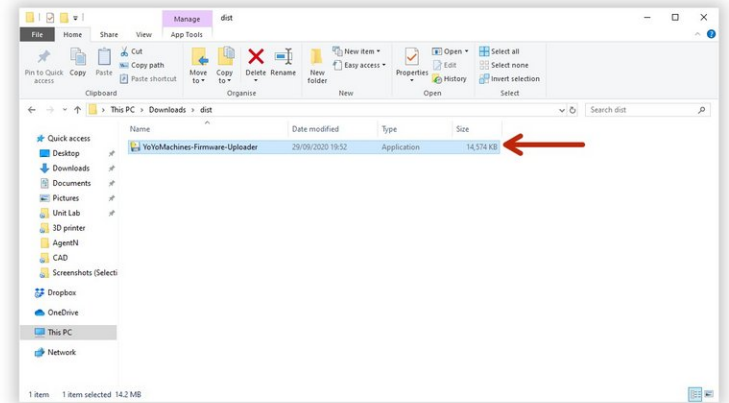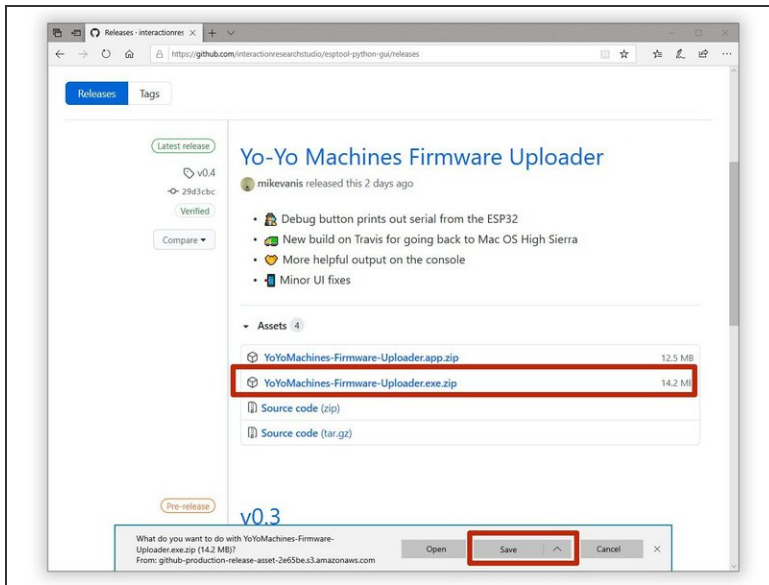
ⓘ The Yo-Yo Firmware Uploader will enable you to upload the latest firmware to your ESP32S board. Download the latest release [here](#).

ⓘ Firmware is code the ESP32S board needs in order to work as a Yo–Yo device. It's called firmware because it is software used to configure hardware — soft + hard = firm. Geddit?

● Unzip the downloaded app and open the contents of the extracted folder. The app should be inside the extracted folder.
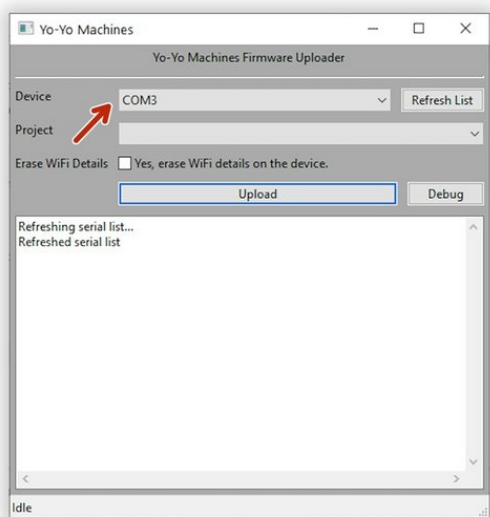
⚠ Please use [7zip](#) or [WinRAR](#) to unzip the files. WinZip will not work.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 4 of 24

Step 4 — Plug in your ESP32S board

- Plug your ESP32S board into your computer with the USB cable. You should see a red light on the board, which means it is powered up.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 5 of 24

Step 5 — Choose your Serial Port

- Open the Yo-Yo Firmware Uploader and select the device in the drop down menu. You may need to press "refresh list" if you do not see it in your list.

- Your board's serial port should appear as something along the lines of **COM#** (COM3 in this case).

- (i) If the device doesn't appear, double check that your USB cable has a data line. Some USB cables only have power lines, as they are used for charging only.

- Leave the **'Erase Wifi Details'** box unticked.
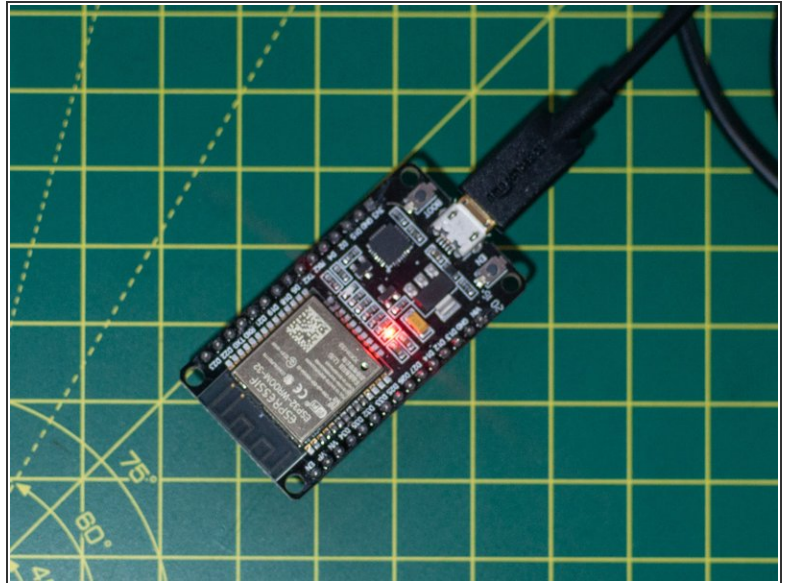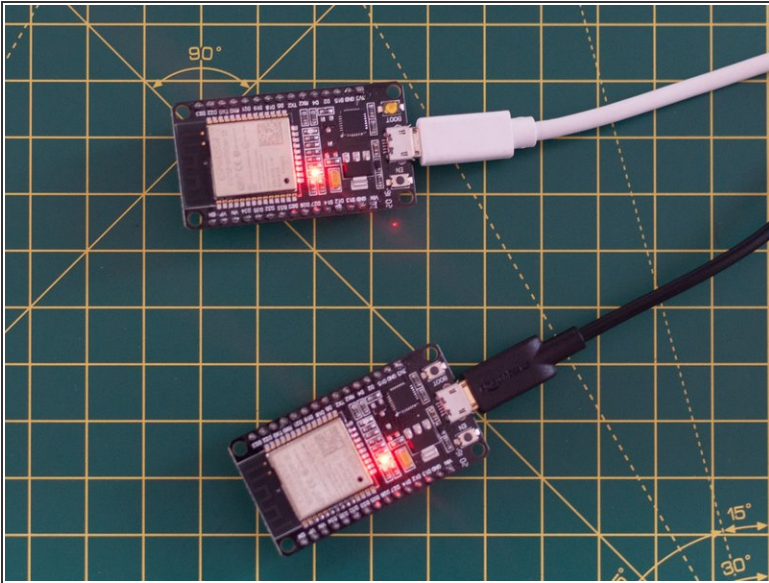
Step 6 — Choose your project
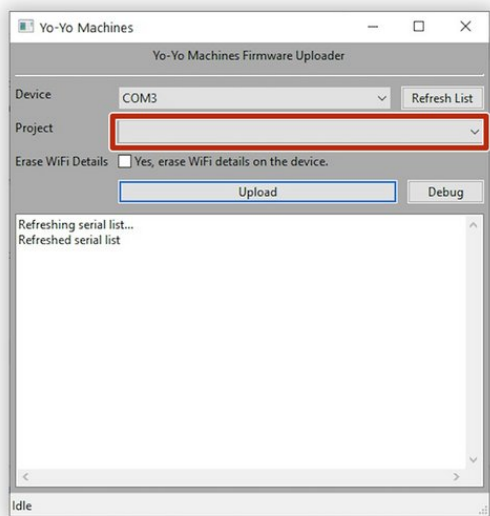
- Use the 'project' drop-down menu to select which device you are making.

