Component List for Low-Cost Autonomous UAV

Motors:

- 4 2216-920KV brushless motors. $80 total.

https://holybro.com/products/spare-parts-s500-v2-kit?variant=42986524836029

This motor is the most cost-efficient option. Although it has to operate at around 60-75% throttle in order to maintain effective acceleration. For the 10-15 minute lifetime, this should be sufficient.

Battery:

- Turnigy 4S 5000mAh

While not the best option in terms of weight and size, it offers ample power. Additionally, this is a reused component which is ideal when managing a budget.

Battery Charger:

- Hiyiton Balanced Charger $40

https://www.amazon.com/Battery-Charger-Hiyiton-Discharger-Connectors/dp/B096LWLD39/ref=asc_df_B096LWLD39/?tag=hyprod-20&linkCode=df0&hvadid=532523005343&hvpos=&hvnetw=g&hvrand=20697662114779465 78&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9013193&hvtargid=pla-1390756798697&psc=1&mcid=8ea00cc858373722928ce0610d134805&gclid=CjwKCAiApaarBhB7EiwAYiMwqgAesuRV3fXBV8nAJFwhdIdYMKaKhUBDoI1UvuYeSzwqWPvrd3Pu_hoC04EQAvD_BwE

We need to be able to charge the LiPo battery. This station is relatively low-cost compared to others.

Power Module:

- PM07 Power Module

https://holybro.com/products/pixhawk-4-power-module-pm07

This power module is made to integrate with the pixhawk and is configured optimally for ESC to motor connections on a quadcopter. This option is the best in terms of power and wire management.

Frame:

- S500 Quadcopter Frame Kit. $38

500mm S500 SK500 Quadcopter Multicopter Frame Kit PCB Version with Carbon Fiber Landing Gear for FPV Quad Gopro Gimbal Upgrade

This frame has ample room for each component and already has a power distribution board. The size does warrant larger propellers and more thrust, but for the price and utility, this is our best option.

Connectors:

- 3 2pc XT60 Parallel Battery Connectors. $27 total.

https://www.amazon.com/Connector-Extension-RC-Helicopter-Quadcopter/dp/B0754JKHWW/ref=asc_df_B0754JKHWW/?tag=hyprod-20&linkCode=df0&hvadid=241938192625&hvpos=&hvnetw=g&hvrand=4451142359708239002&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9013193&hvtargid=pla-466233999011&mcid=7a236013263b3baabb9ee1ed20b01a22&gclid=CjwKCAiApaarBhB7EiwAYiMwqgUCG8oHke5CrBANxKKw_nhzfPQK7IKYXKqevsMuiNFdB0fnRnx-ZxoCewMQAvD_BwE&th=1

These parallel connectors allow us to have an organized set of parallel connections from the battery to the ESCs and other components. Additionally, they are rated for 60A which our design should never really reach or exceed.

- 2 Male and Female XT60 pairs $4

https://www.digikey.com/en/products/detail/sparkfun-electronics/PRT-10474/8258064

These connectors are needed in order to connect the battery to the distribution board of the frame.

- 2pcs XT-60 Female to HXT 4MM Male Bullet Connector Adapter Cable $7

https://www.amazon.com/Female-Connector-Adapter-RC-Battery/dp/B073ZGQGHR

This connector allows us to connect the battery to the distribution board.

ESCs:

- 4pc QWinOut 2-4S 30A RC Brushless. $38.

https://www.amazon.com/QWinOut-Brushless-Controller-Multicopter-Quadcopter/dp/B07SFLJJQ5/ref=sr_1_20?keywords=30%2BA%2BESC&qid=1701458137&sr=8-20&th=1

While our motors should never go near 30A, these ESCs give an extra cushion in terms of pulling more amperage given the design's weight. Further, these ESCs come at a decent price.

BECs:

- SoloGood 2Pcs RC BEC UBEC 5V 5A. $13 for 2

https://www.amazon.com/dp/B09WKCBXKK/ref=sspa_dk_detail_4?psc=1&pd_rd_i=B09WKCBXKK&pd_rd_w=3kk03&content-id=amzn1.sym.08ba9b95-1385-44b0-b652-c46acdff309c&pf_rd_p=08ba9b95-1385-44b0-b652-c46acdff309c&pf_rd_r=YA6JPBNCJ48KW062ASKE&pd_rd_wg=IWKVb&pd_rd_r=6f078a04-505a-4a94-a3dd-b5a9d2f3a918&s=toys-and-games&sp_csd=d2lkZ2V0TmFtZT1zcF9kZXRhaWxfdGhlbWF0aWM

These BECs are for the Pixhawk 6C flight controller and the Jetson Nano 5V. Since the flight controller and the nano have the same input voltage this bundle is the best option since we don't have to look into other BECs.

Propellers:

- T1045, 10''x4.5 propellers. $12 for 4

https://holybro.com/collections/s500/products/spare-parts-s500-v2-kit?variant=41591094313149

These propellers are directly used in the motor spec sheet. By using these propellers, we best replicate the conditions of our preliminary calculations in order to ensure our motors are pulling the thrust we need.

RC Transmitter and Receiver:

- Flysky FS-i6X 10 Channels RC Transmitter and Receiver

https://www.amazon.com/Alaohu-Channels-Transmitter-Quadrotor-Left-Hand/dp/B0BYK9Y149/ref=asc_df_B0BYK9Y149/?tag=hyprod-20&linkCode=df0&hvadid=673650990181&hvpos=&hvnetw=g&hvrand=9442329988307954854&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9013193&hvtargid=pla-2202240825042&psc=1&mcid=bf03c993f87a3ab69104be9b73d08c5c

We selected the FlySky FS-i6 AFHDS 6CH Transmitter and 6CH FS-iA6B Receiver.
One of the main considerations we had was keeping the price below $70. Existing products on the market at a price range equal to or above our selection come with range and speed improvements that are not necessary for our use case. 6 channels is what we need for our use cases so this was the optimal option.

GPS:

- M10 GPS Module

https://holybro.com/products/m10-gps

This GPS module is made to integrate with the Pixhawk and offers more than enough precision.