ESP copter

Drone using esp32

A Project Report

Submitted in partial fulfilment of the requirements for the award of degree of

B.TECH (C.S.E)

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Declaration

We, hereby declare that the work done by us on “Drone using esp 32” is a record of original work for the partial fulfilment of the requirements for the award of the degree.

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ABSTRACT

Nowadays, there is a growing need for flying drones with diverse capabilities for both civilian and military applications. There is also a significant interest in the development of novel drones which can autonomously fly in different environments and locations and can perform various missions. In the past decade, the broad spectrum of applications of these drones has received most attention which led to the invention of various types of drones with different sizes and weights.

I always thought of making your own customizable drone is a hard and cumbersome process and i still believe in that but can we make some alternative to that of high end drone to some mini programmable drone that can help kids mostly (STEM) to know more about the drones and how they actually work in easier way. In this project we tried to maken a simple mini programmable drone using esp 32 that can be controlled from anywhere around the world.

ACKNOWLEDGEMENT

I cannot express enough thanks to my committee for their continued support and encouragement. I offer my sincere appreciation for the learning opportunities provided by my committee.

My completion of this certification course could not have been accomplished without the support of my friend, senior and my classmates.

Thank you for allowing me to take part to experience something from you to research and write. You deserve a trip to destination visit plan! Thanks to my parent and all my close friends without whom I couldn't complete this precious project. The timeless count that you gave to make this thing possible will not be forgotten.

Ultimately, to my loving, caring and all the supportive friends and classmates who resourcefully supported me. My deepest gratitude and love to all the ones who gave their countless time with the kind attention. It was a great comfort and relief to know that what you were willing to provide while I completed my work. My warm-hearted thanks to all the ones.

Thanking You with the warm pleasure appearance.

INTRODUCTION

ESP-Drone is an ESP32/ESP32-S2 based flying development board provided by Espressif. ESP-Drone is equipped with Wi-Fi key features, which allows this drone to be connected to and controlled by an APP or a gamepad over a Wi-Fi network.

Project Objectives

To design developed a mini programmable drone that can fly for about 6 minutes. To control speed and direction of the Quad-copter while flying around we'll use blynk.

Project Specifications

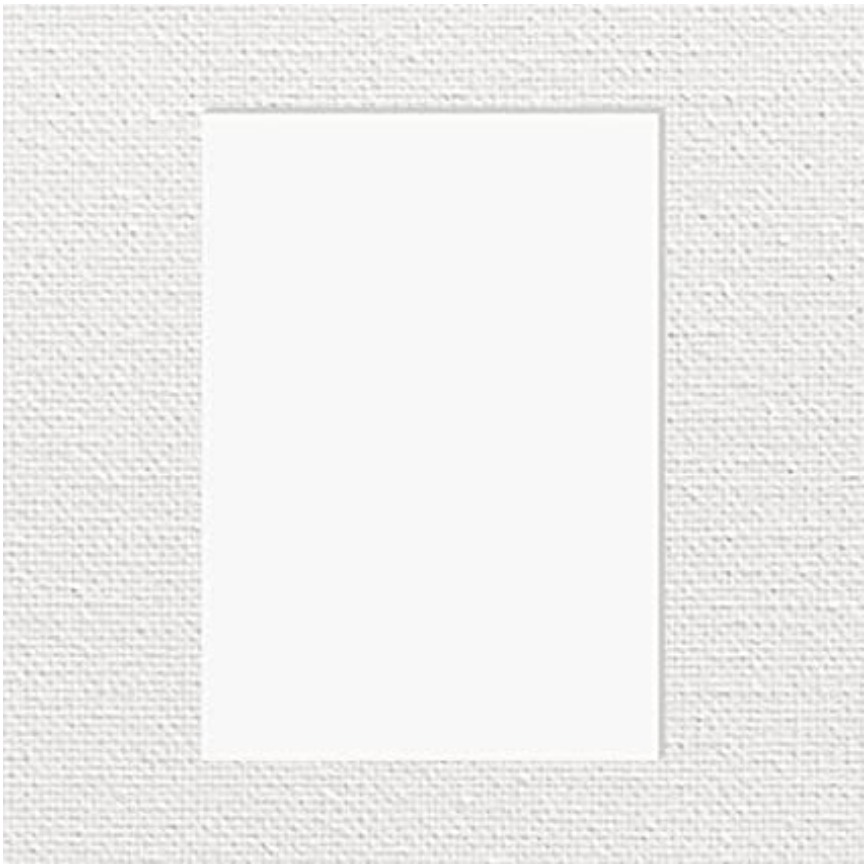
The project will be built with the following specifications:

- **Assumes power system that operates on 7.4V/ 1050 mA battery.**
- **Maximum flying time: 6 minutes continuously.**
- **Remote control from anywhere around the world**
- **BLDC: 39000RPM**
- **Propellers are 55mm (3 inches)**

Sub-system of project

Hardware

1. Frame

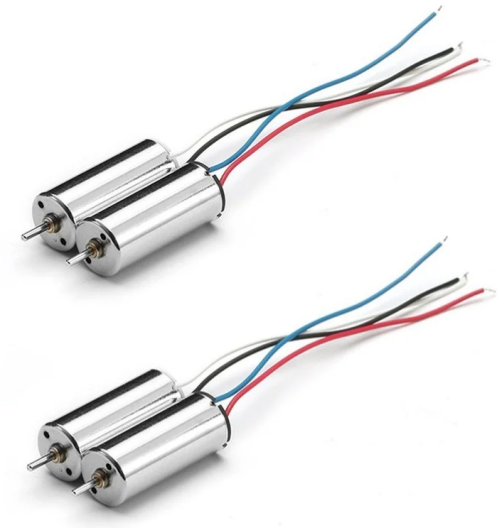


Sunboard

Frame was made using a4 size sunboard

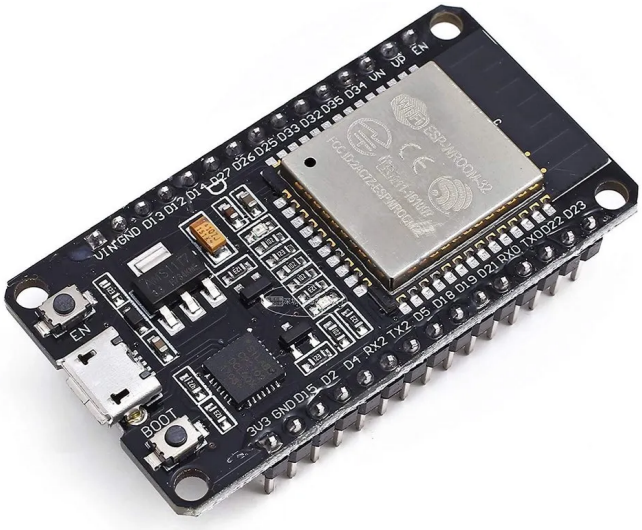
2. Lipo battery 7.4v

3. 8520 Magnetic Micro Coreless Motors for Micro Quadcopters

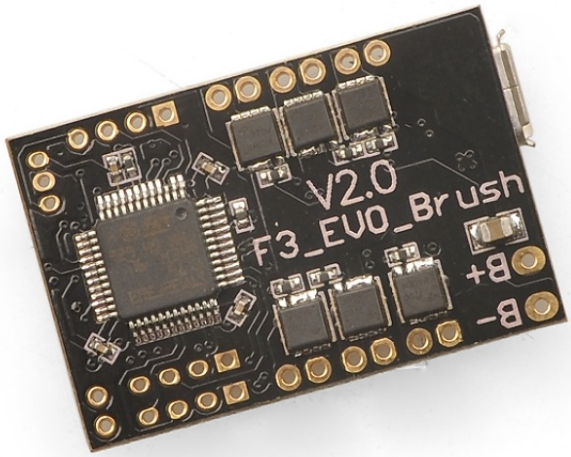


4.Propellers , 55mm (3 inches)