- (i) The menu is blank on this image. Click it to get a list of projects -- make sure to choose the right one for the device you're making! We'll be adding new ones periodically...

This document was generated on 2022-01-24 05:47:42 PM (MST).
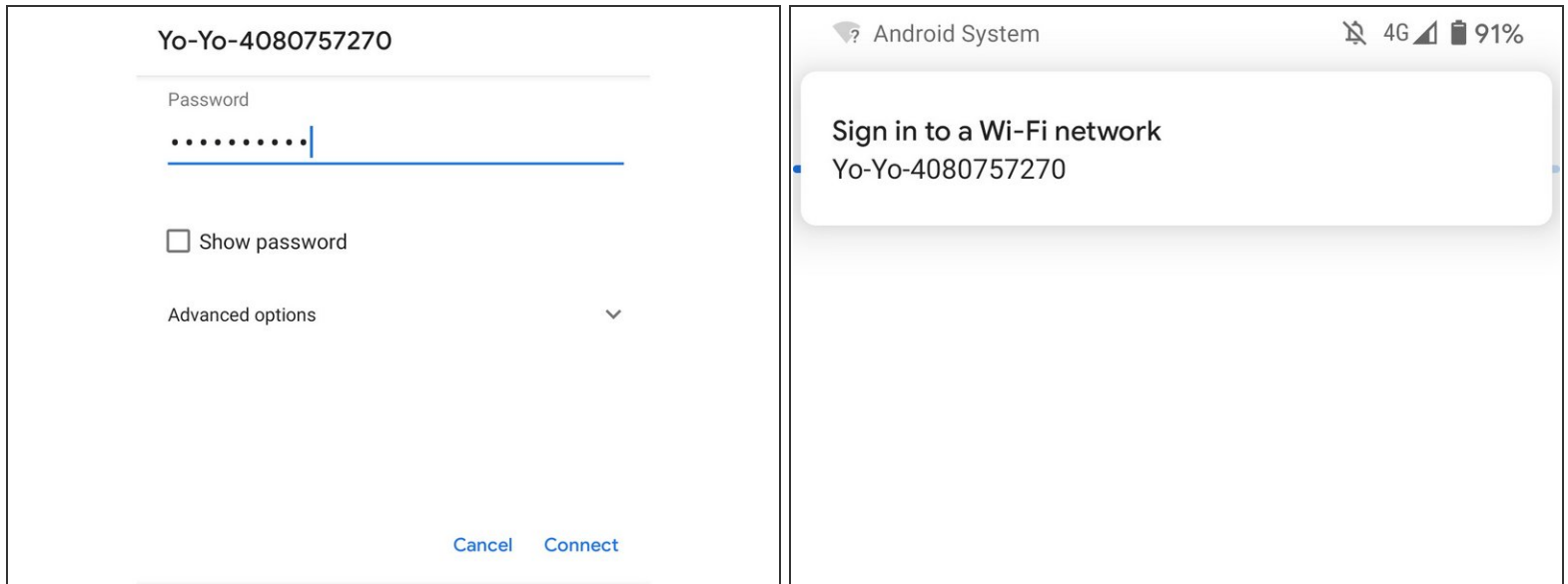
Step 7 — Upload the Firmware
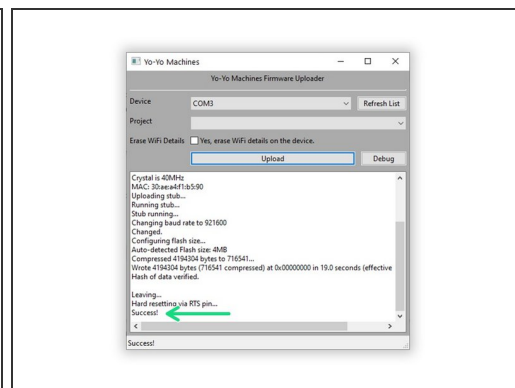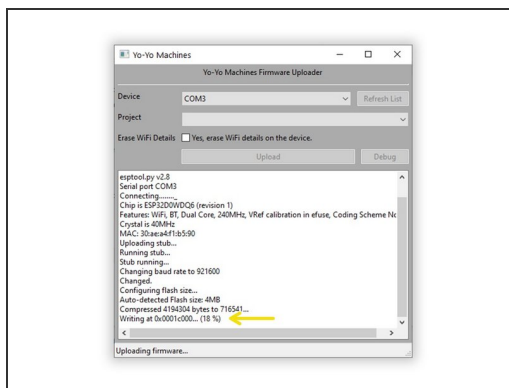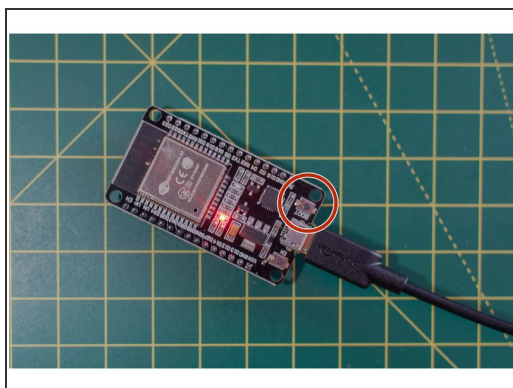
- When you're ready, click on **Upload** to upload the latest firmware.

- When prompted, hold the **BOOT** button on your board to set it to "programming mode". You can let go of the button once you see the text "Writing" in the console text.

⚠ If you receive an error, please make sure you have selected the correct device in the Firmware Uploader, and that you have pressed the 'BOOT' button as described above.

- When the uploader finishes transferring the firmware to the device, it will say **"Success!"** If you have another device to set up, you can repeat this process with the new ESP32S board.

ⓘ In the future, if you want to reset a device to factory settings, you can do so by ticking the **"Erase WiFi Details"** box and re-uploading the firmware.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022　　　　　　　　　　　　　make.yoyomachines.io/　　　　　　　　　　　　　Page 7 of 24
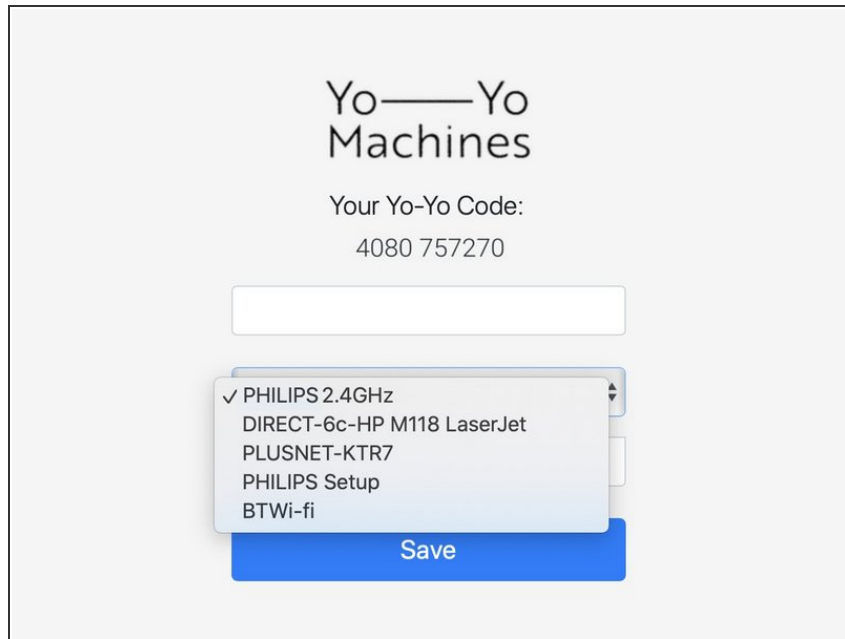
Step 8 — Choosing a setup method

ⓘ There are two main methods for setting up the network and pairing Yo–Yo Machines. In the first, both devices are set up in the same space, before one of them is sent to a remote location. In the second, devices are set up in separate spaces while coordinating with someone over the phone.

