

Quadcopter Project

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1 Specifications

The quadcopter will be designed to fulfill the following functionalities:

- Self stabilization.
- Manual pilot through RF controller.
- FPV with On-Screen telemetry.
- Headfree mode.
- GPS:
 - Hold position.
 - Back-home.
 - Waypoints.
- WiFi connection to Android smartphone.

Flight modes: -Acro (normal) -Headfree -Position hold -Position+alt hold Functions: -OSD Telemetry +Flight mode +Voltage + Current +Flight time +Artificial Horizon + compass +GPS coords + n. satellites +Distance to Home +Height (barometer or sonar) -Safe landing using sonar -Back-to-home -Route -WiFi/BT PID tuning -Define Serial Protocol

2 Hardware

- **Frame.** X525 V3.
- **Flight controller.** Crius All-in-one Pro v2.0, featuring:
 - Atmega 2560.
 - MPU-6050 (3-axis accelerometer + 3-axis gyro) IMU with Motion Processing Unit.
 - HMC5883L 3-axis magnetometer
 - MS5611-01BA03 high precision barometer.
- **GPS.** Ublox NEO-6 v3.0, included with the flight controller.
- **Motors.** Turnigy D2836/8 1100KV
- **ESCs.** TURNIGY Plush 30amp Speed Controller
- **Propellers.** Slow Fly Electric Prop 1045
- **Remote controller.** HK6s 2.4 GHz FHSS 6CH Tx & Rx

- **FPV kit.** Quanum Complete FPV Bundle Set
- **On-Screen Display (OSD) module.** MinimOSD
- **WiFi module.** ESP8266.
- **Bluetooth module.** HC-05.
- **Battery.** ZIPPY Compact 3700mAh 3S 25C
- **Power distribution board.** Hobby King Quadcopter Power Distribution Board
- **Camera.** Mobius.

3 System Overview

1 2 3
4 5 6
7 8 9

4 Control

4.1 Low-level

4.2 High-level

5 Communications

5.1 Protocol

- Raw sensor data
 - Accelerometer
 - Gyro
 - Magnetometer
 - Barometer
 - Temperature
- GPS information
- Computed quaternion
- PID controller
- RC sticks