5. ESP 32s



6. F3 Evo v2.0 Flight Controller



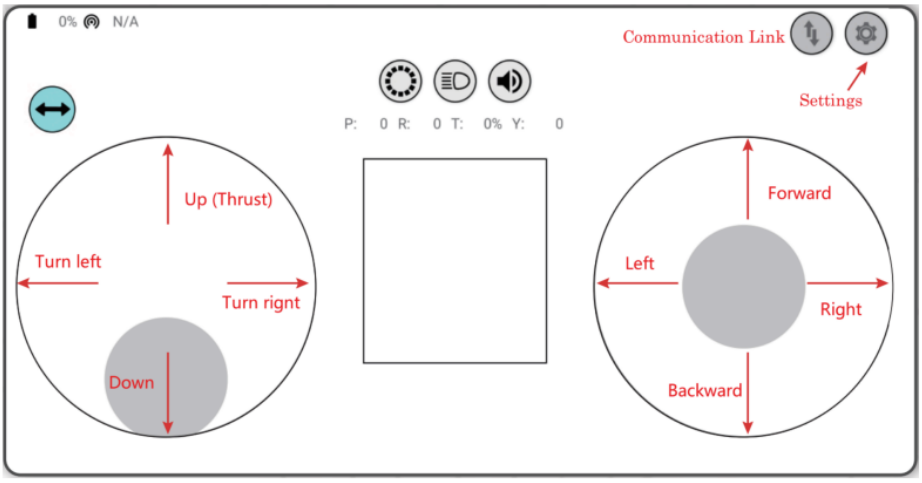
7. Wires and zip ties

Technical Specifications of espcopter

The flight controller of choice is a ESP-32S Development Board paired with a MPU6050 IMU breakout board. The communication between them is done through standard I2C protocol. The signal wires of the ESCs are connected to the breadboard using some extra-long male header pins. The breadboard is mounted onto the frame using double-sided mounting tapes.

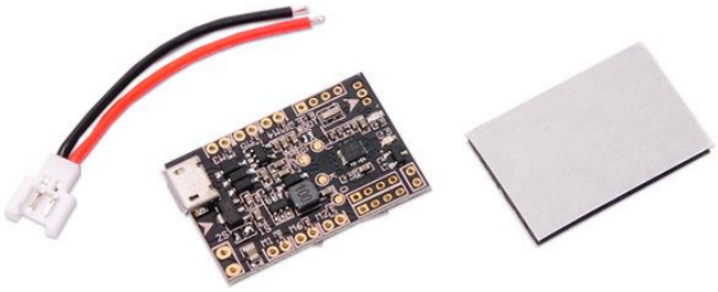
Flight Control through blynk app

- Click “Connect” button/icon at your APP. When the connection is established successfully between your drone and APP, the LED on the drone blinks GREEN.
- Slide “Thrust” slightly to take off the drone.
- Control the flight by moving your fingers on the APP.



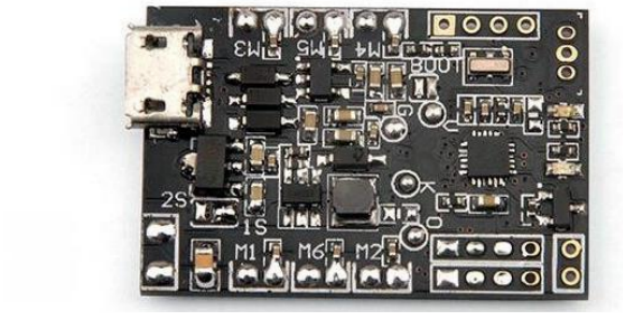
Flight Controller

Hyperion F3 Evo Brushed Manual



The Hyperion F3 EVO Brushed Flight Controller gives you all the features in a small size and designed for micro size quads with brushed motors.

Board layout



Description:
Brand Name: Hyperion
Item Name: F3 EVO Brushed Flight Controller
Dimension: 22mm*32.5mm
Thickness: 1.2mm
Weight: 3g

Features:

1. F3_EVO_Brush is in the revision on the basis of the F3 EVO SP RACING, it is a 32bits brush flight controller based on SP RACING F3 EVO firmware.