ⓘ Both methods are covered in the following guide, but setting up a pair in the same space is shown as the primary method.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022　　　　　　　　　　　make.yoyomachines.io/　　　　　　　　　　　Page 8 of 24

Step 9 — Connect to Yo–Yo network

- Power up the first ESP32S (with uploaded firmware) using a USB port or USB power supply and wait 10 seconds.

- ⓘ Now that the firmware is loaded, you can power your ESP32Ss from any USB power supply – there is no need to use a computer anymore.

- If you are setting up two devices in the same space, turn on the second ESP32S at least 10 seconds after the first. If you are setting them up remotely, you do not need to synchronise in this way. You should still wait at least 10 seconds before proceeding so the ESP32Ss can establish a network.

- With your mobile device or computer, connect to the newly created Wi-Fi network named "Yo-Yo-####" with the password "**blinkblink**". If you are viewing these instruction online on our website, use another device to connect to the new network so you can keep the instruction open. *This procedure is the same whichever method you are using.*

- ⓘ Android users may be prompted with a "Sign in to a Wi-Fi network" notification. Click this to open the captive portal (next).

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 9 of 24
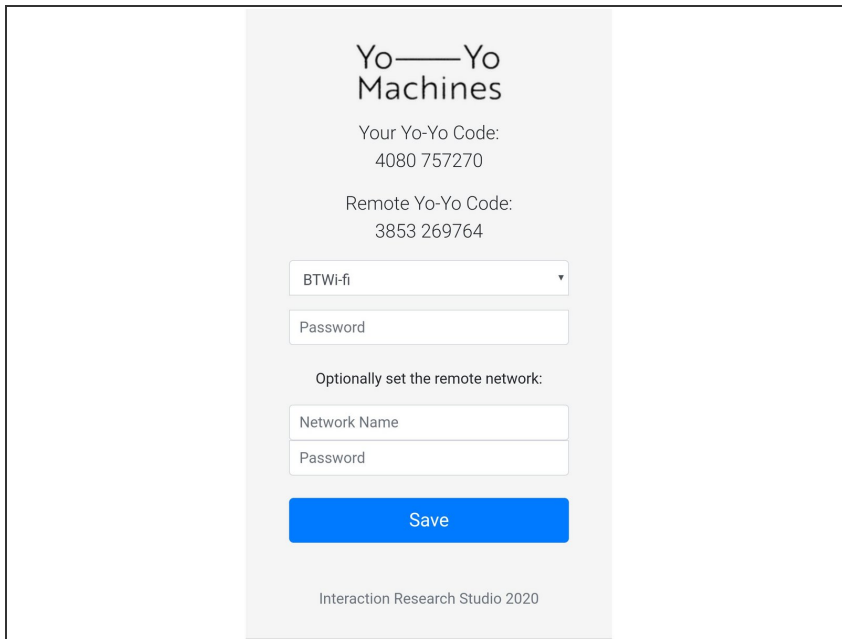
Step 10 — The captive portal

- A [captive portal](#) should open automatically.

⚠️ If the captive portal doesn't open on the device you are using, you may have to try with an alternative smartphone / tablet / laptop.

ⓘ The captive portal will show the 5 Wi-Fi networks with the strongest signals. Sometimes you may not see the network that you would like to connect to, if this is the case, move your hardware closer to your router.

⚠️ The ESP32S board cannot connect to Wi-Fi networks with names longer than 31 characters. If your Wi-Fi network's name is too long, then you will need to change it to a shorter name to complete the build.
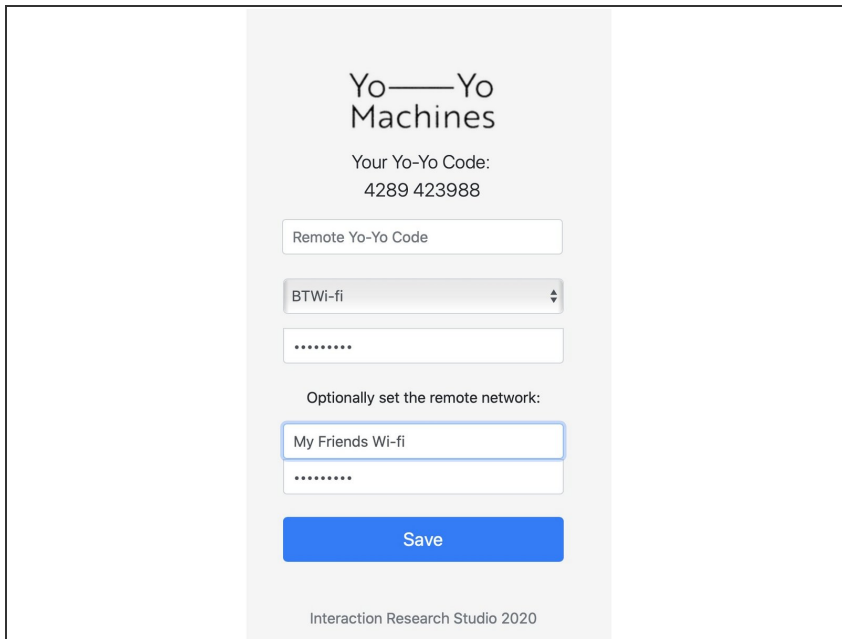
This document was generated on 2022-01-24 05:47:42 PM (MST).

Step 11 — Fill in the Wi-Fi credentials

Yo——Yo
Machines

Your Yo-Yo Code:
4080 757270

Remote Yo-Yo Code:
3853 269764

BTWi-fi ▾

Password

Optionally set the remote network:

Network Name

Password

Save

Interaction Research Studio 2020

● Fill in the prompts with credentials for the Wi-Fi network that you want to connect to.

ⓘ When you are setting up two devices in the same space, you also have the option to include the Wi-Fi credentials of the network you want to send the device to. When you send the second device to someone, it will then automatically connect to their network.

ⓘ Including the Wi-Fi credentials of the remote network when setting up a pair will store both the home and remote network credentials to both devices, so it will not matter which device you send away. For security purposes, the Wi-Fi credentials can never be retrieved from the devices later.

ⓘ The image here shows two devices being set up in the same space. Note that the Yo-Yo codes have been exchanged automatically. Information on how to enter codes manually for remote setup is in the next step.

This document was generated on 2022-01-24 05:47:42 PM (MST).

Step 12 — Exchange Yo–Yo Codes

Yo——Yo
Machines

Your Yo-Yo Code:
4289 423988

Remote Yo-Yo Code

BTWi-fi

●●●●●●●●●

Optionally set the remote network:

My Friends Wi-fi
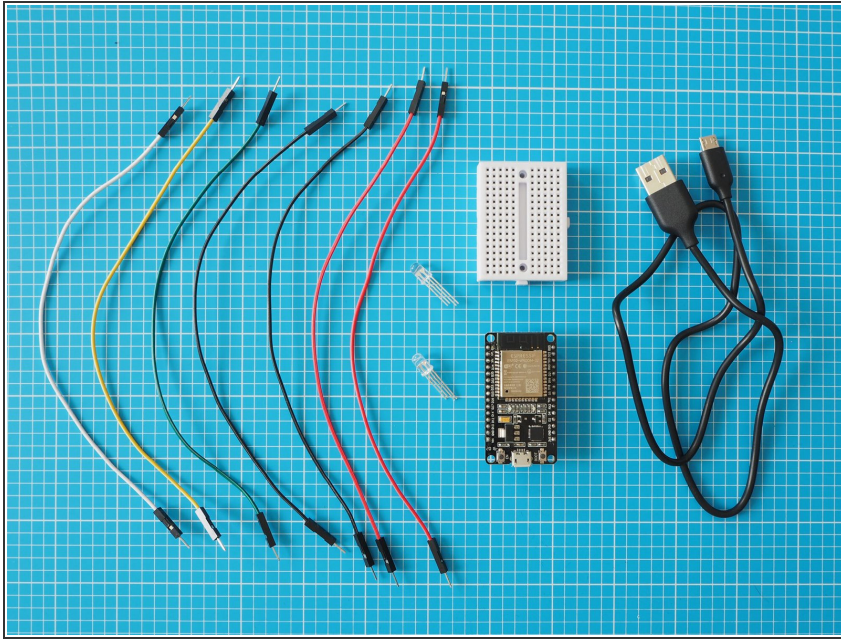
●●●●●●●●●

Save

Interaction Research Studio 2020

ⓘ If you are setting up two devices in the same space, they have already exchanged Yo-Yo Codes automatically. Feel free to skip this step and press **"Save"**

● Copy the text under the heading "Your Yo-Yo Code".

