

We are requesting funding for 4 drones instead of the required 3 due to a likelihood of some components malfunctioning or breaking. Our initial plan for our drone design was unreasonably high (*See Appendix A*; the previous plan resulted in an estimated \$198.40/drone, whereas the new plan results in an estimated \$83.14/drone), bringing us to the conclusion to build our drones from scratch. We were able to find plenty of online resources that will allow us to use open-source code to control the drone with little modification, and found that it may be easier to implement bluetooth connectivity if we start from scratch with a dedicated BLE module doubling as a flight controller for the drone. For the manufacturing, we already have personal access to soldering materials and connectors, so those items were not included in the list.

The BLE AOA boards are an essential part of our project and since UBlox has an open-source codebase, we determined that the product provided below is the best option for our project. Other companies we reached out to such as BlueIOT are selling engineering solutions for end-use customers, thus making their products not feasible for our project.

We have already purchased the *Seeed Studio XIAO nRF52840 Sense* microcontrollers as it falls below the \$100/student limit and so that we can begin evaluating them.

Please let us know what you think about our budget. We are looking forward to your advice.

Thanks,

Jun Ho & Team

## Drone Swarm Parts List

Product Name	Image	Purpose	Price	Quant.	Total Cost
[1] <a href="#">XPLR-AOA-1 (BLE AOA Board)</a>		Must have for BLE AOA system. Other alternatives are full solutions developed by companies. No open-source software	\$373.11	3	\$1119.33
[2] <a href="#">Seeed Studio XIAO nRF52840 Sense (Arduino Board)</a>		Main microcontroller for drone & BLE module + IMU. Cheapest one on market	\$25.06	4	\$105.24
[3] <a href="#">1kg filament</a>		Required to 3d-print frame	\$29.99	1	\$29.99
[4] <a href="#">YoungRC 8520 Coreless Motor 8.5 x 20mm Brushed Motors + 55mm CW CCW Propeller</a>		Drone parts (motor + propellers)	\$19.27	4	\$77.08
[6] <a href="#">Fytoo 5Pcs 3.7V 1200mah Upgrade Li-Polymer Battery</a>		Drone parts (battery)	\$35.99	1	\$35.99
[7] <a href="#">MT3608 DC-DC boost converter (pack of 6)</a>		Drone parts (Microcontroller voltage)	\$10.49	1	\$10.49
[8] <a href="#">TN0702N3-G</a>		Drone parts (mosfet for motor control)	\$2.33	16	\$37.28
[9] <a href="#">1N5817-TP</a>		Drone parts (diode for motor control)	\$0.39	16	\$6.24
[10] <a href="#">Printed Circuit Protoboard</a>		Drone must be soldered together on this board	\$21.99	1	\$21.99

