PROGRAMING ESP32 FOR BATTLE BOTS
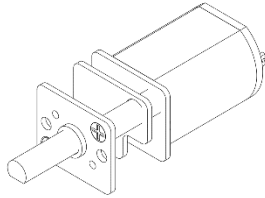
Made By Greggory Hartsfield

Before you begin on your journey, a word of caution. In the comfort of your own home you are about to assemble a combat robot. This robot can Hurt, Cut and Burn you if you are not careful. Please, read the entire manual before you start.

Most of all, good luck!

TABLE OF CONTENTS

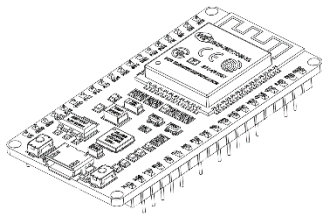## 2 X N20 1000RPM DC MOTOR

A N20 DC motor is a low-cost gear reduction motor to maneuver the robot around its environment.

CAD

1 X BIDIRECTIONAL BRUSHED ESC

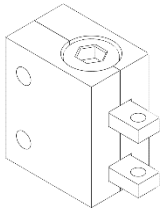Dual-way Bidirectional Brushed ESC is a Speed Controller to control the two N20 motor

CAD

1 X ESP WROOM 32 (38PIN)

The ESP WROOM 32 is a microcontroller with a built in Bluetooth to connect to a controller

CAD

1 X 3S LO-PO BATTERY
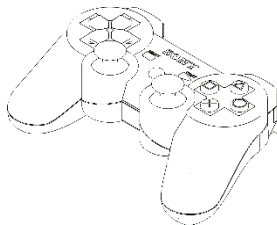
LoPo Battery powers the bot at 11.1V 450mAh

CAD

1 X SCREW POWER SWITCH

A high amperage power switch is made with a M3 fastener is used to connecting 2 terminals using 2.5mm Hex driver

CAD
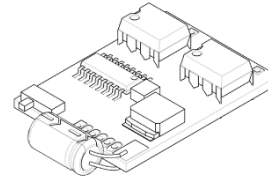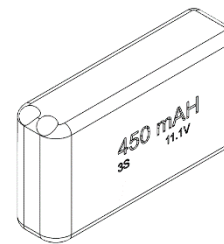
1 X PIEZO SPEAKER

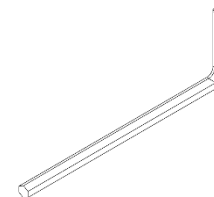Metric fastener with a domed shape head and hex drive. Most commonly found in locations

CAD

1 X PS3 CONTTROLER

Metric fastener with a domed shape head and hex drive. Most commonly found in locations
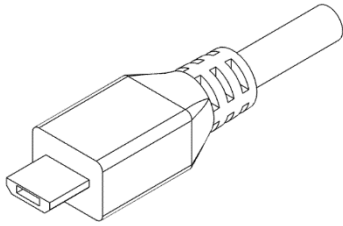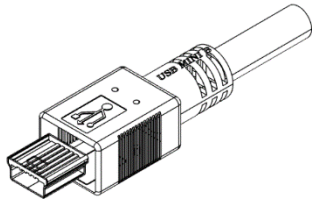
CAD

1 X 2.5MM HEX KEY

M3 fastener is used to connect 2 terminals to make a high amperage power switch. With the use of a 2.5mm Hex driver
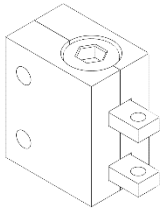
HARDWARE REFERENCE

1 X USB MICRO TYPE A

Used to connect ESP WROOM 32 to a computer or laptop to program.

1 X USB MINI TYPE B

Used to connect PS3 Controller to a computer or laptop to obtain and replace the MAC address of the controller.

1 X 3S LO-PO BATTERY CHARGER

Used to connect PS3 Controller to a computer or laptop to obtain and replace the MAC address of the controller.
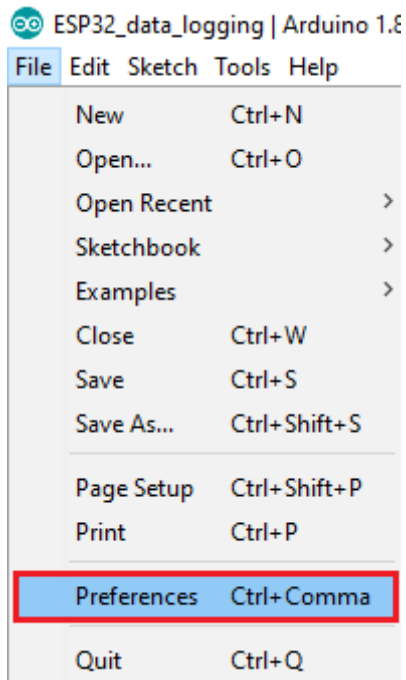
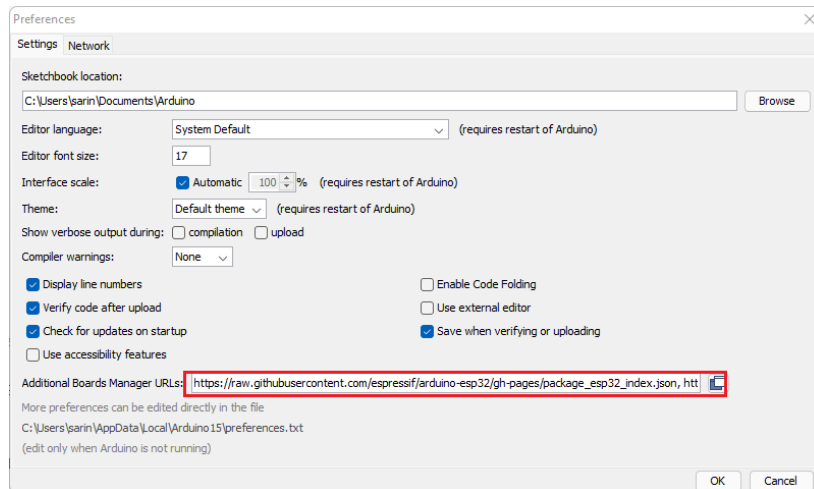# Installing ESP32 Add-on and libraries in Arduino IDE

Prerequisites: [Arduino IDE Installed](#)

Before starting this installation procedure, make sure you have the latest version of the Arduino IDE installed in your computer.

