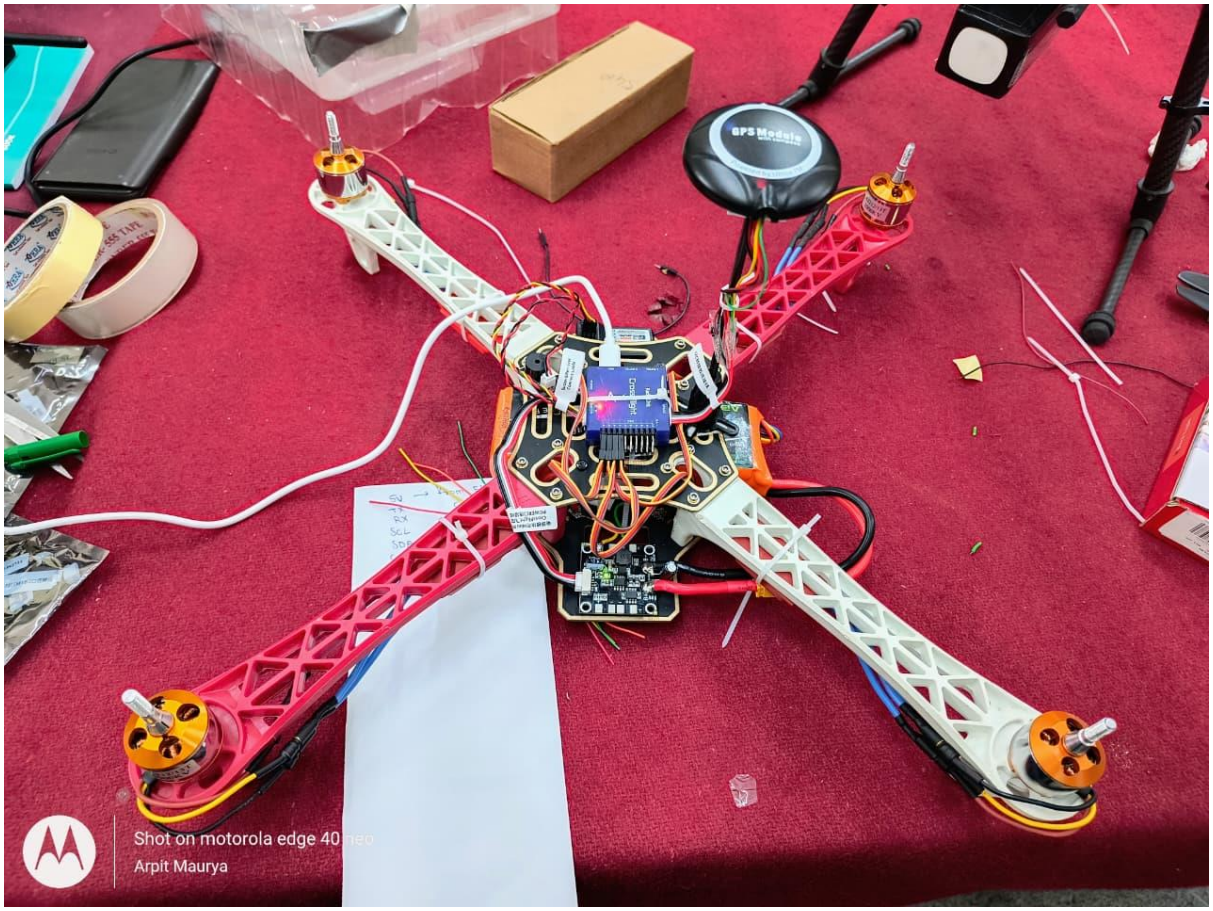
MARVEL UVCE

UAV Assembly & Flight Controller Configuration



Name	USN	Role Assigned
Arpit Maurya	U25UV24T040017	Mission Planner Configuration Calibration
Vishal Patil		Hardware Assembly

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Introduction

What is an UAV ?

A UAV, or **Unmanned Aerial Vehicle**, is an aircraft that flies without a human pilot on board, operated either by remote control or autonomously through onboard software and sensors, commonly known as a **drone.**

Why Quadcopters are Widely Used

- **Vertical Take-Off and Landing (VTOL):** Quadcopters can operate in confined urban environments or rugged terrains without requiring runways.
- **Mechanical Simplicity:** With only four moving motor-propeller units, they are more durable and cost-effective to manufacture than single-rotor aircraft.
- **Agility and Hovering:** Their design allows for precise multidirectional movement and stable hovering, which is essential for capturing high-quality data or inspecting static objects.

