



Drone and Accessories: Research and Selection

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Introduction

Drones have been used in LIDAR, drone racing, housing tours, musical events, and drone shows using Artificial Intelligence (AI). Military and universities have programs teaching skills that are applicable to drone technology. Dr. Craig suggested creating a drone course, based on research with a drone that meets student needs for learning

Objectives

Select drones that meets constraints and would be beneficial to students learning about drone assembly, build, and operations. Make a manual to simplify the assembly and building process



Selection Criterion and Constraints

A criterion is needed to determine satisfactory usage of the selection. The criterion generated is as follow:

- Drone must be a DIY drone
- Must be an FPV drone
- Must be within \$1 - \$500; to be affordable to the average student
- Must be able to assemble in 7 weeks; to give ample time for learning

FAA rules and regulations for recreational flyers

The Federal Aviation Administration (FAA) is the organization that oversees flight operations, and are responsible for regulating aircrafts, certifications, and safety. The FAA has set rules that recreational flyers must follow to properly and legally operate drones. These rules are as follow:

- Fly only for recreational purposes only
- Keep your UAV within a visual line of sight, or use a visual observer who is in direct communication with you
- Give way, and do not interfere with other aircrafts
- Fly at or below FAA authorized altitudes in controlled airspace
- Fly at or below 400ft in uncontrolled airspace
- Pass the TRUST certification and have certification on hand when flying
- Have a current FAA registration, mark your drone on the outside with the registration number, and carry proof of registration
- Do not operate your drone in a manner than endangers the safety of the national airspace system



Drone Manual

A manual is to be made for the selected drone. It must follow additional constraints to meet students' needs. The constraints adopted are as follows:

- The manual needs to be simple to follow
- Must give the necessary information for assembling the system, without overcomplicating the process
- It would need to be legible
- Should be able to serve as a quick guide
- Avoid nuances and irrelevant information
- Troubleshooting information from research
- Visible and clear images, or 3D drawings

Budget

Item	quantitty	Cost
Drone Kit - QAV-S 2 Sub-250 SE 3"	1	\$269.99
7" DIY FPV Drone Kit - Analog	1	\$320.00
Drone Kit - QAV-S 2 Sub-250 SE 3" - Analog	1	\$299.99
Skyliner Mk3 DIY Build kit	1	\$500
TanQ S 3.5" DIY Kit-4S	1	\$487
700mAh 4s 75c Lipo Battery	2	\$21.99
Dual Channel AC/DC Smart Charger	1	\$149.99
Kevlar Lipo Strap - 10x180mm	1	\$5.99
Crossfire Nano Rx (SE) w/ Immortal T V2 Antenna	1	\$38.99
Gemfan Hurricane 3020 3-Blade Propeller	2	\$5.98
Walksnail Avatar HD Pro	1	\$190.99
Total:		\$2,290.91

Initial Research

During initial research to select drones, several drones from a variety of distributors stood out, meeting some of several of the constraints, with one meeting all.

Drone Decision		Alternatives						
Criteria	Importance	QAV-S SE 3" - HD ready	7" Drone Kit - Analog	QAV-S SE 3" - Analog	Skyliner Mk3 DIY kit	TanQ DIY kit	DJI Mini 2	DJI Avata
FPV	8	1	1	1	1	1	1	1
DIY	9	1	1	1	1	1	-1	-1
FC	7	1	1	1	1	1	-1	-1
Build within 7 weeks	6	1	1	1	1	1	0	0
below \$500	10	1	0	1	0	0	-1	-1
Weighted total:		40	30	40	30	30	-18	-18
Unweighted total:		5	4	5	4	4	-2	-2
# of positives:		5	4	5	4	4	1	1
# of negatives:		0	0	0	0	0	3	3

Flight Controller and Configurators

What is a Flight Controller (FC)?

A flight controller is the brains of a drone system. The controller can be programmed to do a variety of tasks, controlling the drone's execution and performance



What is a Flight Configurator?

A flight configurator is a software that can be used to manipulate/program a drone's telemetry and ability to perform operations

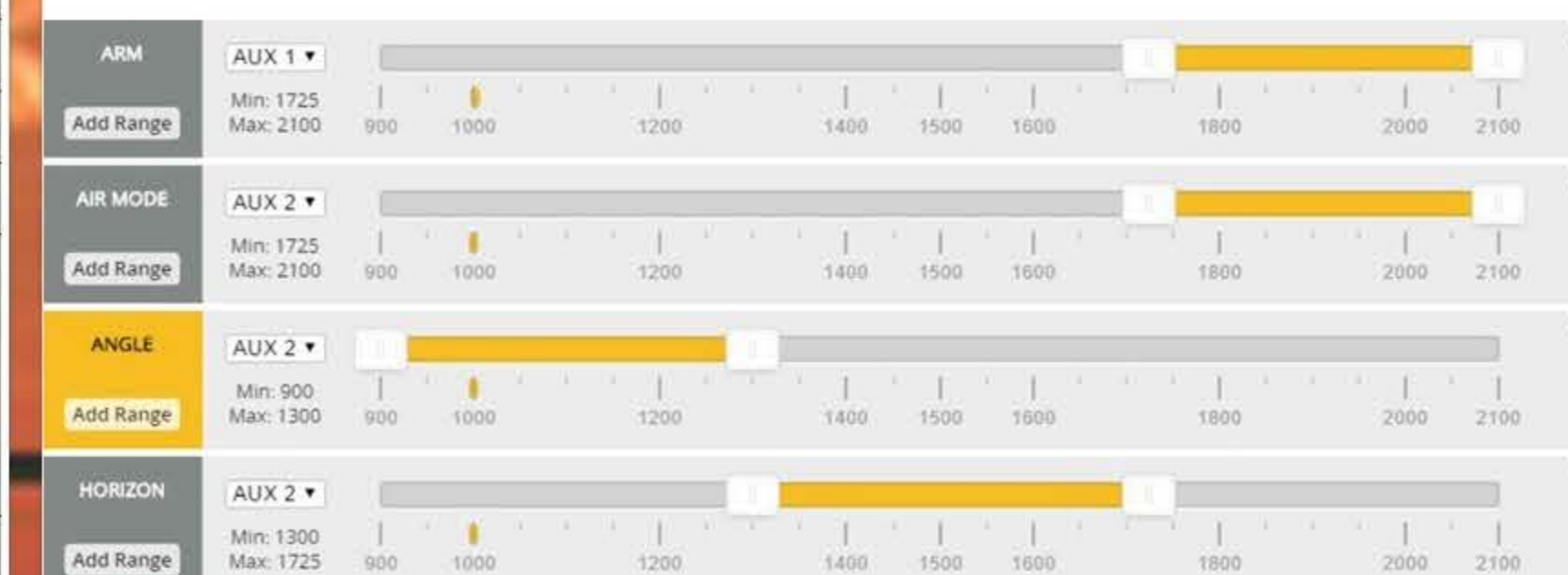
FC being used

The FC being used is the Lumenier LUX HD AIO G4 Flight Controller. This FC usually comes as a fly stack, meaning it comes with an electronic speed controller (ESC).

Configurator Selection

BetaFlight is the most viable. Here's why:

- Simple to use
- Easy to download
- Simplistic, quick, online guide
- Described as "The world's leading multi-rotor flight control software"



Final Selection

The eligible drones are the 3" HD kit and the 3" analog kit. HD is better because HD drones encode data and then send it compared to analog, which transmits immediately; this applies only to the FPV and recording aspect. This does not mean an analog kit is worse. After comparing, the HD kit seems best, on the contrary, the analog kit is better. While more expensive, it includes more essential items to the drone's operation.



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