INSTALLING ESP32 ADD-ON AND LIBRARIES IN ARDUINO IDE

1. In your Arduino IDE, go to **File**> **Preferences**

2. Enter the following into the "Additional Board Manager URLs" field:

   ```
   https://raw.githubusercontent.com/espressif/
   arduino-esp32/gh-
   pages/package_esp32_index.json
   ```
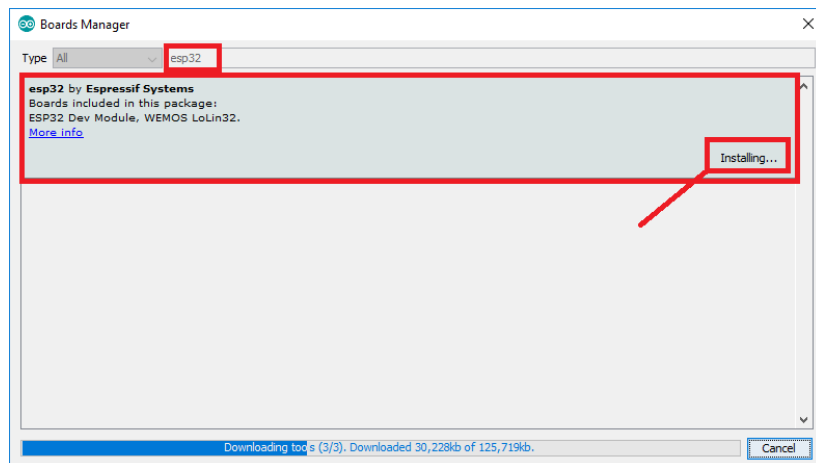
   Then, click the "OK" button:

   Note: if you already have other boards URLs, you can separate the URLs with a comma as follows

INSTALLING ESP32 ADD-ON AND LIBRARIES IN ARDUINO IDE
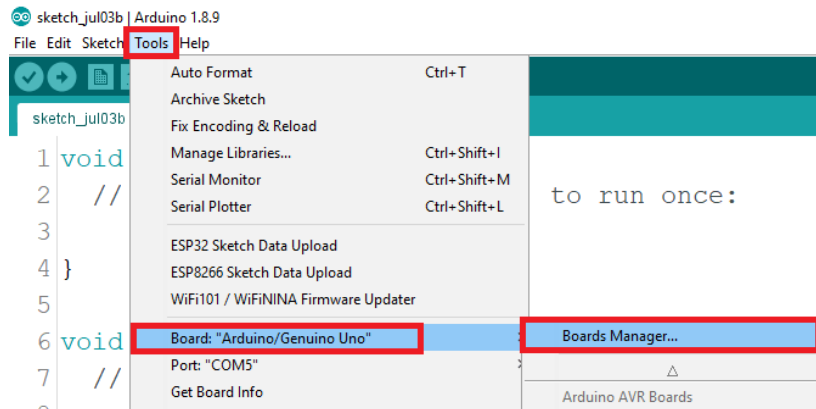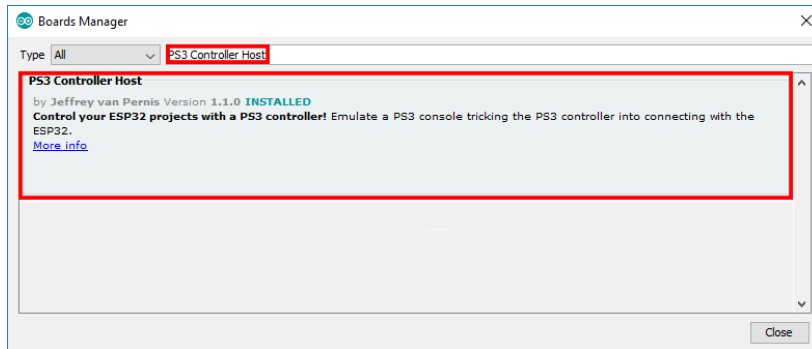

3. Open the Boards Manager. Go to **Tools** > **Board** > **Boards Manager…**

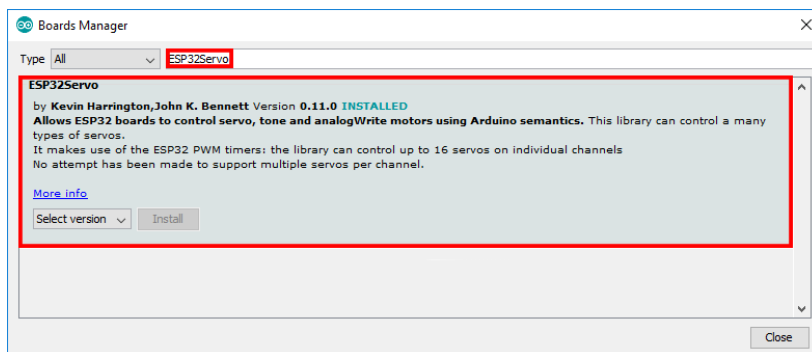4. Search for **ESP32** and press install button for the "**ESP32 by Espressif Systems** ":

    It should be installed after a few seconds.

5. Now ,search for **PS3 Controller Host** and press install button for the "**PS3 Controller Host by Jeffrey van Pernis** ":

    It should be installed after a few seconds.

6. Then search for **ESP32Servo** and press install button for the "**ESP32Servo by Kevin H , John B**":

    It should be installed after a few seconds.