2. The flight control support 1S (4.2V) and 2S (8.4V) power supply, with 2S power, flying experience can be more wild.

3. Independent design of the circuit structure, comes with the pressure reduction technology, whether it is 1S or 2S power input, UART1/2 output 5V, UART3 output 3.3V

4. Using STM32F303CCT6 + MPU6500, advanced hardware platform F3 guarantee more stable flight.

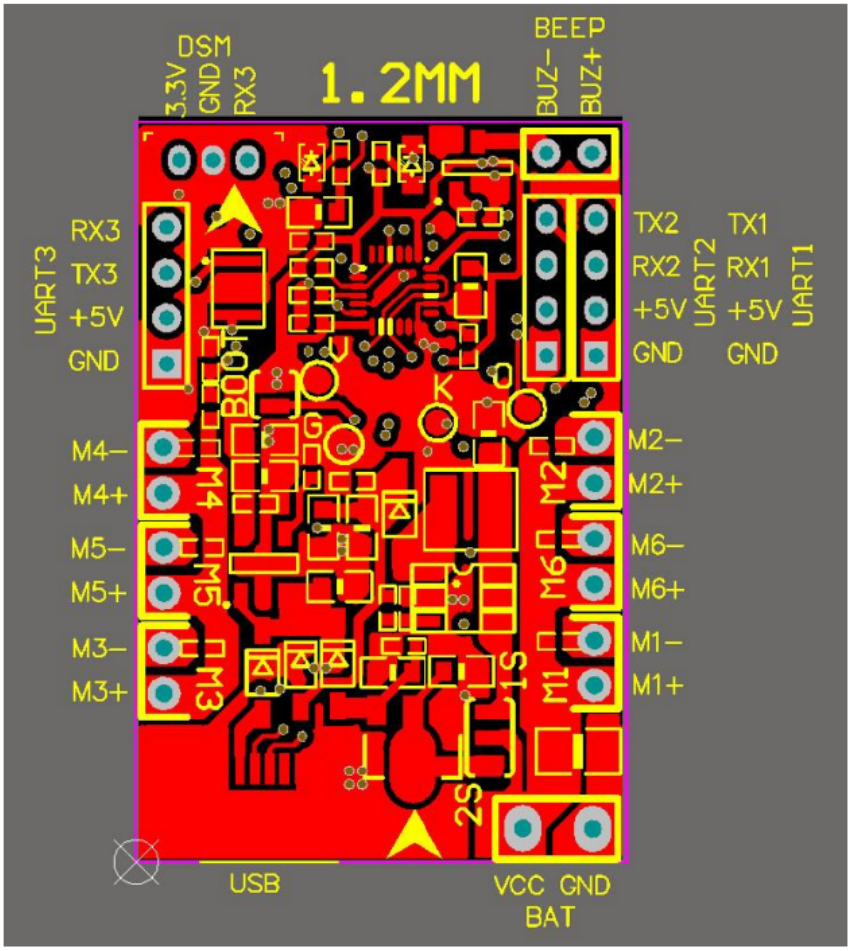
5. With a 6-ways large current NMOS transistors, operating current of up to 10A or more. Each machine is equipped with freewheeling diodes.

6. Support for PPM, SBUS, DSM receiver input signal.

7. With battery voltage detection and buzzer interface.

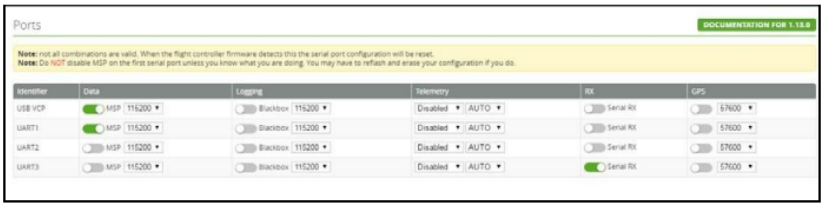
8. Support for 6 motors, including 1020 coreless motor.