● Send your Yo–Yo Code to your partner via SMS, email, etc., in exchange for the one from their device.

● Enter the Yo-Yo Codes for the partner devices in the text field named **"Remote Yo-Yo Code"**. It should be in the same format as yours eg: "4289 423988". Once the forms are complete, press **"Save"**.

This document was generated on 2022-01-24 05:47:42 PM (MST).

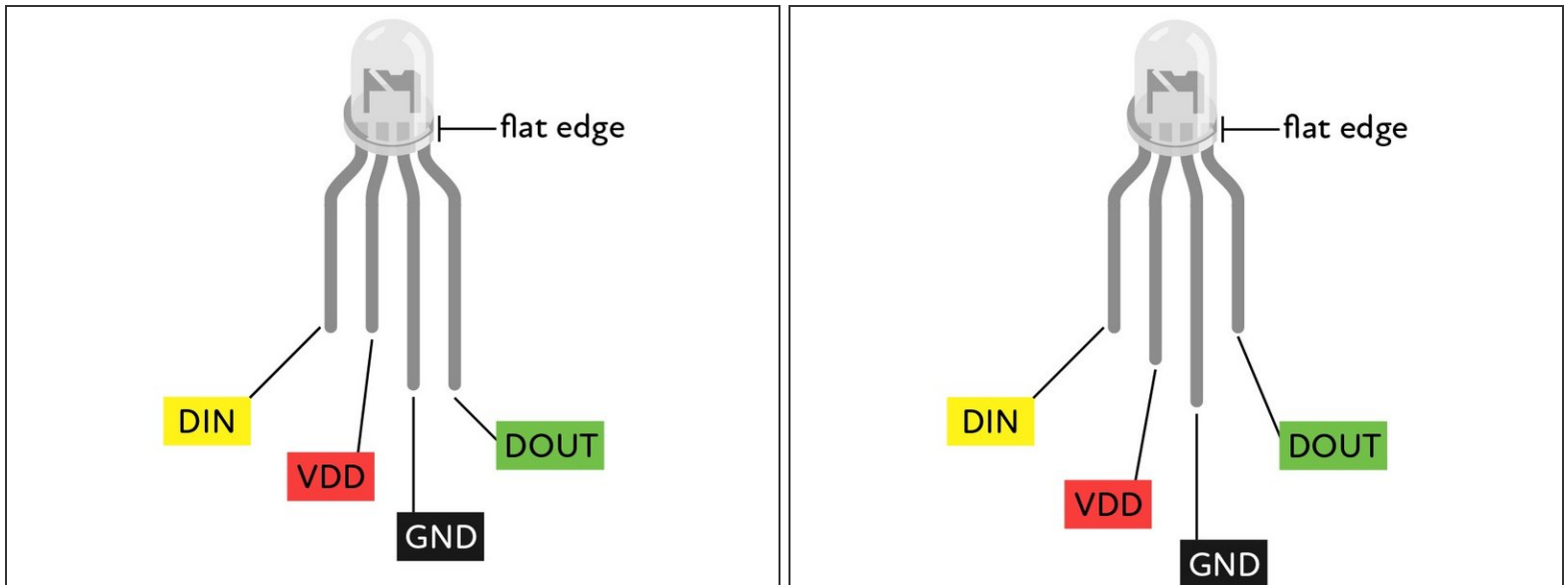## Step 13 — Test that the devices are connected
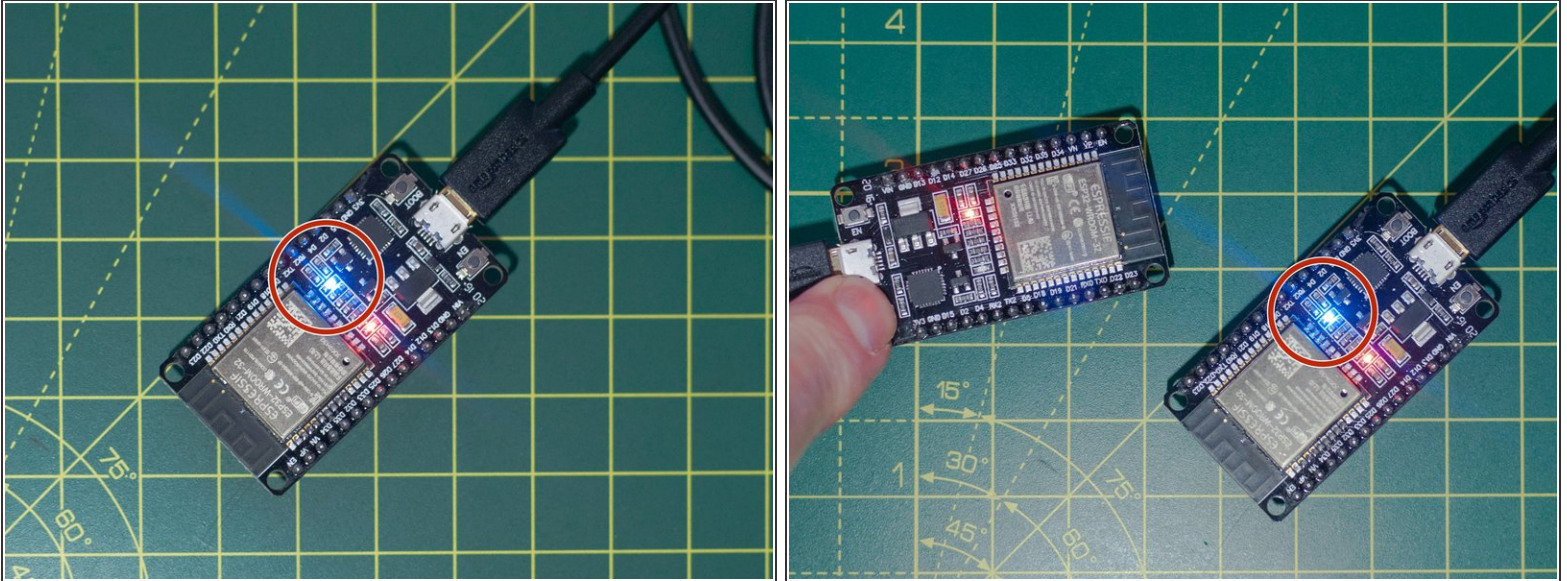
- Wait for the devices' blue LEDs to blink 3 times to confirm the local wifi details are correct. If these details have been inputted incorrectly, please reconnect to the Yo-Yo-#### network and try again.

- Once both devices have confirmed they can connect to their respective wifi networks, the connection between the devices can be tested. This is done by pressing the **"BOOT"** button of one device to blink the on-board led of the other.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 13 of 24

Step 14 — What you will need

- Gather your components and take a moment to identify them.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022

make.yoyomachines.io/

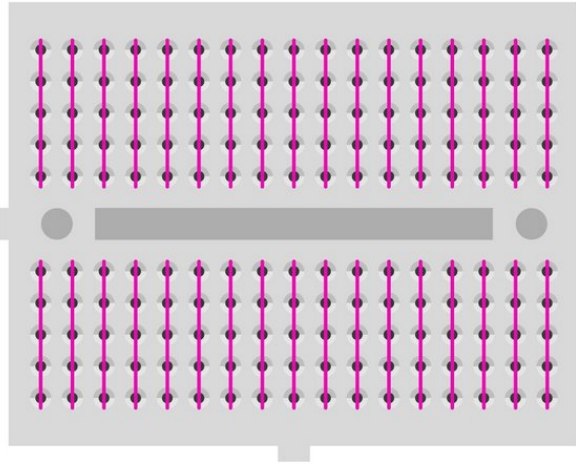Page 14 of 24

Step 15 — Addressable RGB LEDs

ⓘ Orientation of the pins are signified by the lengths of the legs.