    Congratulations That's it. Your Arduino IDE is ready for programming

Using the Sixaxis Pair Tool

Prerequisites: Sixaxis Pair Tool

Hardware: PS3 Controller , USB Micro Type B Cable

Before starting this installation procedure, make sure you have the hardware and have installed Sixaxis Pair Tool. This software is made to look up and update the MAC address of the controller.
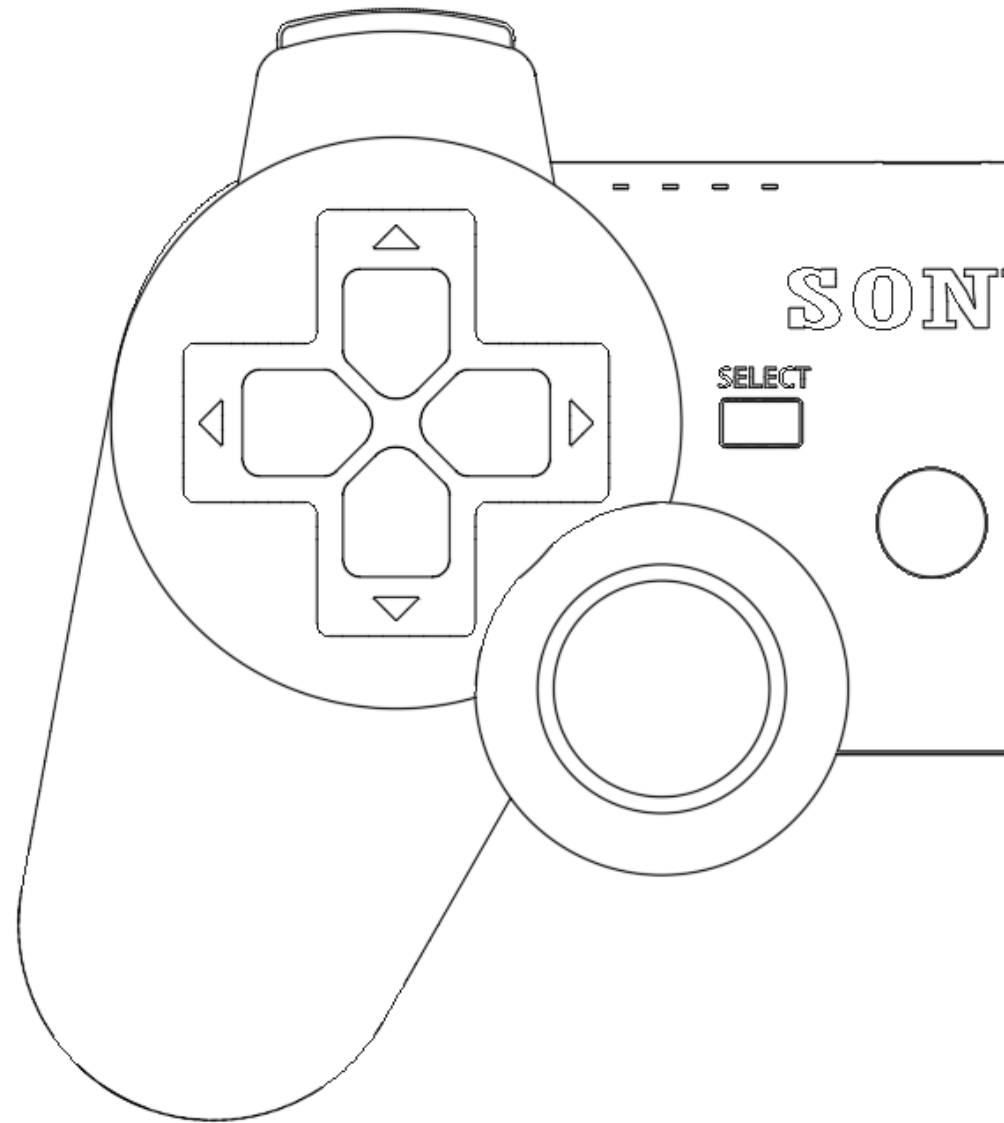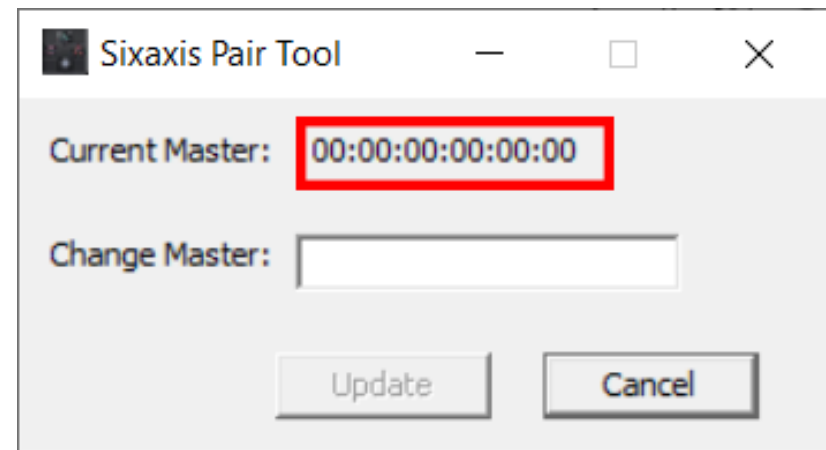
USING THE SIXAXIS PAIR TOOL

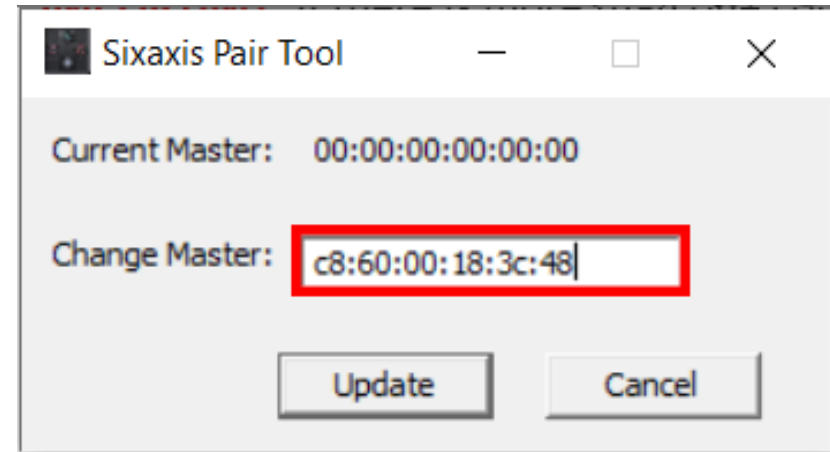1. Once installed open the Sixaxis Pair Tool from your **Start Menu** and plug in your controller
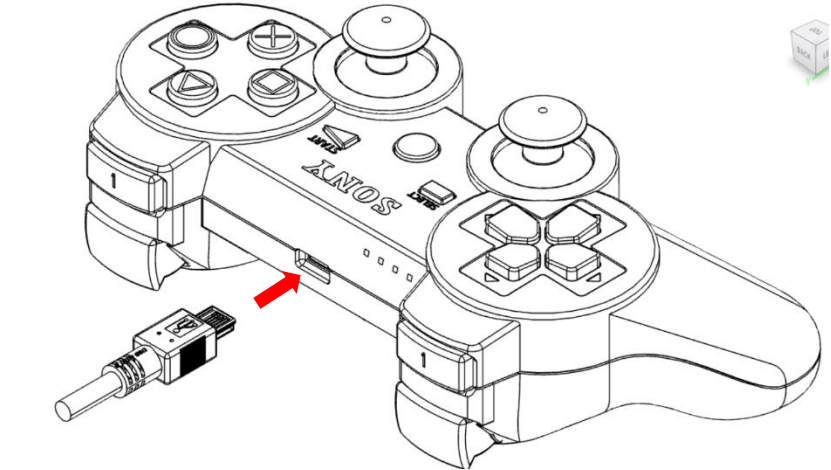
2. Once open, it will display the current MAC Address of the Controller.

