

How to Control Your Robot Remotely

Congrats on completing the STEM Camp!

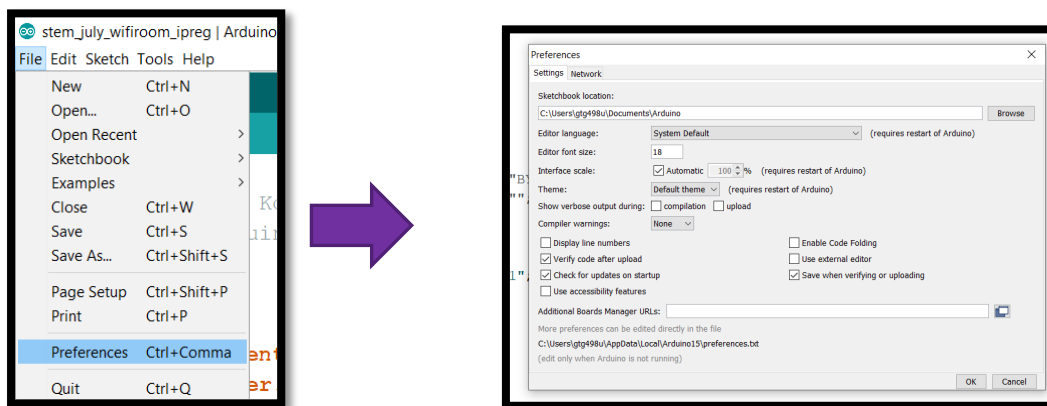
Step 1. Download the Arduino IDE to a computer at your residence.

You can follow the Instructions on the Arduino IDE website:

<https://docs.arduino.cc/software/ide-v1/tutorials/Windows>

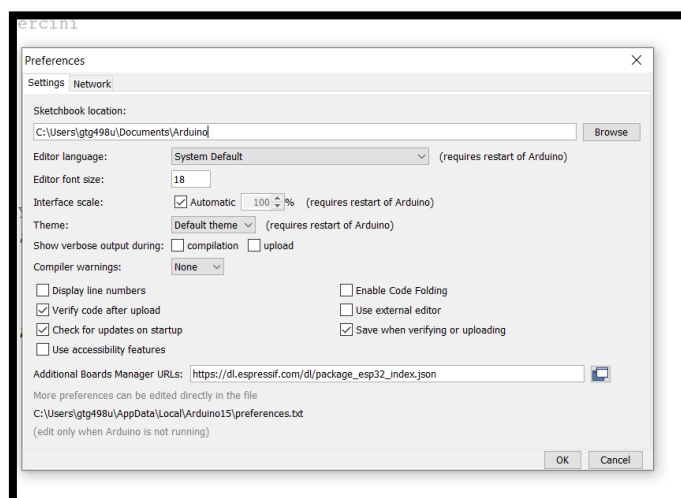
Step 2. After completing step 1, you'll need to configure the IDE to recognize the ESP32.

- Start Arduino and open the Preferences window.



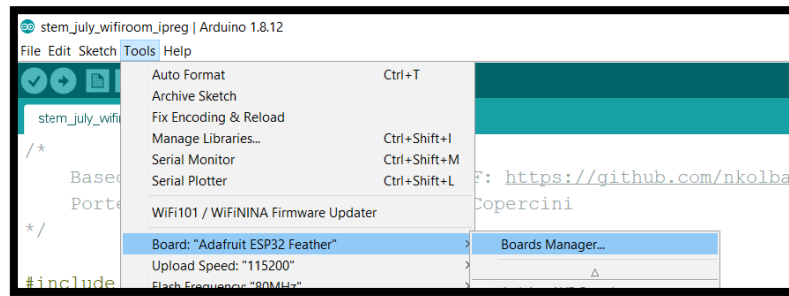
- In **Additional Board Manager URLs** (bottom white text box) type:
 - https://dl.espressif.com/dl/package_esp32_index.json

Note: Do not put this link into a web-browser. Copy and paste the URL into the **Additional Board Manager URLs** textbox.