● DIN = Data In

● VDD = Supply voltage

● GND = Ground

● DOUT = Data Out

⚠ Some LEDs have leg lengths like the second image. If yours match this, please refer to this for wiring.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022　　　　　　　　　　　make.yoyomachines.io/　　　　　　　　　　　Page 15 of 24
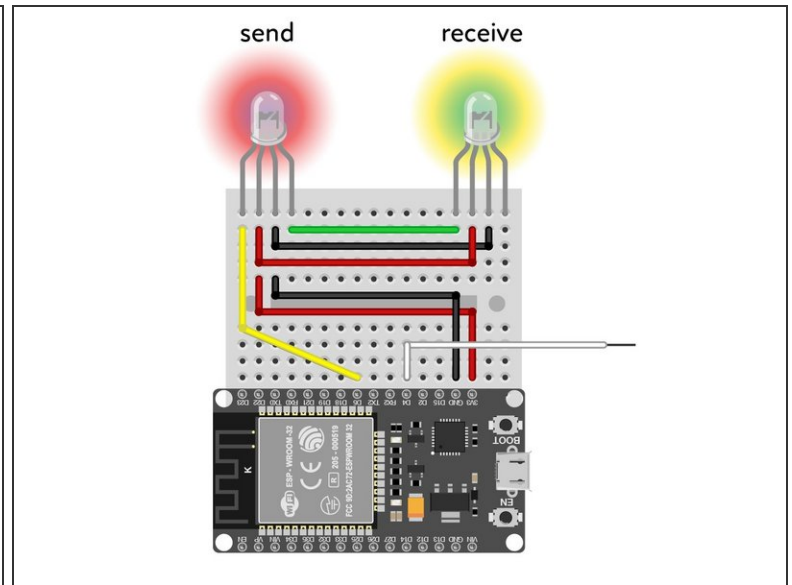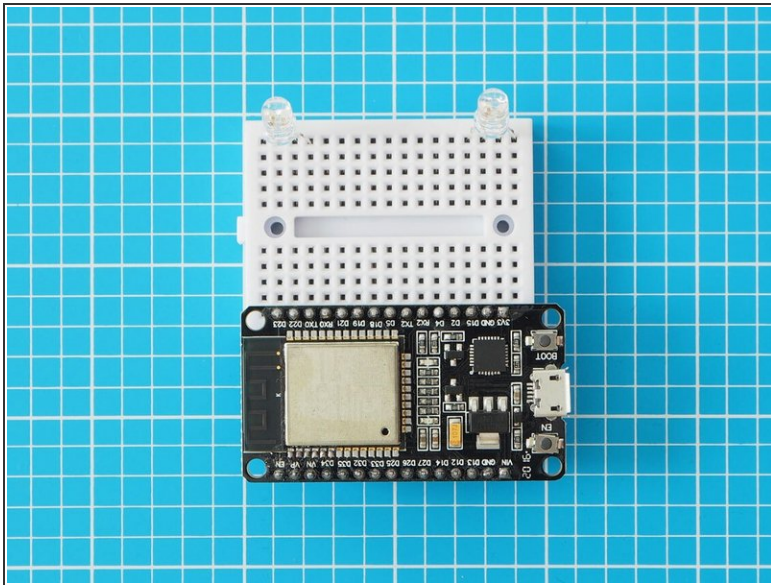
Step 16 — Breadboard

- Bread boards are used to create quick connections between electronic components.

- They have sockets that are electrically connected in rows. The connected sockets are shown as green lines in this diagram.

- Jumper leads and components place in these rows will be connected together.

Step 17 — Using the breadboard
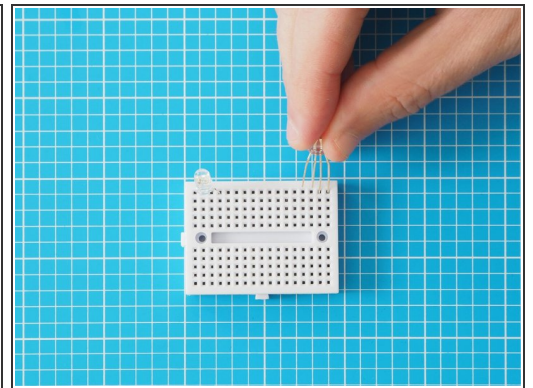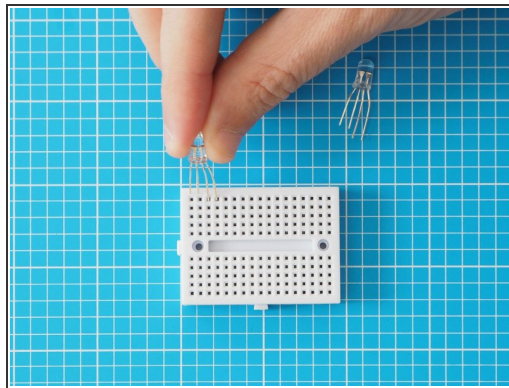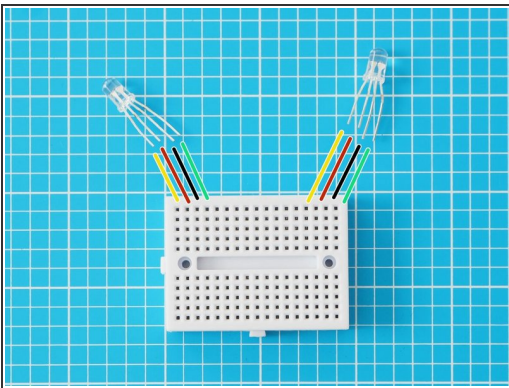
- Place LEDs in breadboard as pictured. Make sure the orientation of the LEDs are the same **(short legs to the left of the breadboard)**

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022　　　　　make.yoyomachines.io/　　　　　Page 16 of 24

Step 18 — Placing the breadboard

- Place one side of the ESP32 onto the other side of the breadboard. The side used should be the same side as the button labelled boot.

- (i) Make sure all the pins are lined up and give the ESP32 a good solid push to plug it all the way into the breadboard.