3. Using lower case letters and numbers make a unique MAC address in this layout (XX:XX:XX:XX:XX:XX)
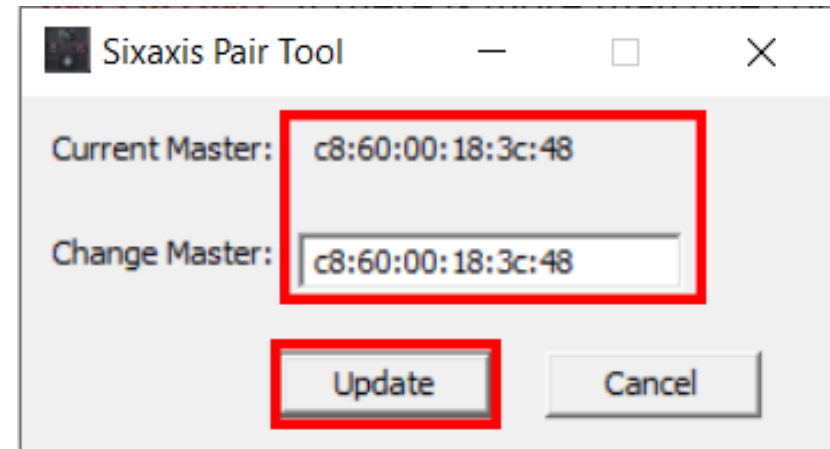
   IMPORTIMT: If there is more than one copy of the MAC address the ESP 32 will not connect to your controller.
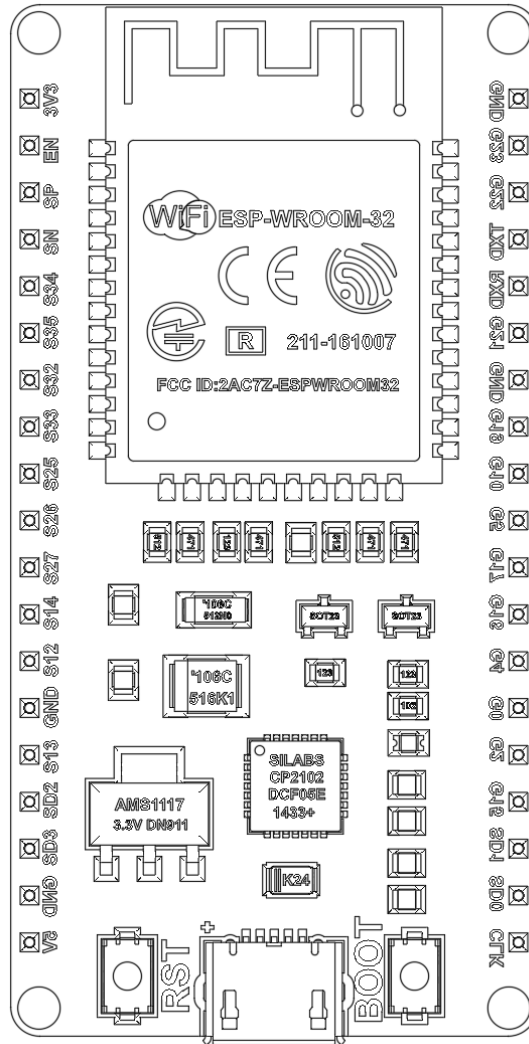
4. Press the **Update** button in the Sixaxis Pair Tool. Wait a few seconds.

   The Current Master should now match Change Master.

5. Congratulations your controller is now unique MAC address! **Write the MAC address for later**. You can close the Sixaxis Pair Tool.
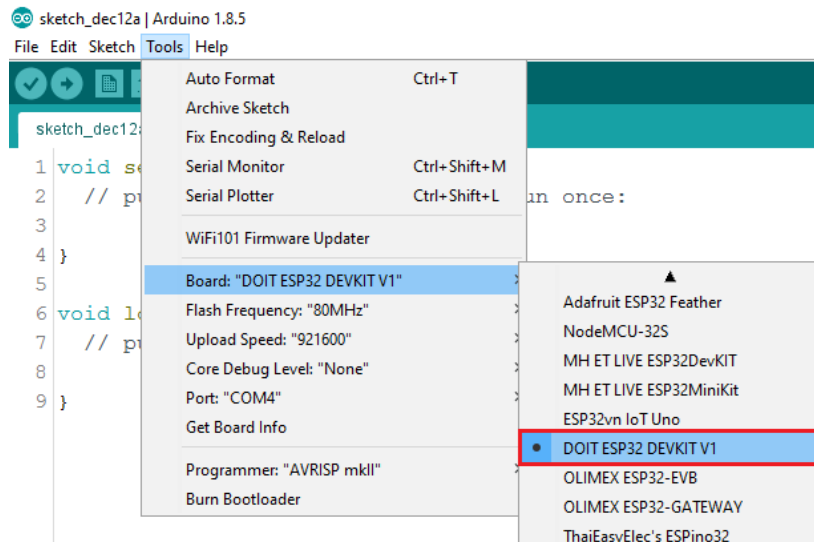
Testing the Installation

Prerequisites: Installing ESP32 Add-on and libraries in Arduino IDE , Using the Sixaxis Pair Tool , Unique MAC address for the controller
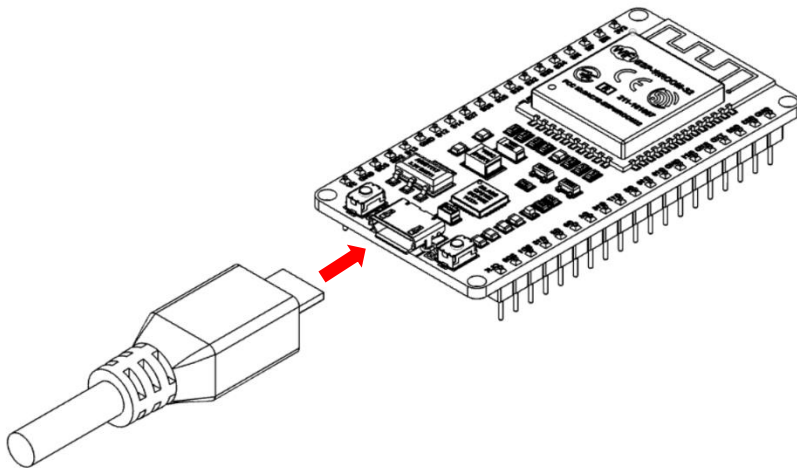
Hardware: ESP WROOM 32, PS3 Controller, USB Micro Type A Cable

Before programing, make sure you have you completed Prerequisite steps. If you don't, you will run in to compiling errors
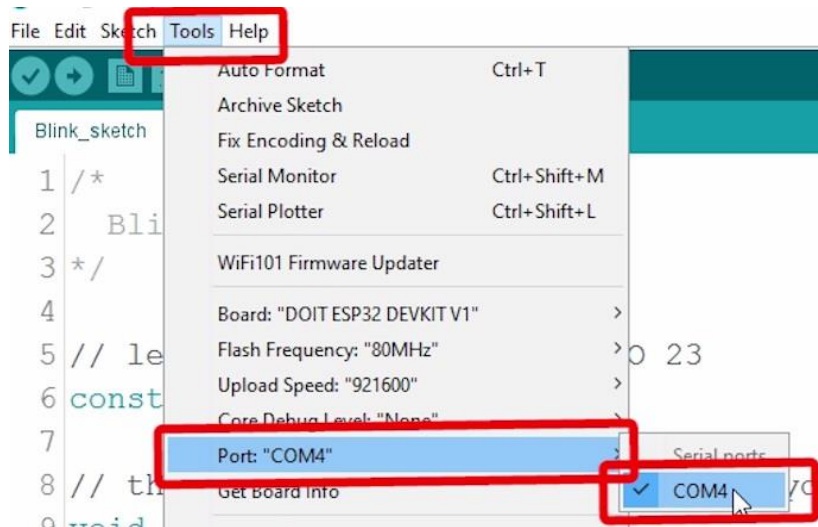
TESTING THE INSTALLATION

