# FlyNet Hardware

## Selected Components

The components for the FlyNet system (as of the Fall 2015 semester) can be split into two categories, these being the quadrotor structure and the onboard electronics. The quadcopter structure can be broken down further into the frame itself and the additions of custom created landing gear and propeller guards. The electronics consist of all of the sensors, actuators, and computers that make the quadcopter fly autonomously.

The structure of the quadcopter is essential as without it, there would be no platform to support the sensors and no way to move throughout the environment. The custom additions (landing gear and propeller guards) will be covered in the following subsection. The frame of the quadcopter was selected as the AlienCopter Bee 430mm, shown in Figure 1. Initially this platform was provided to the FlyNet team from RECUV. This allowed initial testing to begin and members of the team to become comfortable with flying quadcopters. Further investigation was needed however to prove the use of this frame.

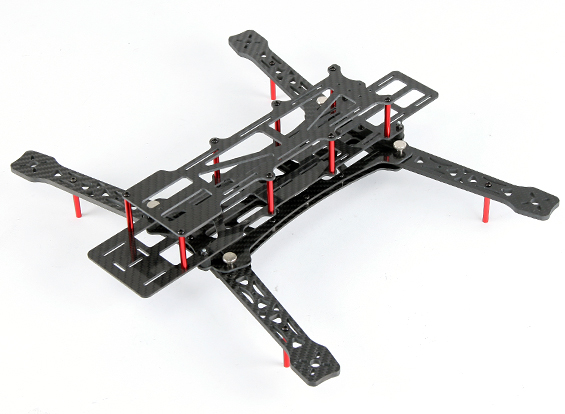


Figure 1: AlienCopter Bee 430mm Frame

A trade study was performed between different off the shelf frames. Additional frames were considered…

Table 1: Quadcopter Frame Trade Study

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Grading Weight | AlienCopter Bee |  |  |  |
| Frame Size |  |  |  |  |  |
| Available Space |  |  |  |  |  |
| Weight |  |  |  |  |  |
|  |  |  |  |  |  |

## Custom Constructed Components



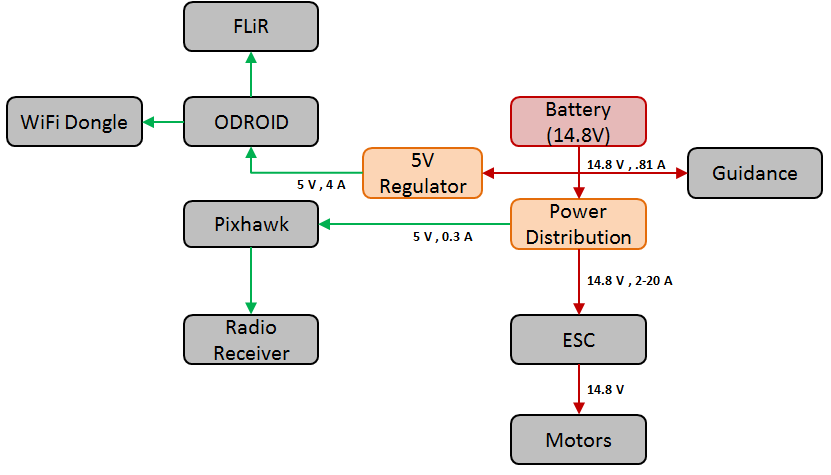
## Mass Budget

Table 2: Terminator Quadcopter System Mass Budget

|  |  |  |
| --- | --- | --- |
| **Component** | **Qty** | **Mass (each) [g]** |
| AlienCopter Bee Frame | 1 | 303.0 |
| Custom Landing Gear | 4 | 22.5 |
| Custom Propeller Guards | 2 | 123.0 |
| ODROID XU4 (w/ case and WiFi dongle) | 1 | 83.5 |
| ODROID Expansion Shield | 1 |  |
| DJI Guidance Sensor | 1 | 462.2 |
| Pixhawk | 1 | 40.3 |
| FliR Lepton LWIR Camera | 1 | 0.6 |
| FrSKY TFR4 Radio Receiver | 1 |  |
| SunnySky V2216-12 II Motors | 4 | 68.7 |
| 10x4.7 Propellers | 4 | 11.1 |
| 20A ESC | 4 | 28.4 |
| Turnigy Multistar 4S 10.0 LiPo Battery Pack | 1 | 815.8 |
|  |  |  |

# Power System

## Power Distribution



## Power Budget & Flight Endurance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **Qty** | **Nominal Voltage [V]** | **Nominal Current**  **[mA]** | **Nominal Power**  **[mW]** |
| ODROID XU4 | 1 | 5 | 4000 | 20000 |
| DJI Guidance Sensor | 1 | 14.8 | 810 | 12000 |
| Pixhawk | 1 | 5 | 300 | 1500 |
| FliR Lepton LWIR Camera | 1 |  |  |  |
| FrSKY TFR4 Radio Receiver | 1 |  |  |  |
| SunnySky V2216-12 II Motors | 4 | 14.8 | 18981\* | 280924 |
|  |  |  |  |  |

# Stopping Distance Simulation