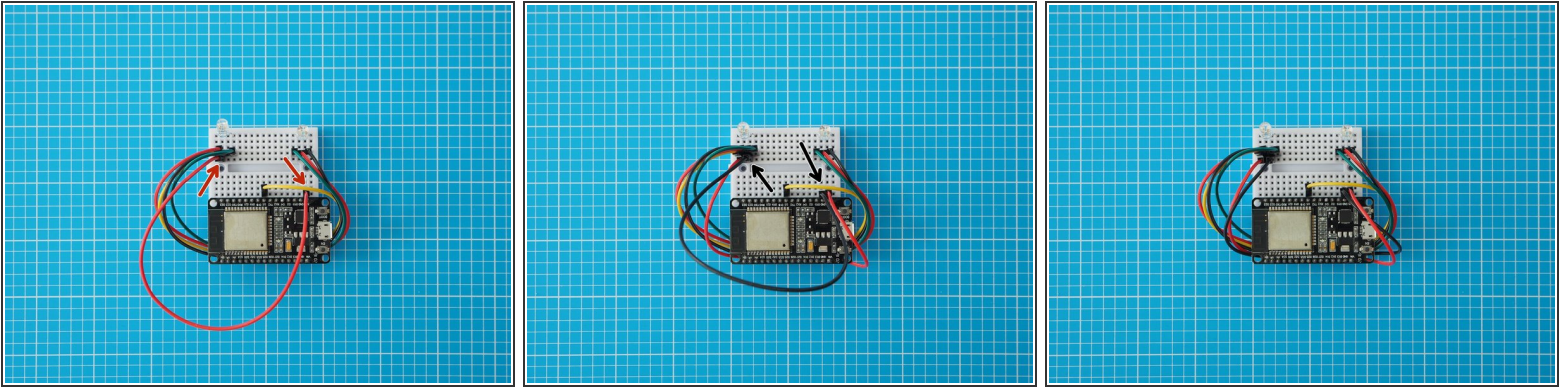## Step 19 — Wiring the addressable LEDs - part 1
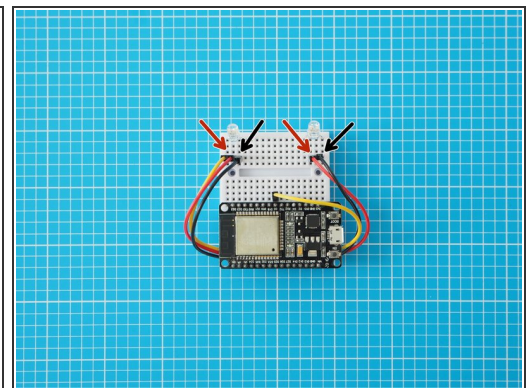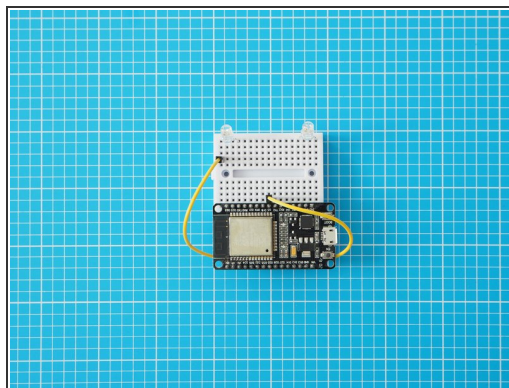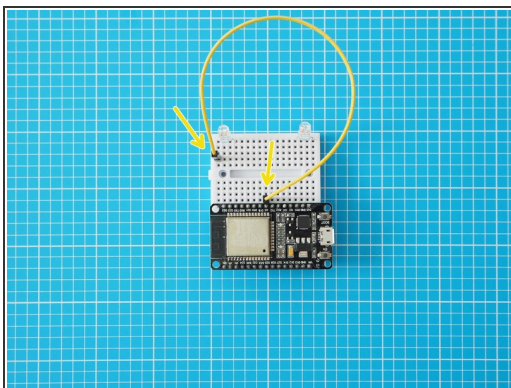
- Wire the leftmost pin **(DIN)** of the LED to pin **D5** of the ESP32.

- Next, wire the adjacent two pins (**VDD and GND)** to the equivalent pins on the other LED.

Step 20 — Wiring the addressable LEDs - part 2
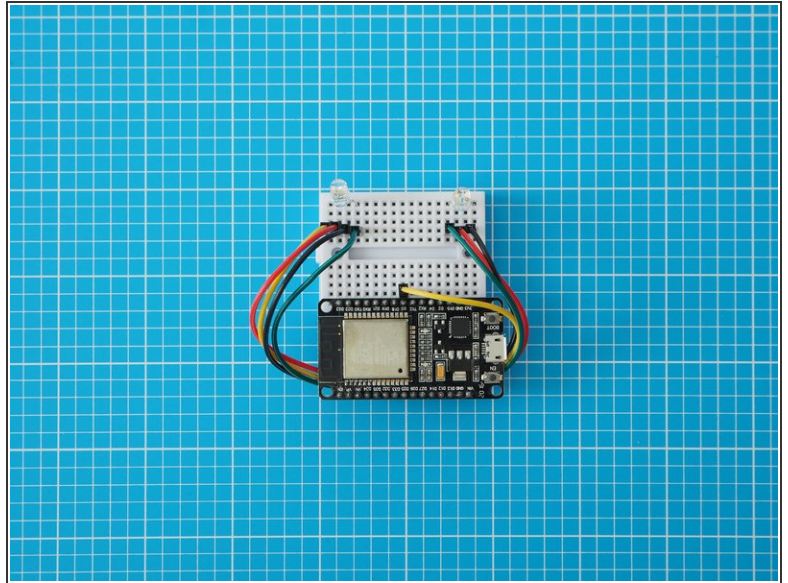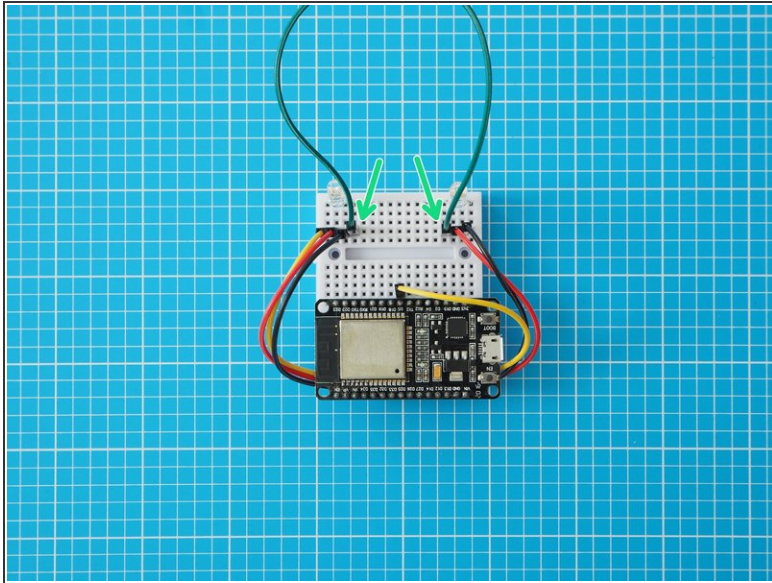
- Connect the remaining leg **(DOUT)** of the lefthand LED to the leftmost leg **(DIN)** of the righthand LED

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 18 of 24

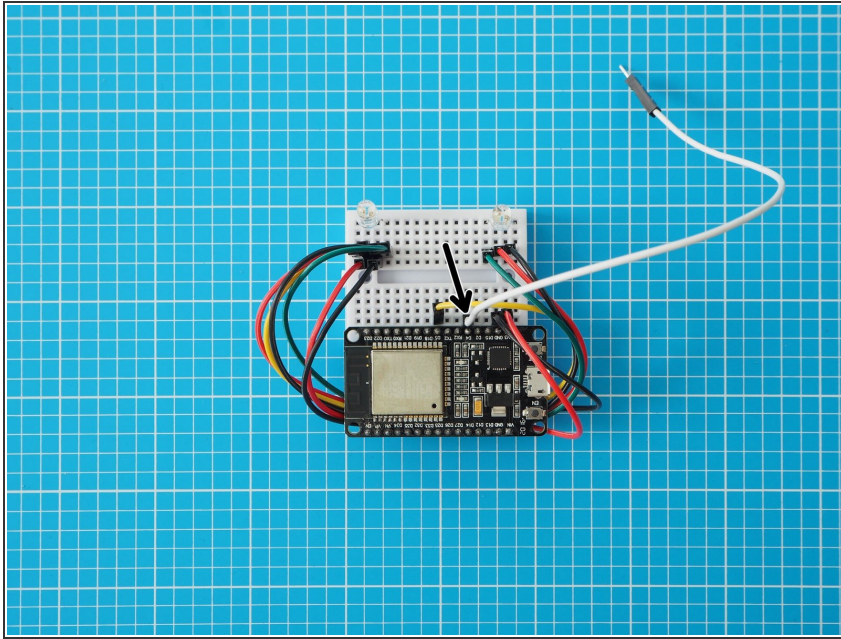## Step 21 — Wiring the addressable LEDs - part 3

- Add a wire in line with the LED's centre left leg **(VDD)** and connect that to the ESP32 **3v3** pin. This LED leg is the shorter leg of the middle legs.

- Add a wire in line with the LED's centre right leg **(GND)** and connect that to the ESP32 **GND** pin. This LED leg is the longer of the middle legs.

⚠ Please check your wiring and make sure you have connected this correctly. Wiring your LED backwards can damage it permanently.