1. Select your Board in **Tools** > **Board** menu (in this example it's named **DOIT ESP32 DEVKIT V1**)
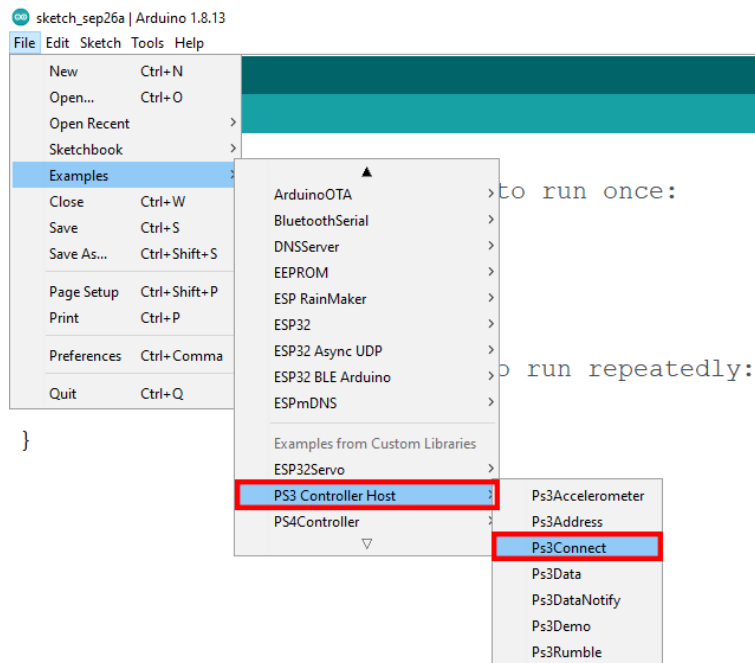

2. Plug in your ESP32 with USB Micro Type A cable.

TESTING THE INSTALLATION
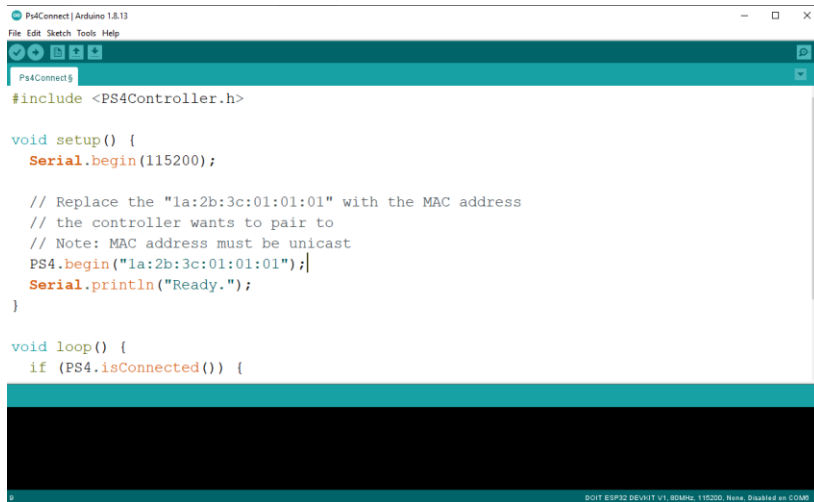

3. Select the Port (if you don't see the COM Port in your Arduino IDE, you need to install the CP210x USB to UART Bridge VCP Drivers).

4. Open the following example under **File** > **Examples** > **PS3 Controller Host** > **Ps3Connect.**
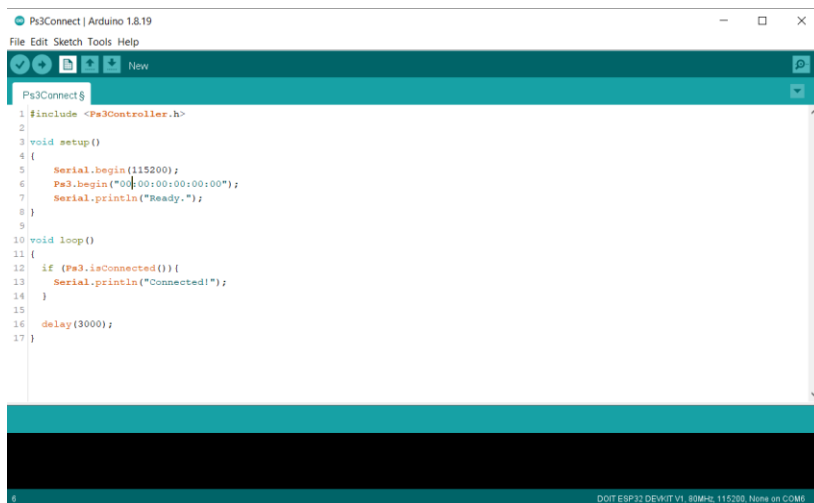
TESTING THE INSTALLATION

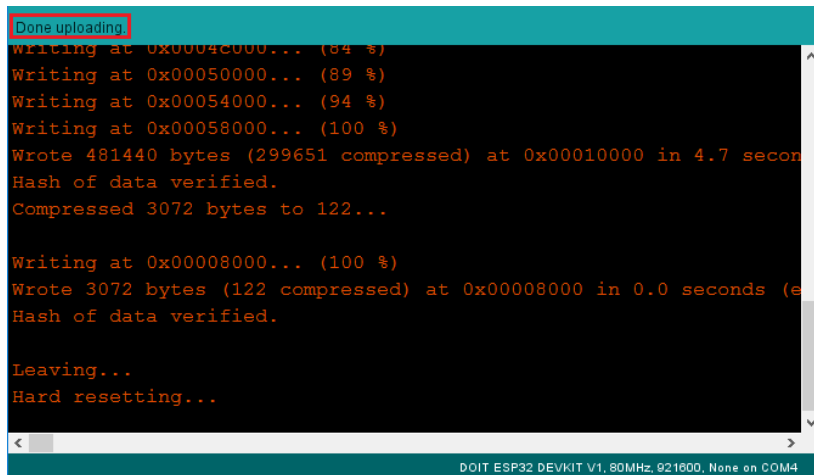5. A new sketch will open in your Arduino IDE.