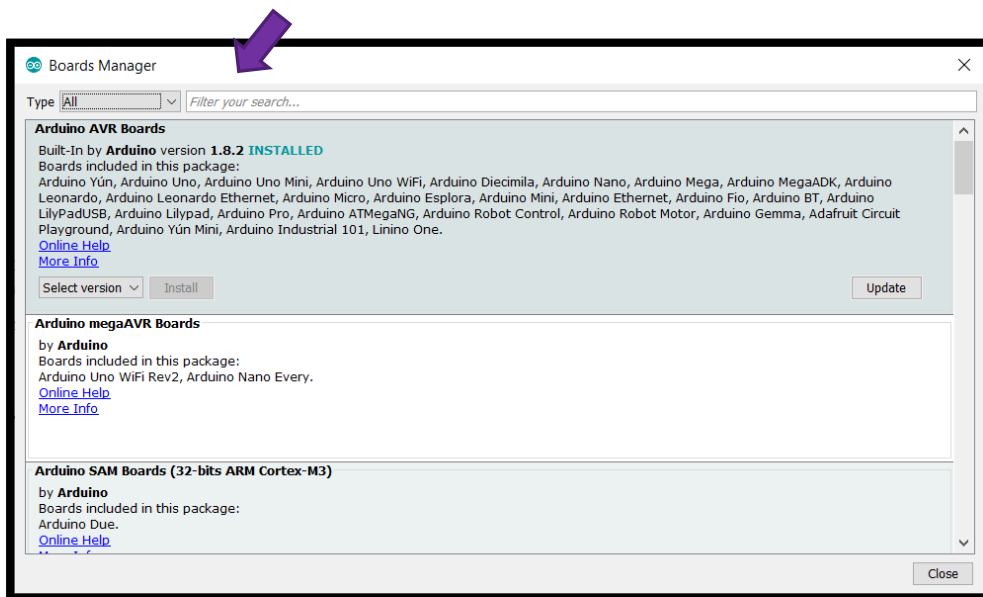


Click **OK**

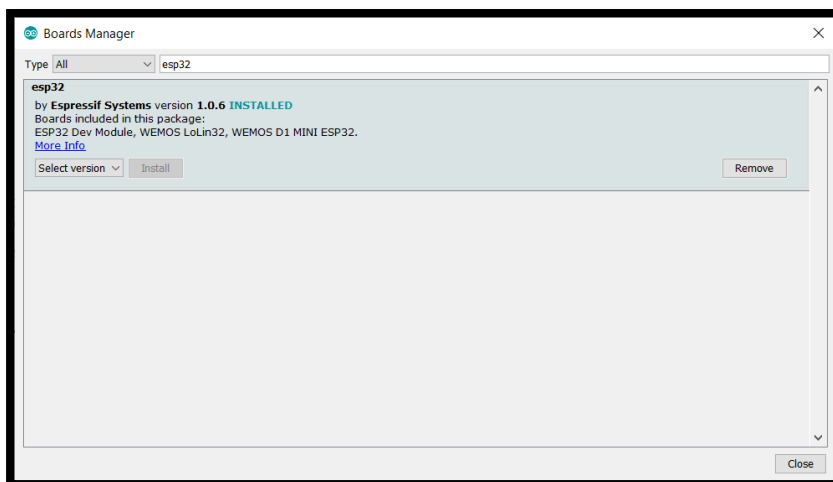
- Open **Boards Manager** from **Tools > Board** menu. Click on **Boards Manager...**



Wait for the top white text box to appear. (It may take a few minutes to appear depending on your Internet connection.)



Type: **esp32**



Click on **Install**

It may take a few minutes to install depending on your Internet connection.

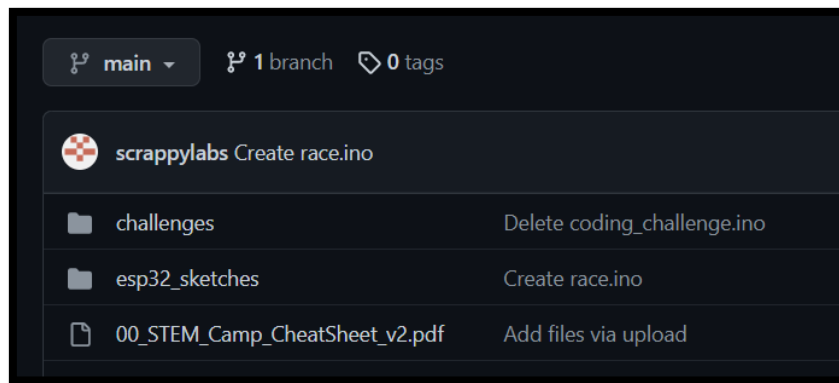
Step 3. Open a web-browser and visit:

<https://www.reachrf.com/stem-camp/>



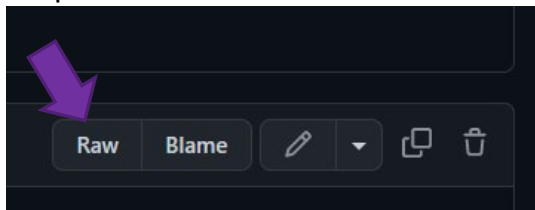
On the web-site click on **STEM Camp GitHub**

Step 4. Click on **esp32_sketches**



Step 5. Click on **at_home_control_robot.ino**

Step 6. Click on **Raw**



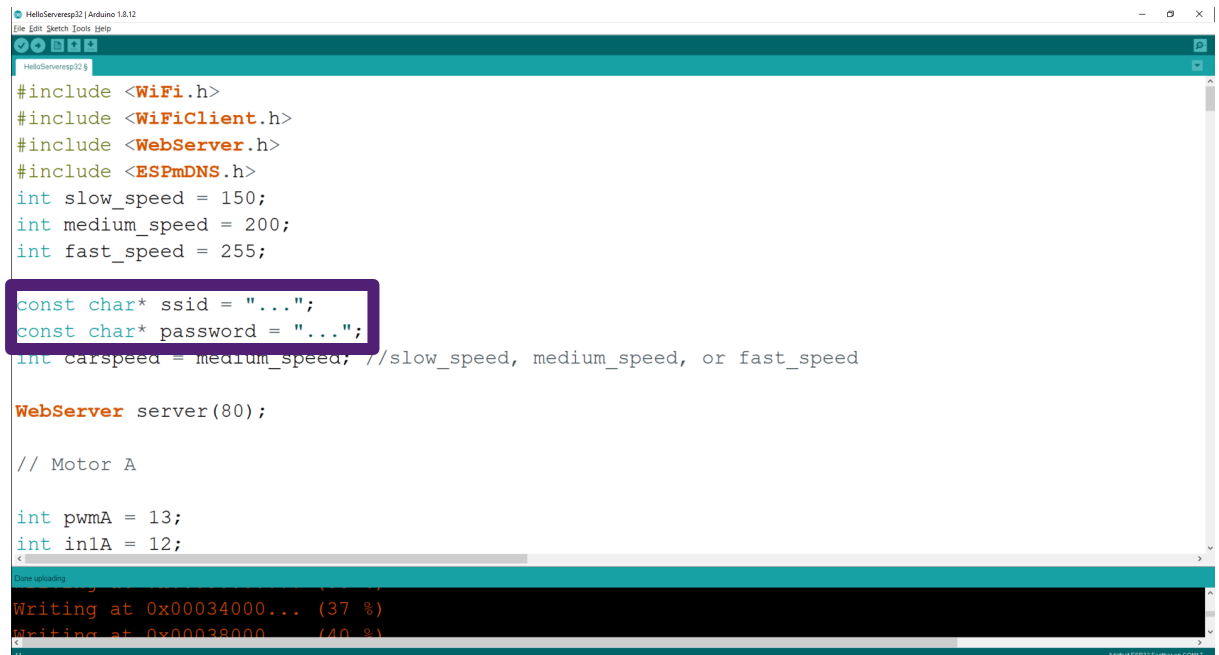
Step 7. Select all the text in the web-browser (hint: you can hold **Ctrl** then tap **a (Ctrl+a)** on the keyboard to select all)

Step 8. Copy the highlighted text with **Ctrl+c**

Step 9. On Arduino IDE, delete the code in the current sketch.

Step 10. Paste the code you copied from the web-browser into the blank Arduino IDE.