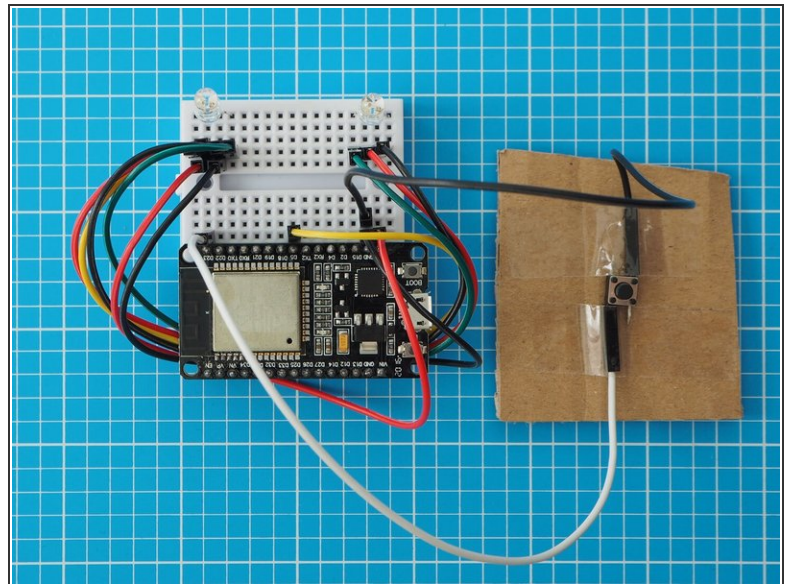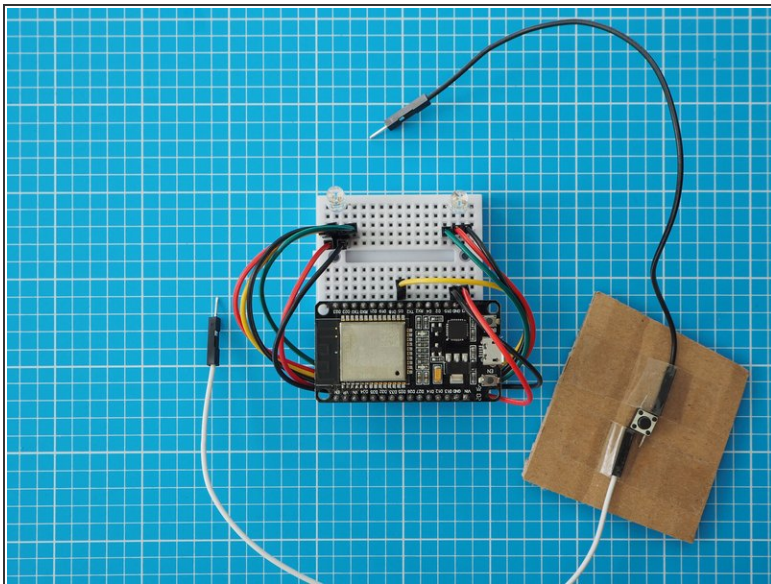ⓘ the ESP32 has two GND pins. We recommend connecting to the one adjacent to the 3v3 pin for ease of use.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 19 of 24

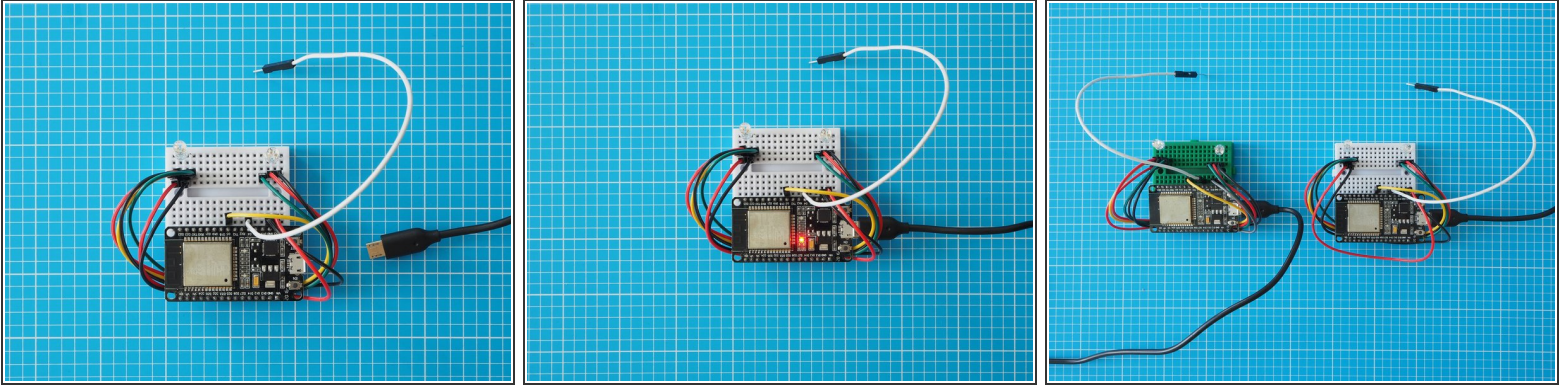## Step 22 — Adding the capacitive touch wire

- Add the final jumper wire in line with ESP32 pin **D4**.

Step 23 — Optional - external button

- An external Button can be used instead of capacitive touch by adding a switch between pin **D23** and **GND** on the ESP32.

This document was generated on 2022-01-24 05:47:42 PM (MST).

Step 24 — Power up and repeat

- Plug in your USB micro cable.

- Make another Light Touch device using the same steps (11 - 21).

- (i) You can make both Light Touch devices in the same household and post one to your remote partner. Alternatively, they can be made remotely and paired via the internet.

- (i) Use the Network Setup guide to pair two Light Touch devices. We assume you'll do before you start assembling the electronics, but you can link or re-link them at any time.

- (i) When you power up the devices the two addressable LEDs should blink as an indicator that you've wired up your LEDs correctly. Also the blue LED onboard the ESP32S board should blink to show the network connection is working.