6. In the sketch find **Ps3.begin("00:00:00:00:00:00");** and replace with MAC address that is associated with in the PS3 Controller.

NOTE: Sixaxis Pair Tool is used to obtain and replace the MAC address.

Press the Upload button in the Arduino IDE. Wait a few seconds while the code compiles and uploads to your board.
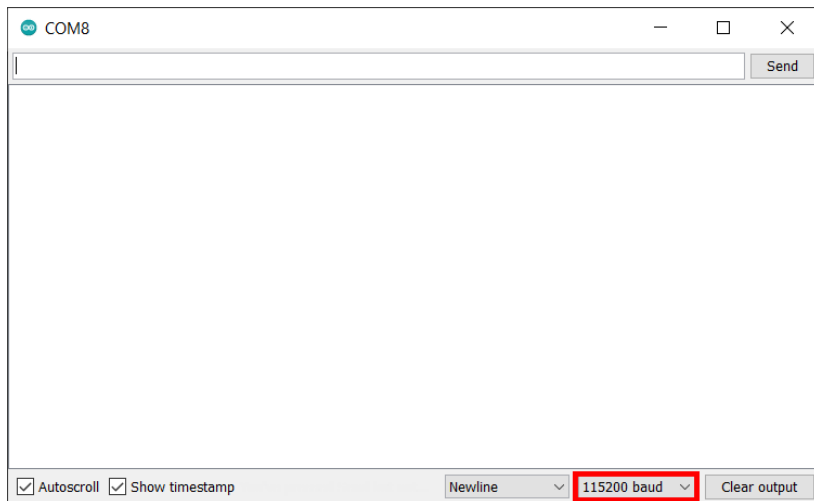
TESTING THE INSTALLATION

```
Done uploading.
Writing at 0x0004c000... (84 %)
Writing at 0x00050000... (89 %)
Writing at 0x00054000... (94 %)
Writing at 0x00058000... (100 %)
Wrote 481440 bytes (299651 compressed) at 0x00010000 in 4.7 secon
Hash of data verified.
Compressed 3072 bytes to 122...

Writing at 0x00008000... (100 %)
Wrote 3072 bytes (122 compressed) at 0x00008000 in 0.0 seconds (e
Hash of data verified.

Leaving...
Hard resetting...

DOIT ESP32 DEVKIT V1, 80MHz, 921600, None on COM4
```

7. If everything went as expected, you should see a "Done uploading" message.

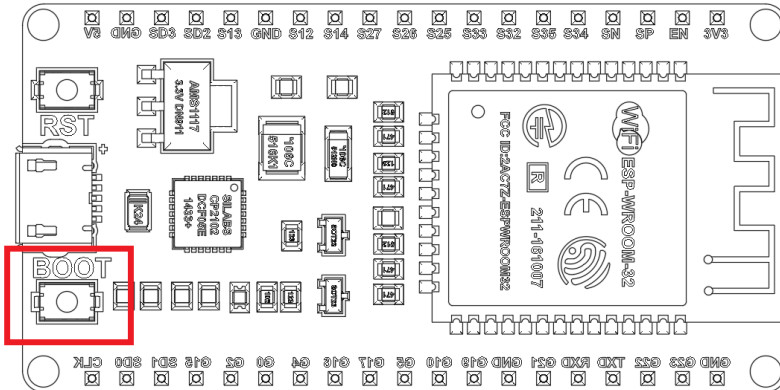   NOTE: If you get the error message "A fatal error occurred: Failed to connect to ESP32: Timed out... Connecting...".Go to the trouble shooting section.

```
COM8                                          —   □   ✕
|                                                    Send

☑ Autoscroll ☑ Show timestamp      Newline ▽  115200 baud ▽  Clear output
```
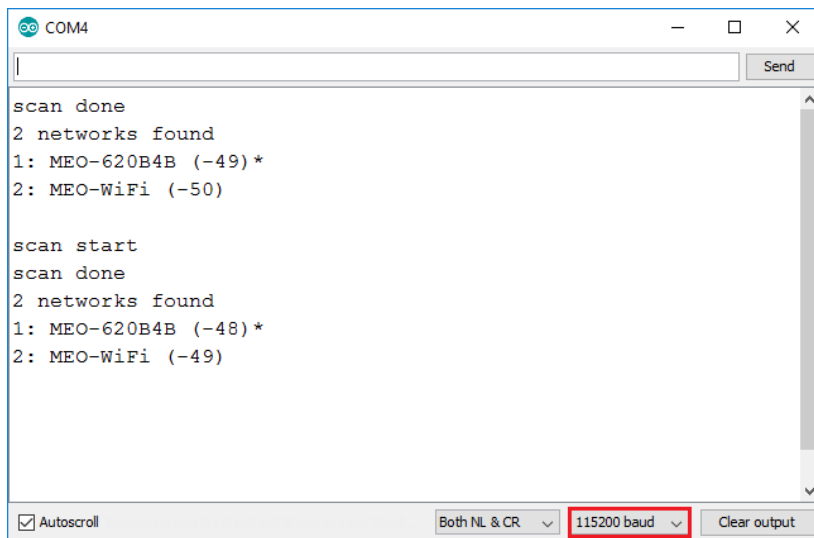
8. Open the Arduino IDE Serial Monitor at a baud rate of 115200:

TESTING THE INSTALLATION

9. Press the ESP32 on-board **Boot** button and you should see the "Connected" in Serial Monitor.

6. Congratulations your Installation of the Arduino IDE works.

Programing The ESP 32 Battle Bot Code

Prerequisites: Battle Bot Code , Installing ESP32 Add-on and libraries in Arduino IDE , Using the Sixaxis Pair Tool , Unique MAC address for the controller

Hardware: ESP WROOM 32, PS3 Controller, USB Micro Type A Cable

Before programing, make sure you have you completed Prerequisite steps. If you don't, you will run in to compiling errors
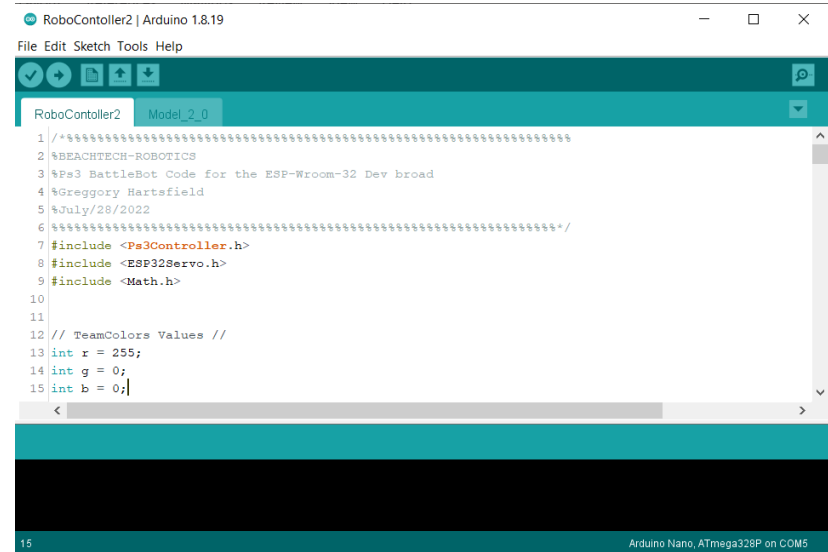
ESP 32 Pinout Diagram