Step 11. Change ONLY the **ssid** and **password** to match the 2.4GHz Wi-Fi network at your residence.



```
#include <WiFi.h>
#include <WiFiClient.h>
#include <WebServer.h>
#include <ESPmDNS.h>
int slow_speed = 150;
int medium_speed = 200;
int fast_speed = 255;

const char* ssid = "...";
const char* password = "...";

int carspeed = medium_speed; //slow_speed, medium_speed, or fast_speed

WebServer server(80);

// Motor A

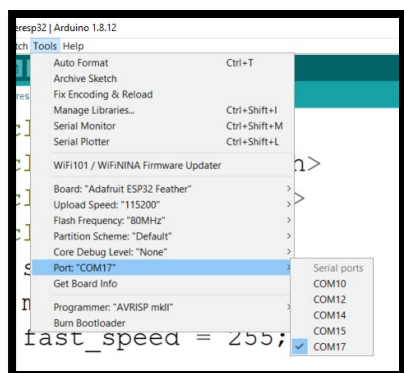
int pwmA = 13;
int in1A = 12;
```

Serial Monitor output:

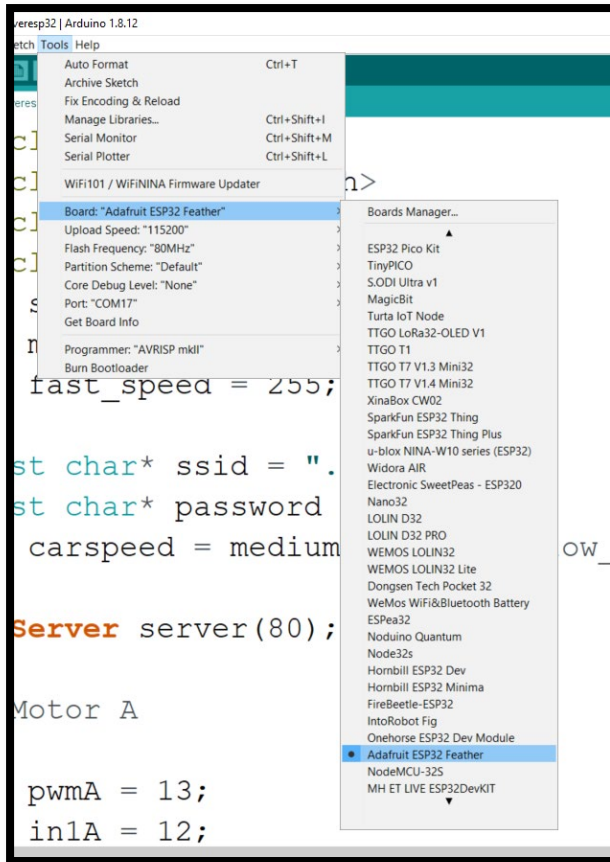
```
Writing at 0x00034000... (37 %)
Writing at 0x00038000... (40 %)
```

Step 12. Plug in your robot to the computer (you need a micro-USB cable).

Step 13. Go to **Tools->Port** and select the Port that your robot is identified by. In the example below, after plugging in the robot, I see **COM17** appear. Your port may be different than COM17. Select the Port that appear when your robot is plugged in.

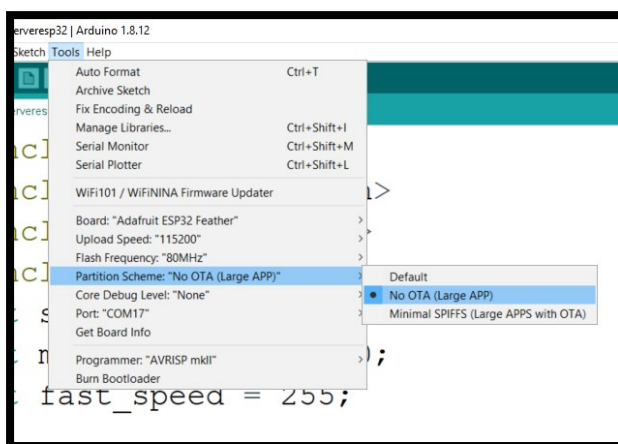


Step 14. Go to **Tools->Board** and select: **Adafruit ESP32 Feather**

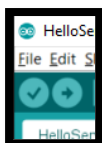


If you do not see this option, complete **step 2**, from earlier.