Importance of Flight Controllers

The flight controller acts as the **"brain"** of the quadcopter, performing several critical roles:

- **Stability and Sensor Fusion:** It processes data from sensors like gyroscopes, accelerometers, barometers, and GPS to make thousands of micro-adjustments per second, maintaining level flight even in windy conditions.
- **Decision-Making:** It translates pilot commands or autonomous mission waypoints into specific motor speeds via Electronic Speed Controllers (ESCs).
- **Safety Mechanisms:** Modern controllers manage failsafes such as "Return-to-Home" (RTH) during signal loss, geofencing, and automated landing in low-battery situations.

Objective of the Project

- To assemble a functional quadcopter
- To integrate receiver, GPS, and flight controller
- To configure the UAV using Mission Planner
- To calibrate sensors and radio inputs

Bill of Materials

Component	Model	Quantity	Purpose
Flight Controller	Radiolink Crossflight	1	UAV Control
Transmitter	Flysky	1	Manual Control
Receiver	Flysky	1	Signal reception
Motors	1000 KV BLDC	4	Lift
ESC	Simonk 30A	4	Motor Control
GPS Module	U-Blox	1	Positioning
Battery	Li-Po 4500 mAh	1	Power Supply

Hardware Assembly

a) Frame Assembly

- Mount arms and center plate

b) Motor & ESC Connection

- ESC signal → Flight controller motor outputs
- Power → PDB

c) Power Distribution

- Battery → PDB → ESCs & FC

d) Receiver Connection

- RP1 → FC via UART / SBUS

Sensor Calibration

a) Accelerometer Calibration

- Level placement
- Six-axis calibration

b) Compass Calibration

- Interference issues
- Rotation method

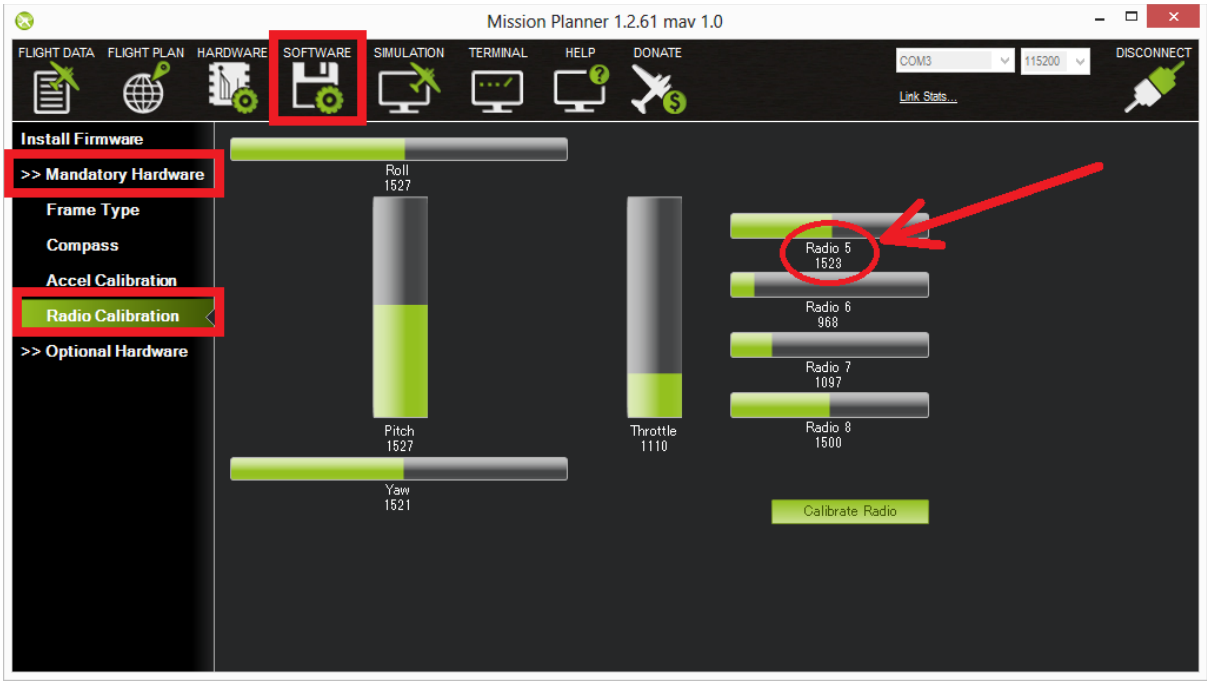
c) Radio Calibration

- Throttle, yaw, pitch, roll

Problems encountered

The radio calibration couldn't be completed. This is due to the fact that the FC was not receiving the RC data, even though the binding was successful.

The protocols were checked and update successfully but even then, the problem could not be solved.



The green bars that are shown here was not displaying while we were performing out task.

Software Configuration & Calibration

Testing and Results