Recommended PWM GPIO pins on the ESP32 include 2,4,12-19,21-23,25-27,32-33
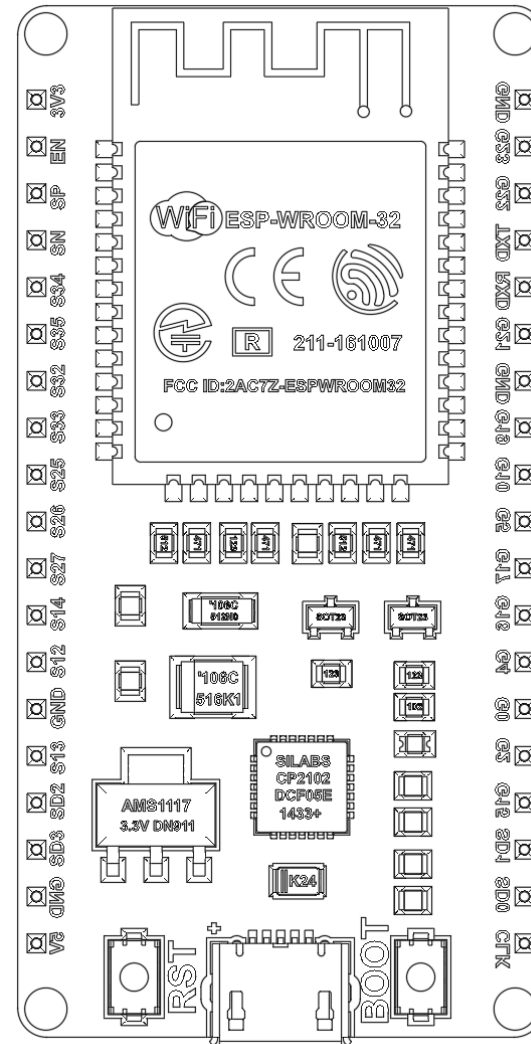
CIRCUIT DIAGRAM

- **S1 form the ESC** connect to **pin 24 on the ESP32**.
- **S2 form the ESC** connect to **pin 14 on the ESP32**.
- **(Red +) wire form the ESC** connect to **VIN on the ESP32**.
  Warning if you connect VIN pin with more the 5V you will burnout the ESP 32
- **(Black –) wire form the ESC** connect to **GND on the ESP32**.
- **Red wire form the Pezo Speaker** connect to **Pin 32 on the ESP32.**
- **Black wire form the Pezo Speaker** connect to **GND on the ESP32.**
- **Connect 2 x N20 Motors** to M1 and M2 respectfully to the **ESC**

Before moving on please complete the circuit.
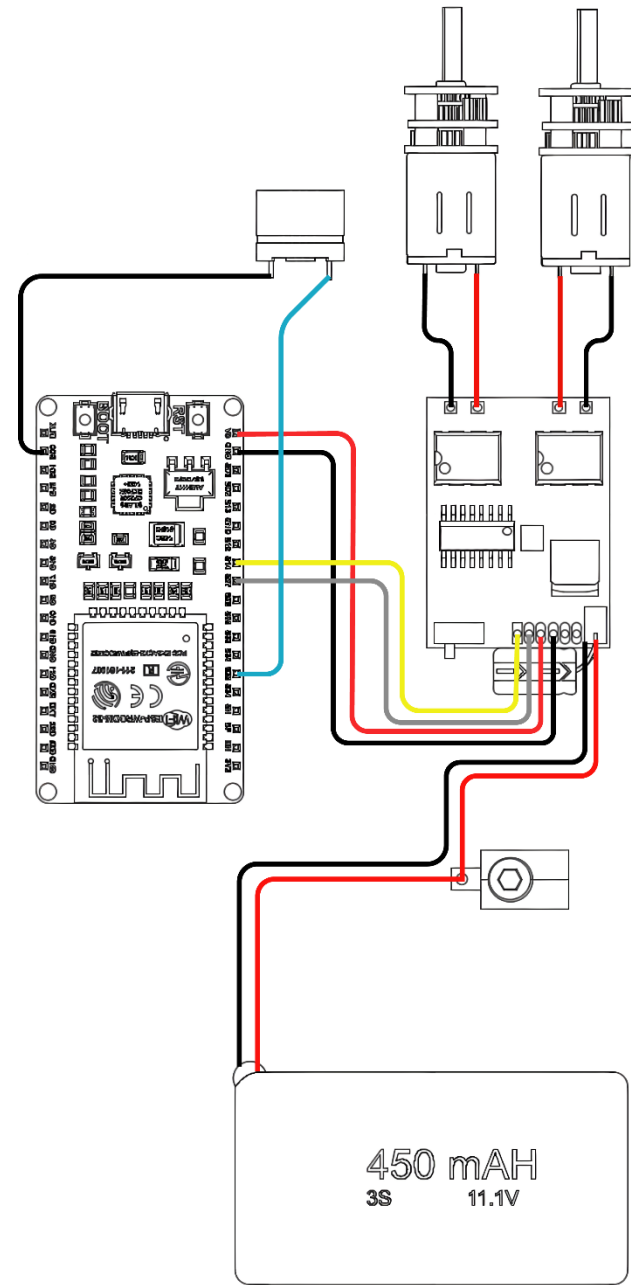
PROGRAMING THE ESP 32 BATTLE BOT CODE

1. Once the code is Downloaded un-zip the file and open the "RoboController 2.0" .A new sketch will opens in your Arduino IDE.
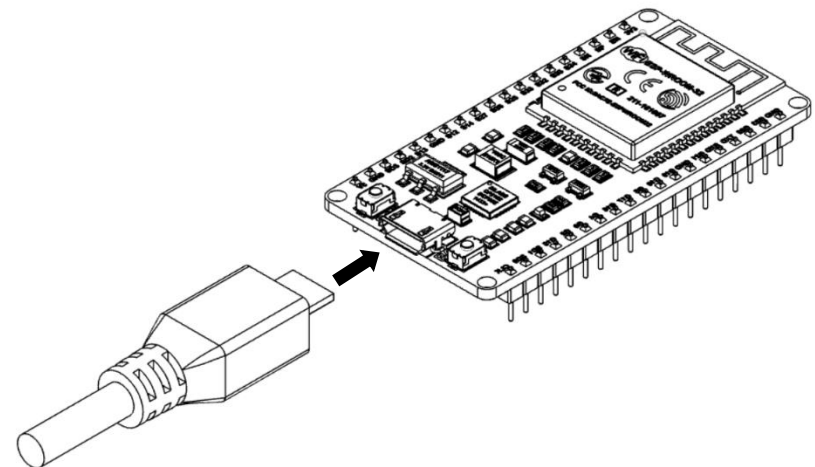

1. Plug in your ESP32 with USB Micro Type A cable.

1. In the sketch find **Ps3.begin("00:00:00:00:00:00");** and replace with MAC address that is associated with in the PS3 Controller.