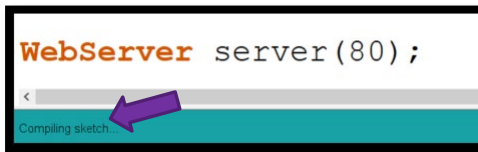
Step 15. Go to **Tools->Partition Scheme** and select **No OTA (Large App)**



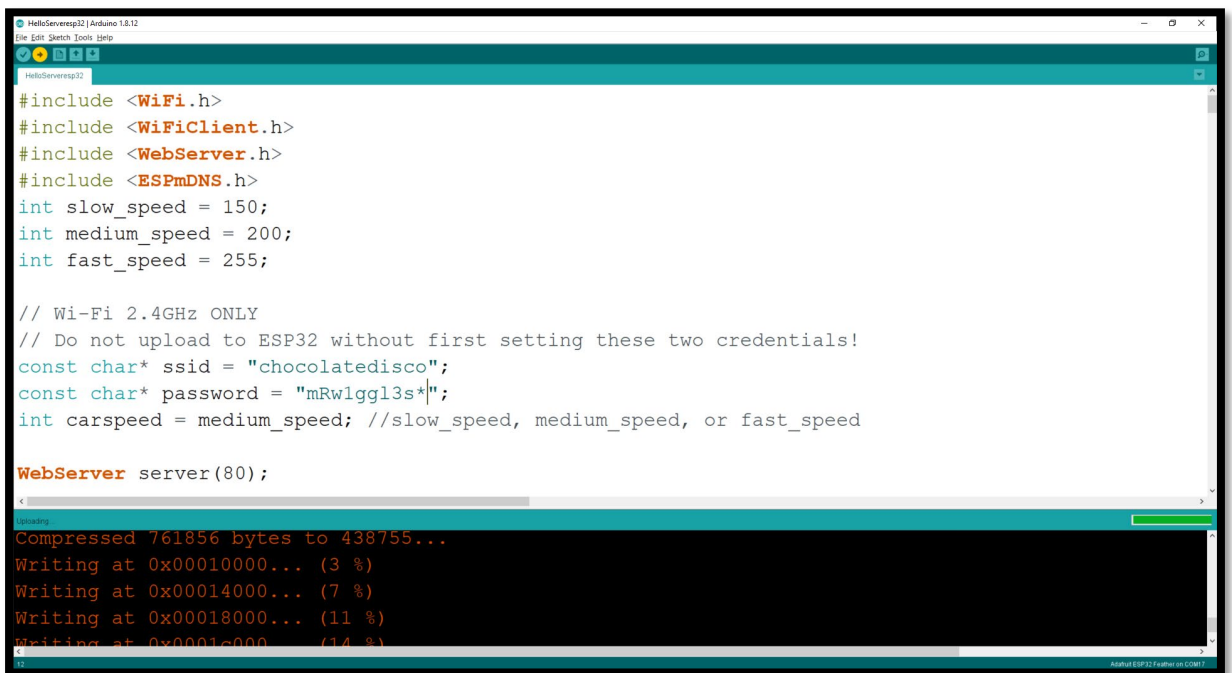
Step 16. With your robot attached, click the **arrow** button.



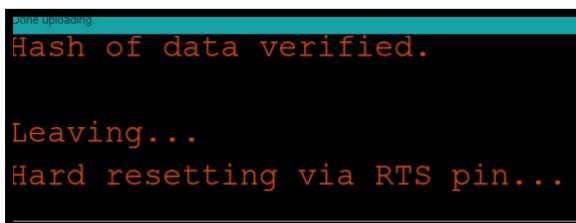
Step 17. Your code will compile



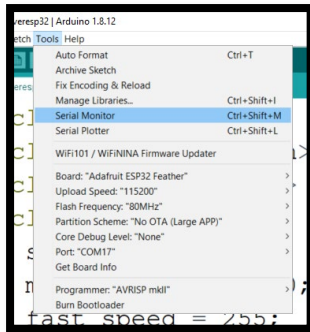
Step 18. Your code will then attempt to upload to the ESP32 (orange text). If your screen hangs on connecting..., then press and hold the boot button on the ESP32. (the BOOT button is to the LEFT of the ESP32 microUSB connector, close to the pin labelled: CLK)