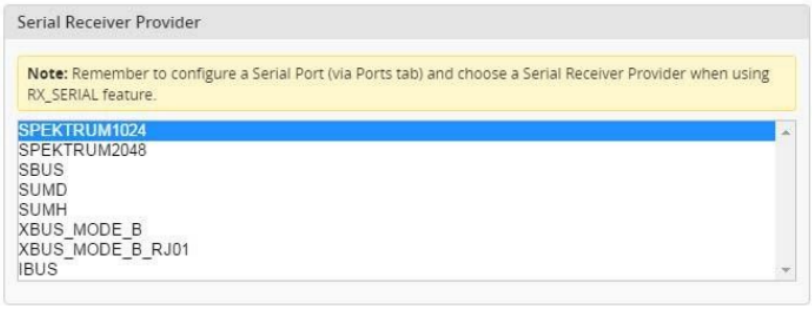
Connection diagram:



Receiver configuration:

1. DSM receiver soldered directly to the DSM/DSM2/DSMX Receive interface 3.3V, GND, RX3. Enable Serial_RX for UART3 and Set Receiver mode RX_SERIAL, Select Spektrum1024(DSM/DSM2) or Spektrum2048(DSMX) in Cleanflight configurator.





FIRMWARE FLASHING for F3 EVO Brush

The following tutorial covers flashing Cleanflight Firmware onto the F3 EVO Brush Flight Controller. Betaflight is the same steps like Cleanflight.

Installing the ST drivers:
(For Windows Only)
Download and install the DfuSe demo package.
Open an explorer window and browse to (assuming you've installed to the default path) C:\Program Files (x86)\STMicroelectronics\Software\DfuSe v3.0.5\Bin\Driver
Browse two folders deeper to the folder relative to your Operating System version, and x86-32bit or x64-64bit variant.
Click the dpinst_x##.exe to install the driver.

Installing Cleanflight Configurator:
(For Windows Only)
You must use Cleanflight Configurator v 1.0.0 or newer.
The following assumes you also have the Chrome Browser installed.
Get the latest Cleanflight Configurator (+ Add to Chrome)

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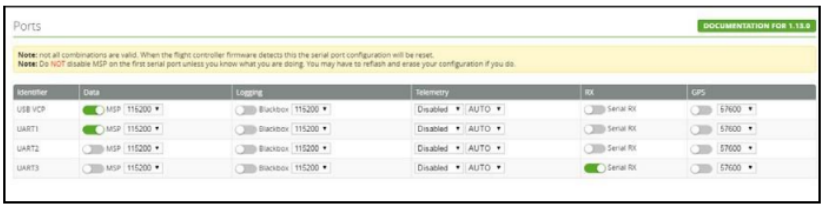

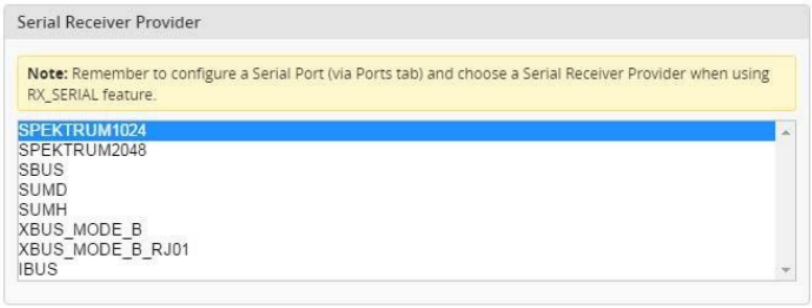

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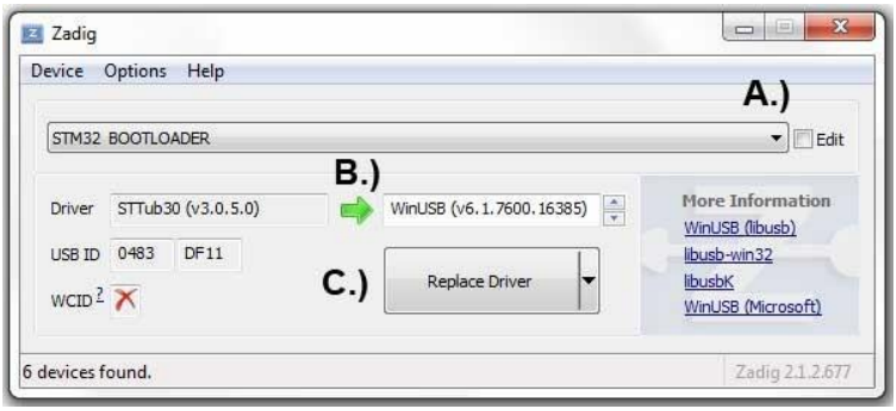