   Press the Upload button in the Arduino IDE. Wait a few seconds while the code compiles and uploads to your board.

2. If everything went as expected, you should see a "Done uploading" message.

   NOTE: If you get the error message "A fatal error occurred: Failed to connect to ESP32: Timed out… Connecting…".Go to the trouble shooting section.
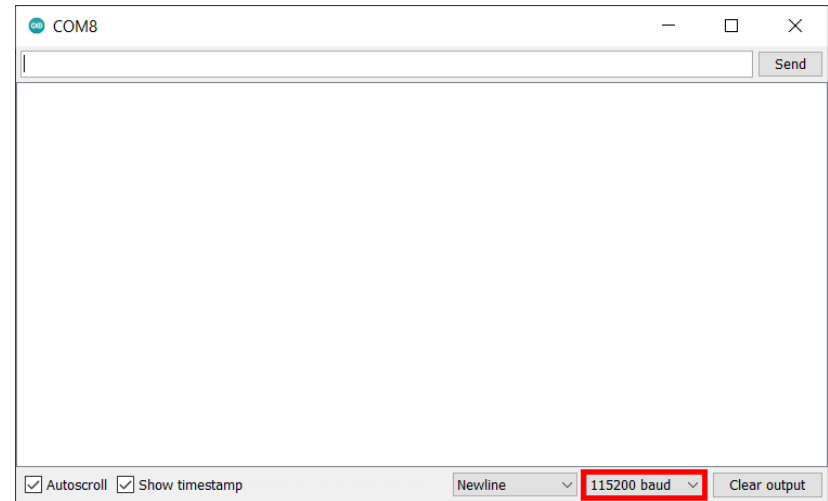
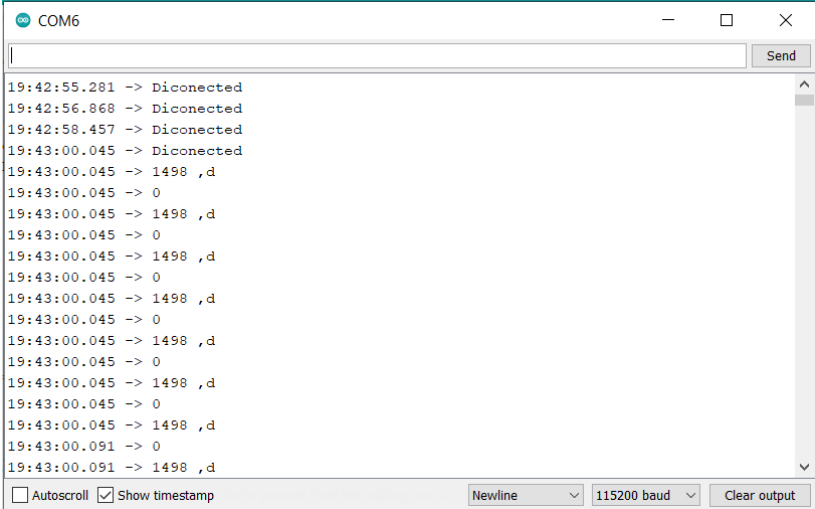3. Open the Arduino IDE Serial Monitor at a baud rate of 115200:

4. Press the ESP32 on-board **Boot** button and you should see the "Initializing Motors . . . Complete" and "Disconnected" in Serial Monitor.

5. Press the PS3 Home button on the controller and you should see the "Connected" in Serial Monitor and then a stream of data from the controller.

```
COM6                                                    −  □  ×
|                                                         Send
19:42:55.281 -> Diconected                                 ^
19:42:56.868 -> Diconected
19:42:58.457 -> Diconected
19:43:00.045 -> Diconected
19:43:00.045 -> 1498 ,d
19:43:00.045 -> 0
19:43:00.045 -> 1498 ,d
19:43:00.045 -> 0
19:43:00.045 -> 1498 ,d
19:43:00.045 -> 0
19:43:00.045 -> 1498 ,d
19:43:00.045 -> 0
19:43:00.045 -> 1498 ,d
19:43:00.045 -> 0
19:43:00.045 -> 1498 ,d
19:43:00.045 -> 0
19:43:00.045 -> 1498 ,d
19:43:00.091 -> 0
19:43:00.091 -> 1498 ,d                                    v
☐ Autoscroll ☑ Show timestamp      Newline ∨  115200 baud ∨  Clear output
```

6. Congratulations Programed your ESP32

Troubleshooting

If you try to upload a new sketch to your ESP32 and you get this error message "*A fatal error occurred: Failed to connect to ESP32: Timed out… Connecting…*". It means that your ESP32 is not in flashing/uploading mode.

Having the right board name and COM port selected, follow these steps:

- Hold-down the "**BOOT**" button in your ESP32 board
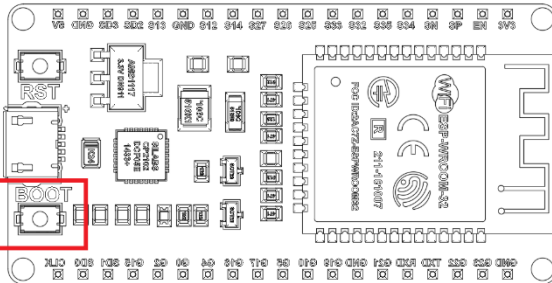
- Press the "**Upload**" button in the Arduino IDE to upload your sketch:

- After you see the "**Connecting….**" message in your Arduino IDE, release you finger from the "**BOOT**" button:

- After that, you should see the "**Done uploading**" message

That's it. Your ESP32 should have the new sketch running. Press the "**ENABLE**" button to restart the ESP32 and run the new uploaded sketch.

You'll also have to repeat that button sequence every time you want to upload a new sketch. But if you want to solve this issue once for all without the need to press the **BOOT** button, follow the suggestions in the next guide:

Sources

I've had tremendous help developing this this guide and code by reading these sources:

ESP32 PS3 Library made by jvpernis :

https://github.com/jvpernis/esp32-ps3

Installing the ESP32 Tutorial made by randomnerdtutorials :

https://randomnerdtutorials.com/installing-the-esp32-board-in-arduino-ide-windows-instructions/