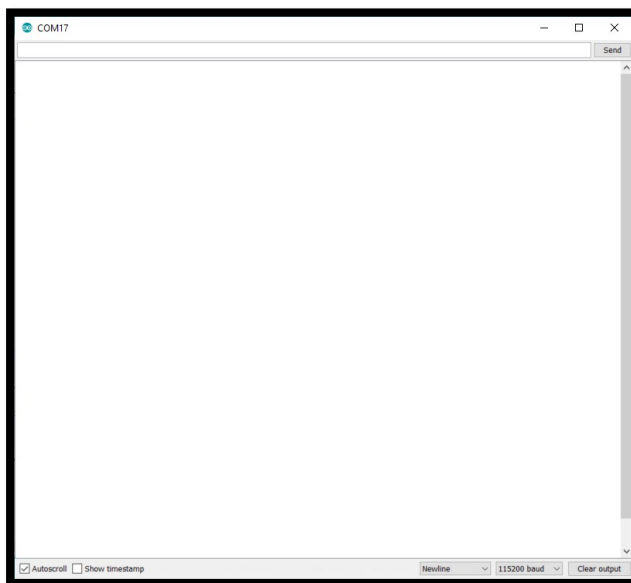
Step 19. Your code is deployed when you see the below message:



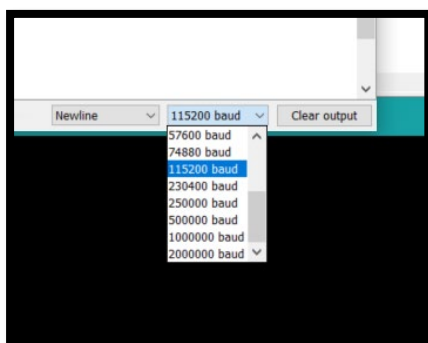
Step 20. Go to and select Serial Monitor: **Tools->Serial Monitor**



Step 21. A new window appears, this is the Serial Monitor.

