

DRONE CALIBRATION ver. 26_Mar_2025

⚠ Drone Setup: For calibration of the Drone, it has to be assembled without the propellers and battery.

⚠ Drone Handling: For calibration of the Drone, the drone shouldn't be moved, unless the calibration test instructions ask you to, this is to maintain correct calibration.

⚠ Select DOIT ESP32 DEVKIT V1 Board for ESP32 on in the drone and **Arduino Nano Board** accordingly and IDE should have the following boards and libraries installed (Scroll to find)

- ESP32 Board
- ESP-NOW library
- ESP-WiFi library
- ESP-Servo library
- ESP-ADC driver library
- WiFi library
- Adafruit BUS IO Library
- Adafruit GFX Library
- Adafruit SSD1306 Library
- EEPROM Library

⚠ Laptop capability: For calibration of the Drone, upto step 2, you have to keep drone's Arduino Nano board connected with a laptop via USB-C cable, however if you connect another ESP32 board in function with same laptop, the laptop may shutdown due to power compatibility issue from your laptop's USB port. Avoid such scenarios by using two different laptops.

⚠ Note: This manual slightly differs in naming folders for code, from the tutorial video uploaded on moodle. However the process of calibration remains same.

Calibration Procedure

STEP 1:

1. Open the code in the folder **Drone receiver Code - Drone DO IT ESP32** to the esp32 in the drone.
2. Change the SSID Prefix to your Group number i.e. "A5", then upload the code (Don't use any special characters) in **line 51**.

STEP 2:

3. Open the folder named **YMFC AL_setup Code**, here you will see two codes, one for Arduino Nano present in Drone, one for ESP32 in Joystick.
4. From the folder **Drone Calibration – Joystick DO IT ESP32** open the code present in subfolder then replace word "slave" with your Group number i.e. "A5" in **line 109**, then upload the code to the esp32 present in the joystick.

5. From the folder **YMFC-AL_setup - Drone Arduino Nano** open the code present in subfolder and upload the code to the Arduino nano present in the drone without any alteration.
6. Now the Joystick has to be calibrated pressing the right joystick button (with ARM = "0") and after calibration ARM switch needs to be toggled to "1", eventually OLED will show the info "Connected".
7. Open up the serial monitor in the laptop where the Arduino Nano is connected with the USB-C cable, and set the baud rate to 576000.
8. Double click on the serial monitor logo (fig. 1) to soft reset the serial monitor.

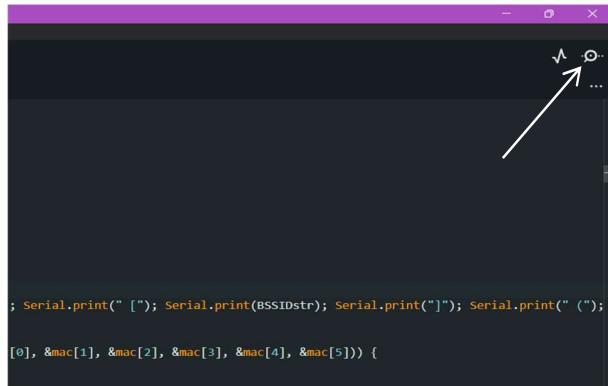


Fig. 1

9. Make yourself known to the controls of Front, Back, Nose Left, Nose Right side and Nose Up, Nose Down of the Drone as it will ask you to perform a few tasks in the instructions.
10. Align the joysticks in the centre position so that THRO: 127, YAW: 127 (PICT ROLL will be in middle as the right joystick has a spring, **if you see values otherwise, you may have to recalibrate your joystick**)
11. As soon as that is done, instructions to calibrate the Drone will come up on serial monitor.
 - a. Joysticks have to be kept in centre positions within 10 seconds of prompt in serial monitor, and observe the centre values from the OLED in joystick, these values will be critical further in calibration.
 - b. Joysticks have to be moved in a few mentioned directions and then have to be brought back at the centre position (match the centre position from earlier observed values, HINT: observe OLED).
 - c. Sequentially calibration of gyro will start, there you have to move the Drone in a few particularly mentioned directions manually, after each movement, you have to provide control: "Nose Up" to proceed.
 - d. The LED in Drone will be lit when calibration will be over and calibration data will be written on EEPROM, **if it fails at any stage, start back from STEP 8.**

STEP 3:

12. Refer to the folder **YMFC AL_esc_calibrate** and upload code from subfolder **YMFC-AL_esc_calibrate - Drone Arduino Nano** to the Arduino Nano of the Drone.
13. Now you need to connect battery to your drone in order to let the motors rotate. However, you may remove the USB connection from the ESP32 present in the Drone.
14. Open up the serial monitor in the laptop where the Arduino Nano is connected with the USB-C cable, and set the baud rate to 576000, and then
 - a. You have to type the following commands (fig. 2) in the message box (fig. 3)

```
///////////  
//The program will start in calibration mode.  
//Send the following characters / numbers via the serial monitor to change the mode  
//  
//r = print receiver signals.  
//a = print quadcopter angles.  
//1 = check rotation / vibrations for motor 1 (right front CCW).  
//2 = check rotation / vibrations for motor 2 (right rear CW).  
//3 = check rotation / vibrations for motor 3 (left rear CCW).  
//4 = check rotation / vibrations for motor 4 (left front CW).  
//5 = check vibrations for all motors together.
```

Fig. 2



Fig. 3

- b. **Type** next commands as shown in Fig. 2 one after another, and you will be able to see instructions in the serial monitor, follow as it instructs.
- c. **Check** whether the drone is receiving correct signals when you provide controls by the joystick and gyro is providing correct angles when you move the drone by hands.
- d. **Check** whether the motors are rotating (clockwise or Counterclockwise) in the correct direction as they are supposed to rotate, if not then re-do the connections of the motors correctly. If everything is in order proceed with next step.

STEP 4:

15. Open the subfolder named **YMFC AL_Flight Controller**, here you will see two codes, one for Arduino Nano present in Drone, one for ESP32 in Joystick
16. From the folder **Joystick Flight Control Code - Joystick DO IT ESP32** open the code present in subfolder **then replace word "slave" with your Group number i.e. "A5" in line 109**, then upload the code to the esp32 present in the joystick.
17. From the folder **Drone controller Flight Control Code - Drone Arduino Nano** open the code present in subfolder and upload the code to the Arduino nano present in the drone without any alteration.
18. Remove all USB connections and prepare your drone and joystick for flying.