* Credits for the Zadig option – Cleanflight Docs

Flash Firmware

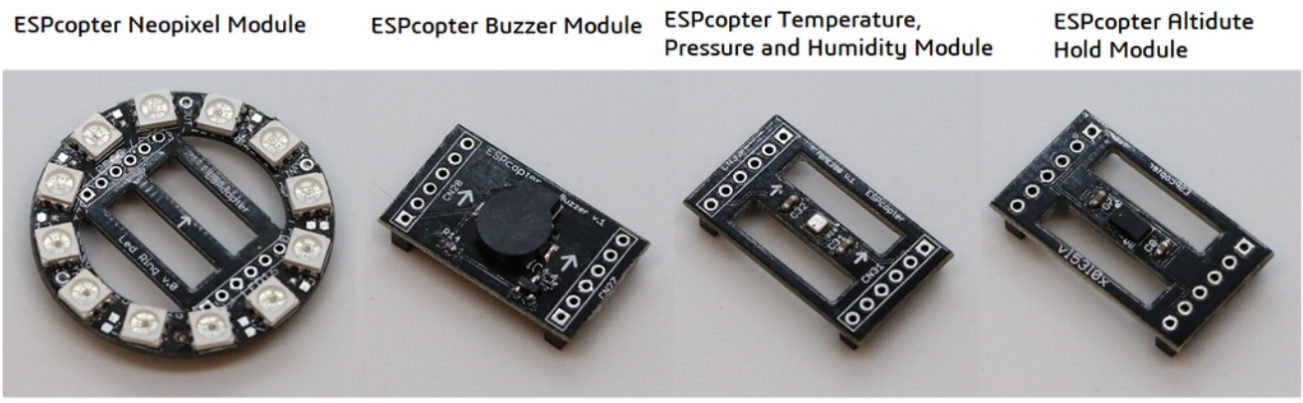
Go back to Cleanflight configurator and Click Flash Firmware

again after the Driver replace completed, and you will see the firmware flashed successfully!

Code link - https://github.com/avionicharshit-byte/esp32/blob/main/esp32.ino

Project Materials and budget

Other Espcopter Modules



ESPcopter Neopixel Module

ESPcopter Buzzer Module:

ESPcopter Temperature Pressure and Humidity module

ESPcopter Altitude Hold Module

Modules that we can design and add to the espcopter

Lesson learn

- Make sure to use the suitable length of motor base bolts. It the bolt were to long it might smash the winding wires inside the motor generating high heat or damaging the whole motor.

- Make sure to use open area for the motor to make it able to be cooled by the flow of air it generates from rotation.

- Make sure to use high melting temperature material on the motor area to prevent it from being melt due to the heat comes from the motors.

- Do not use large propellers with high KV motors as it could burn the motor. Make sure to use the recommended size and to track and monitor the current it uses.

Conclusion

The main intention of our project is to familiarize ourselves with the complete design process from engineering requirement to finalize the product. our goal to make a design of a quadcopter using esp32 than can help school kids to learn about the drones in a easier way. With the support of our advisor we have the resources and technical knowledge to complete this project successfully. We chose the espcopter for our UAV design since it has interesting design elements and potential for marketable gains. At this point the project could go in a variety of directions since the platform seems to be as flexible. This flexibility allows changing the functions it performs and also allows integration of any technology that would prove to be useful. This project will clearly demonstrate the goals of proving that small scale UAVs are useful across a broad range of applications.

References

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5. Espcopter mini programmable drone- https://www.instructables.com/ESPcopter-Programmable-Mini-Drone/