This document was generated on 2022-01-24 05:47:42 PM (MST).
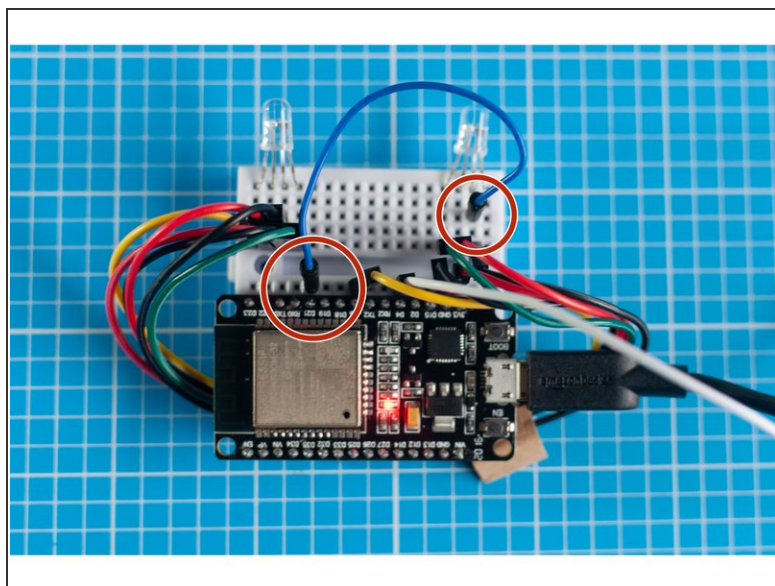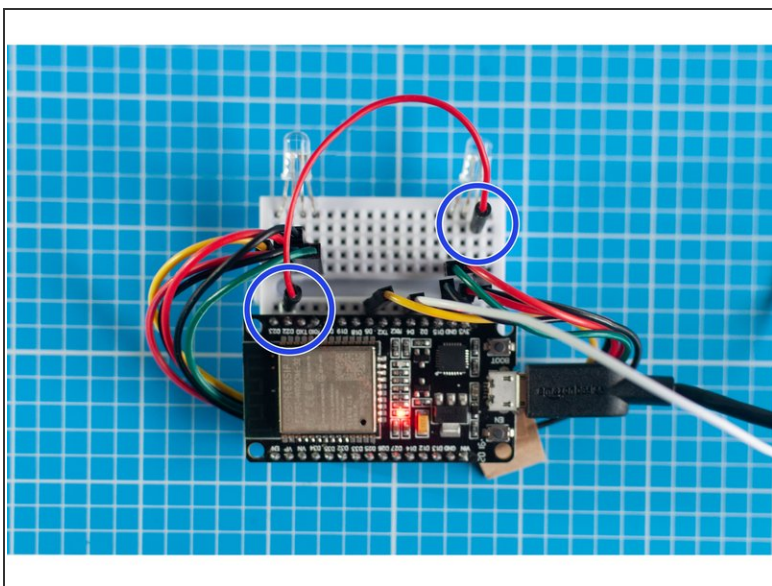
Step 25 — Check it's working
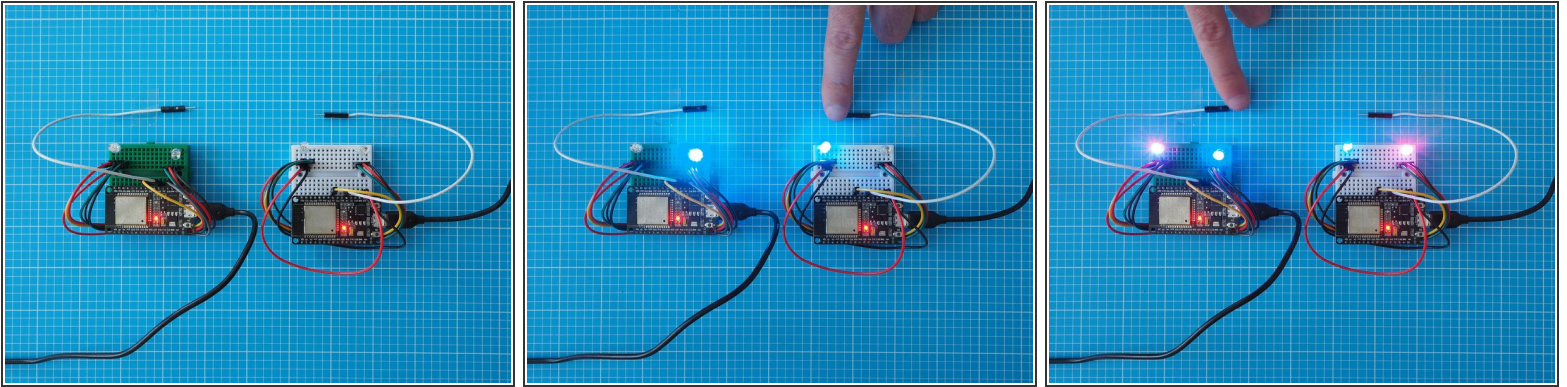
- Press and hold the capacitive touch lead (white) on one Light Touch device to scroll through different colours. Let go to select a colour.

- Tap quickly on the capacitive touch lead to send this colour to the other Light Touch Device.

- Using the second Light Touch, select and send a colour back.

Step 26 — Adjusting fade time
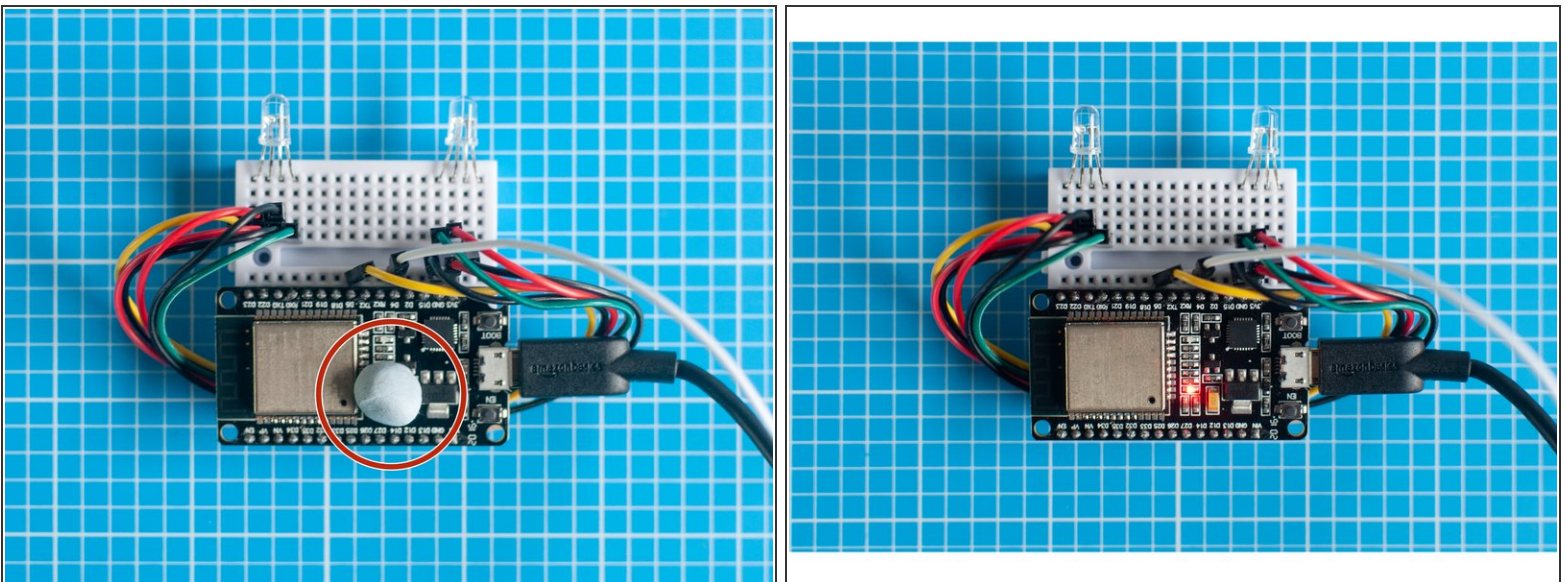

- This step is optional, but the red power LED on the ESP32S board can seem quite bright in a darkened space and interfere with the main LED's. Covering this LED with a piece of Blu Tack or tape will eliminate the issue.

This document was generated on 2022-01-24 05:47:42 PM (MST).

© 2022   make.yoyomachines.io/   Page 22 of 24

Step 27 — Adjusting fade time

- By default, the LED's are programmed to slowly fade to off over 6 hours from the last touch. However, the fade time can be adjusted by adding additional jumper leads.

- To reset the fade time to 3 hours from the last touch, to off, add a jumper lead between pin D22 on the ESP32S and ground (GND) as shown in the first picture.

- To reset the fade time to 1 hour from the last touch, to off, add a jumper lead between pin D21 on the ESP32S and ground (GND) as shown in the second picture.

- To reset the fade time to 9 hours from the last touch to off, add jumper leads between pin D21 & D22 on the ESP32S and ground (GND).

- ⓘ These images show the leads connected to ground (GND) on the right LED but they could be connected to any ground (i.e. on the other LED or ESP32S) since they're all wired to one another.

This document was generated on 2022-01-24 05:47:42 PM (MST).

Step 28
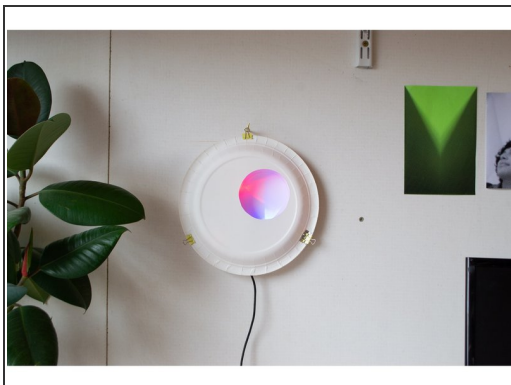
- Now that your Light Touch device is working you can now think about what kind of enclosure you want to encase it in.

- We have a few examples in the Enclosure section of the website , or feel free to invent your own.

Congratulations, you're ready to build an enclosure for your Light Touch device!

This document was generated on 2022-01-24 05:47:42 PM (MST).