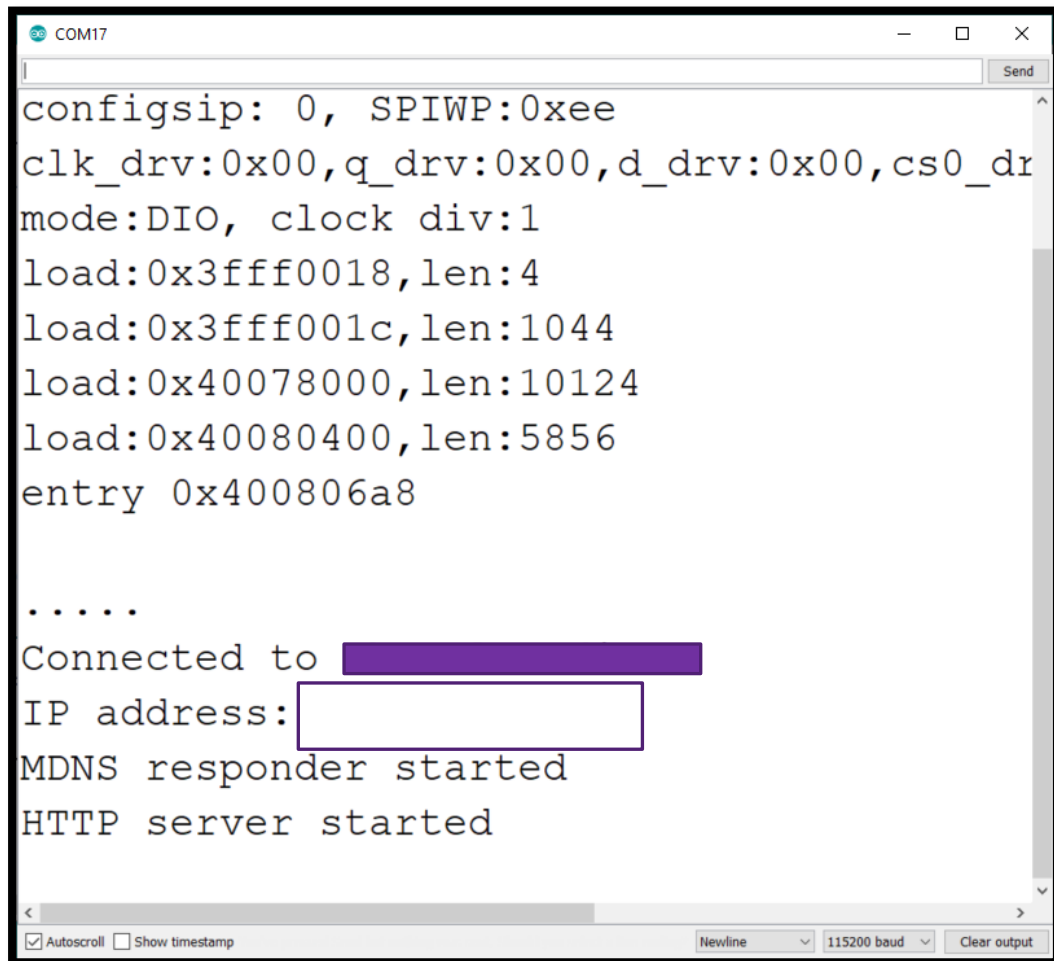


Step 22. Bottom right, select **115200 baud**



Step 23. Press the RESET button on the ESP32. (the RESET button is to the RIGHT of the ESP32 microUSB connector, close to the pin labelled: V5)

Step 24. Confirm that your ESP32 has received an IP address from your Wi-fi network. It will take the form: **X.X.X.X** where **X** is a number from 0 to 255.

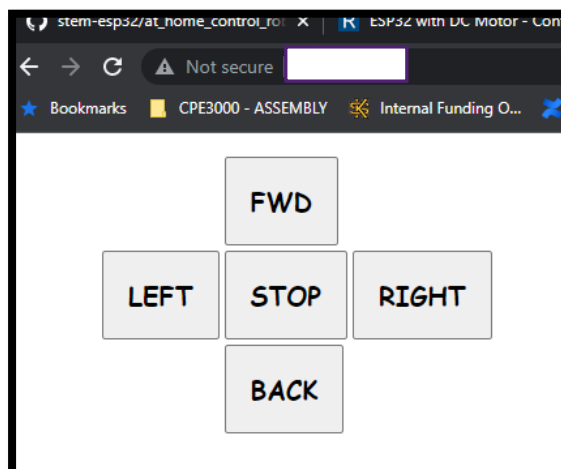


```
COM17
configsip: 0, SPIWP:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_dr
mode:DIO, clock div:1
load:0x3fff0018,len:4
load:0x3fff001c,len:1044
load:0x40078000,len:10124
load:0x40080400,len:5856
entry 0x400806a8

.....
Connected to [REDACTED]
IP address: [REDACTED]
MDNS responder started
HTTP server started
```

The screenshot shows a serial terminal window titled 'COM17'. It displays the boot sequence of an ESP32, including memory loading and entry point execution. After a series of dots, it shows the device has connected to a Wi-Fi network (represented by a redacted name) and has been assigned an IP address (also redacted). Subsequently, the MDNS responder and HTTP server are started. The terminal interface includes a 'Send' button, a scroll bar, and settings at the bottom like 'Autoscroll', 'Show timestamp', 'Newline', '115200 baud', and 'Clear output'.

Step 25. Open a web-browser on a device that is connected to your Wi-Fi network. In the URL type the IP address you recorded from **Step 24**.



Step 26. You can now control your robot! If you experience any delays, Wi-Fi is known to experience delays. Just be patient controlling your robot. To make the robot go faster/slower, you'll need to change the code:

For slow speed:

```
int carspeed = slow_speed; //slow_speed, medium_speed, or fast_speed  
WebServer server(80);
```

For medium speed:

```
int carspeed = medium_speed; //slow_speed, medium_speed, or fast_speed  
WebServer server(80);
```

For fast speed:

```
int carspeed = fast_speed; //slow_speed, medium_speed, or fast_speed  
WebServer server(80);
```

After making the changes you'll need to repeat **Steps 16-19**.