Estimated total cost + GST = \$1,602.73

Estimated total drone cost (without item #1) + GST = \$332.57

**Estimated cost per drone (without item #1) + GST = \$83.14**

- **Shipping is free for all suppliers**

**Links to Products:**

1. [https://www.digikey.ca/en/products/detail/u-blox/XPLR-AOA-1/14549114?fbclid=IwAR3k5VZjX66F7ShL8c7aWn6LkvkIc2r7w\\_MWlxSzp\\_wnh6KT42nRtjb\\_iG4](https://www.digikey.ca/en/products/detail/u-blox/XPLR-AOA-1/14549114?fbclid=IwAR3k5VZjX66F7ShL8c7aWn6LkvkIc2r7w_MWlxSzp_wnh6KT42nRtjb_iG4)
2. <https://www.digikey.ca/en/products/detail/seeed-technology-co-ltd/102010469/16652896?s=N4IgTCBcDaIIwAYwMQFgGwE4QF0C%2BQA>
3. <https://www.amazon.ca/AMZ3D-1-75mm-Printer-Filament-Black/dp/B01BZ5ND8O>
4. [https://www.amazon.ca/YoungRC-Coreless-Brushed-Propeller-Quadcopter/dp/B078NL9KQQ/ref=sr\\_1\\_12?crid=2WGL7HZKSPT86&keywords=drone+dc+motor&qid=1668567764&qu=eyJxc2MiOiLyLjk0IiwicXNhIjoiMC4wMCIsInFzcCI6IjAuMDAifQ%3D%3D&refinements=p\\_85%3A5690392011&rnid=5690384011&rps=1&sprefix=drone+dc+motor%2Caps%2C119&sr=8-12](https://www.amazon.ca/YoungRC-Coreless-Brushed-Propeller-Quadcopter/dp/B078NL9KQQ/ref=sr_1_12?crid=2WGL7HZKSPT86&keywords=drone+dc+motor&qid=1668567764&qu=eyJxc2MiOiLyLjk0IiwicXNhIjoiMC4wMCIsInFzcCI6IjAuMDAifQ%3D%3D&refinements=p_85%3A5690392011&rnid=5690384011&rps=1&sprefix=drone+dc+motor%2Caps%2C119&sr=8-12)
5. [https://www.amazon.ca/BETAFPV-3-Blade-Propellers-Meteor65-Quadcopter/dp/B081C6NX8Y/ref=sr\\_1\\_5?crid=ISDATAEYC2Q5&keywords=micro+drone+propellers&qid=1668567371&qu=eyJxc2MiOiLyLjE5IiwicXNhIjoiMC4wMCIsInFzcCI6IjAuMDAifQ%3D%3D&sprefix=micro+drone+propellers%2Caps%2C63&sr=8-5](https://www.amazon.ca/BETAFPV-3-Blade-Propellers-Meteor65-Quadcopter/dp/B081C6NX8Y/ref=sr_1_5?crid=ISDATAEYC2Q5&keywords=micro+drone+propellers&qid=1668567371&qu=eyJxc2MiOiLyLjE5IiwicXNhIjoiMC4wMCIsInFzcCI6IjAuMDAifQ%3D%3D&sprefix=micro+drone+propellers%2Caps%2C63&sr=8-5)
6. [https://www.amazon.ca/Fytoo-Li-polymer-Batteries-Quadcopter-Replacement/dp/B0795CJWPB/ref=asc\\_df\\_B0795CJWPB/?tag=googleshopc0c-20&linkCode=df0&hvadid=335213580686&hvpos=&hvnetw=g&hvrand=2668537867823253935&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9000929&hvtargid=pla-784912314206&psc=1](https://www.amazon.ca/Fytoo-Li-polymer-Batteries-Quadcopter-Replacement/dp/B0795CJWPB/ref=asc_df_B0795CJWPB/?tag=googleshopc0c-20&linkCode=df0&hvadid=335213580686&hvpos=&hvnetw=g&hvrand=2668537867823253935&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9000929&hvtargid=pla-784912314206&psc=1)
7. [https://www.amazon.ca/AIHJCNELE-MT3608-Adjustable-Transformer-Stabilizer/dp/B09Z38RV4H/ref=sr\\_1\\_3?keywords=MT3608&qid=1668570377&qu=eyJxc2MiOiIzLjU3IiwicXNhIjoiMi43OCIsInFzcCI6IjMuMTEifQ%3D%3D&s=electronics&sr=1-3&th=1](https://www.amazon.ca/AIHJCNELE-MT3608-Adjustable-Transformer-Stabilizer/dp/B09Z38RV4H/ref=sr_1_3?keywords=MT3608&qid=1668570377&qu=eyJxc2MiOiIzLjU3IiwicXNhIjoiMi43OCIsInFzcCI6IjMuMTEifQ%3D%3D&s=electronics&sr=1-3&th=1)
8. <https://www.digikey.ca/en/products/detail/microchip-technology/TN0702N3-G/4902376>
9. <https://www.digikey.ca/en/products/detail/micro-commercial-co/1N5817-TP/950394>

**Appendix A:** Previous drone budget

1. Flywoo GN405 20A AIO BL\_S Flight Controller
  - a. <https://www.getfpv.com/micro-quadcopters/micro-flight-controllers/flywoo-gn405-20a-aio-bl-s-flight-controller.html>
  - b. **\$94.99 \* 4 = \$379.96**
2. Flywoo Firefly Nano Baby 20 2S Micro Quadcopter Frame Kit - Caddx Naked Polar Nano
  - a. <https://www.getfpv.com/micro-quadcopters/micro-airframes/flywoo-firefly-nano-baby-20-2s-micro-quadcopter-frame-kit-caddx-naked-polar-nano.html>
  - b. **\$19.99 \* 4 = \$79.96**
3. Flywoo ROBO 1002 15500KV Fpv Motor
  - a. <https://www.getfpv.com/flywoo-robo-1002-motor-15500kv-23500kv.html>
  - b. **\$12.99 \* 16 = 207.84**
4. Gemfan Durable 2015 2-Blade Propeller (Set of 8) - 1.5mm Shaft
  - a. <https://www.getfpv.com/gemfan-durable-2015-2-blade-propeller-set-of-8-1-5mm-shaft.html>
  - b. **\$3.29 \* 2 = \$6.58**
5. Auline EX 500mAh HV 80C XT30 LiPo Battery - 7.6V 2S
  - a. <https://www.getfpv.com/auline-ex-500mah-hv-80c-xt30-lipo-battery-7-6v-2s.html>
  - b. **\$6.99 \* 4 = \$27.96**

Estimated total cost of drones + GST = \$793.60

Estimated cost per drone + GST = \$198.40