Brigham Young University

AUVSI Capstone Team (Team 45)

Airframe Component Placement

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1 Introduction

To have a stable and aerodynamically efficient flight, it is vital that the airframe have a center of gravity (CG) at a specific location - specifically, one that is in front of the aerodynamic center (about 1/4 chord of the main wings). In our analysis of the airframe (see AF-011), we determined this location to be 6.2 cm in front of the leading edge of the wing. In this artifact, we present the locations of the major components of the system in order to achieve this desired CG of the entire aircraft. Figure 1 shows the placement of our main components in the airframe to achieve the desired CG. Table 1 lists the exact x-locations (measured from the nose of the aircraft) of each component. Only the x-location is listed because component placement primarily affects longitudinal stability (pitch). The y- and z-locations are not critical for our application. Note that only components with significant spacial requirements are included. This includes center of gravity, signal interference, and physical volume.

Table 1: Layout of components for ideal CG placement, avoiding signal interference, and practicality.

Item #	X Location (cm)	Item Description	Reason for Location
1	7.5	GPS Antenna	Avoid interference with 5Ghz antenna
2	17.5	Ubiquiti Bullet	CG placement
3	21.5	Battery	CG placement
4	33.5	Camera	Near CG to reduce oscillations during image capture
5	43.5	Flight Controller and Inertial Sense	Inertial Sense should be near the CG
6	43.5	Odroid	Central location is convenient for connecting components
7	52.5	RC Antenna/Receiver	CG placement
8	60.5	UGV	CG placement, bay door design
9	63	5GHz antenna	Avoid interference with GPS antenna
10	68.5	Parachute	Effective deployment with UGV

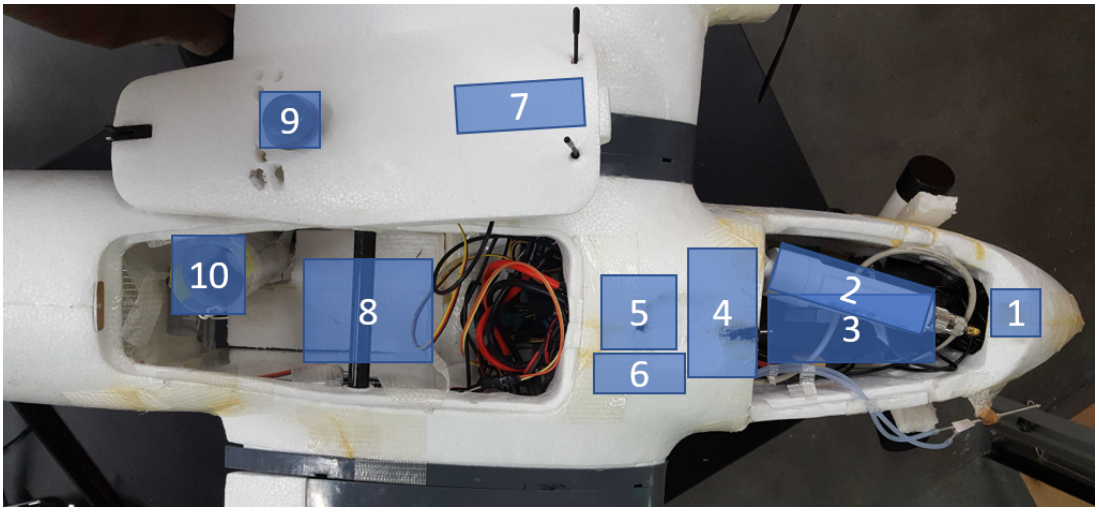

Figure 1: Diagram illustrating component placement. Numbers refer to those listed in Table 1.