Major Components List

1. **VTOL Wings**: SonicModell AR WING PRO Wings
   1. The SonicModell AR Wing Pro wings were selected for their large wing spans and aerodynamic stability, enabling our design to have an increased carrying capacity. In addition, the length of these wings fit well with the current ModiFly design.
   2. How much Payload can our plane hold? (60-70g / dm2)
   3. SonicModell Wing Area ~28 dm^2
      1. Estimated Root Chord = 268 mm
      2. Estimated Tip Chord = 170 mm
      3. Wing Span = 1000mm
   4. Estimated 1680-1960g payload capacity
2. **VTOL Propellors and motors**: iFlight Xing-E Pro 2207 (4pcs) and 7-inch Tri-Blade Propellers (4pcs)
   1. These motors were chosen for their high speed and lift capacity, allowing the heavier Modifly drone base to lift into the air
      1. Base Mounting Pattern: 16x16mm M3 Thread
      2. Motor Wire Length: 150mm / 20AWG
      3. Internal Resistance (Rm): 81.5mΩ
      4. Max Burst Current <10s: 35.22A
      5. Motor Dimension: 28.5x19.7mm
      6. Idle Current @12.6v (Io): 1.2 A
      7. Weight: 33.8g (150mm wires)
      8. Shaft Diameter: 4mm / Steel
      9. Max Power (W) 60s: 845W
      10. Magnets: N52SH Curved
      11. Stator Diameter: 22mm
      12. Configuration: 12N14P
      13. Bearing Size: 9x4x4
      14. Cells (LiPo): 2-6S
   2. These propellers were chosen due to their lift potential, as well as their balance
3. **VTOL Battery**: HRB 4S Lipo Battery 3000mAh 14.8V 60C
   1. This battery was chosen for its small height (28mm), while still being a 4S battery. This was due to height limitations on the Modifly Drone base.
      1. Weight: 13.4oz
      2. 135x42x28mm
4. **Flap Servo Motors**:
   1. 2pcs 9g metal gear servo
5. **VTOL Tilt Motors**:
   1. 2pcs 9g metal gear servo
6. **Carbon Fiber Rods**:
   1. 10x10x1000mm Carbon Fiber Tubes (4pcs)
7. **Modifly Base Components** (Total Weight not including 3D printed case ~85.6g)
   1. **Flight Controller**: PixHawk 4
      1. The flight controller was upgraded from the Flywoo Goku F745 to the PixHawk4 for the extra serial ports needed to control the additional servo motors and additional motors that come with the VTOL module.
      2. Weight: 15.8g
   2. **Power Distribution Board**
      1. Weight: ~16g
   3. **BEC Component**
      1. UBEC Micro 5V/3A Adjustable BEC
   4. **Radio Transmitter**: Futaba
      1. The Futaba transmitter was selected as it uses the s.bus2 protocol to exchange signals with the radio control receiver. This transmitter is also small and lightweight
      2. 2.4GHz signals
      3. 8/32 Channels
      4. Size: 0.98 x 1.86 x 0.56" (24.9 x 47.3 x 14.3mm)
      5. Weight: 10.1g
      6. Power Requirement: 4.8-7.4V
      7. Battery F/S Voltage: Sets up with a transmitter.
      8. Extra Voltage Port: 0 ~ 70V DC
   5. **I2C Splitter Module**: Smakn Pixhawk I2C
      1. 5 parallel I2C connections
      2. 4-bit socket
      3. Weight: ~5g
   6. **LiDar** : TF-Luna LiDAR single-point ranging module
      1. The LiDar has obstacle avoidance built into the code. This provided the ModiFly Drone 8m of object detection for a low cost.
      2. Detecting Range: 0.2m~8m
      3. Field of View: 2°
      4. Supply Voltage: 5V±0.1V
      5. Frequency: 100Hz
      6. Data Interface: UART/I2C
      7. Weight: 5g
   7. **Bluetooth Module**
      1. The bluetooth module is small and lightweight keeping the overall weight of the Modifly down without taking up necessary space for larger components.
      2. Size: 37.5 x 16.5 x 4.4mm
      3. Weight: 10.1g
      4. Power Requirement: 4.8-7.4V
   8. **4in1 ESC**: HAKRC 45A 2-6S BLHeli\_S 4in1 ESC
      1. The HAKRC ESC was chosen due to the PixHawk 4 not having a built in 4in1 ESC like the Flywoo Goku needed to control the VTOL motors.
      2. Weight: 13.6g

LINKS TO PURCHASED ITEMS:

* Wing Kit: [https://www.amazon.com/SonicModell-AR-Wing-Pro-Main-Wing/dp/B08XBLV5PL/ref=sr\_1\_17?crid=3M9HXTGCS2OGC&keywords=sonic+model+ar+wing+pro&qid=1678595397&sprefix=ar+wing+pro%2Caps%2C105&sr=8-17&ufe=app\_do%3Aamzn1.fos.18ed3cb5-28d5-4975-8bc7-93deae8f9840](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.amazon.com%2FSonicModell-AR-Wing-Pro-Main-Wing%2Fdp%2FB08XBLV5PL%2Fref%3Dsr_1_17%3Fcrid%3D3M9HXTGCS2OGC%26keywords%3Dsonic%2Bmodel%2Bar%2Bwing%2Bpro%26qid%3D1678595397%26sprefix%3Dar%2Bwing%2Bpro%252Caps%252C105%26sr%3D8-17%26ufe%3Dapp_do%253Aamzn1.fos.18ed3cb5-28d5-4975-8bc7-93deae8f9840&data=05%7C01%7CConrad.Obeng%40my.utsa.edu%7C1d0876efd31e44b6531608db2357e836%7C3a228dfbc64744cb88357b20617fc906%7C0%7C0%7C638142632696457719%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=4zTVcFfd16LP5lLjIs6a1vUlZ6RFqzXXE5U5h2ye12s%3D&reserved=0)
* Digital Servo Motors: [https://www.amazon.com/4-Pack-MG996R-Torque-Digital-Helicopter/dp/B07MFK266B/ref=sr\_1\_7?crid=1847EDRGLE85S&keywords=metal+gear+servo+motor&qid=1678422104&sprefix=metal+gear+servo+motor%2Caps%2C141&sr=8-7](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.amazon.com%2F4-Pack-MG996R-Torque-Digital-Helicopter%2Fdp%2FB07MFK266B%2Fref%3Dsr_1_7%3Fcrid%3D1847EDRGLE85S%26keywords%3Dmetal%2Bgear%2Bservo%2Bmotor%26qid%3D1678422104%26sprefix%3Dmetal%2Bgear%2Bservo%2Bmotor%252Caps%252C141%26sr%3D8-7&data=05%7C01%7CConrad.Obeng%40my.utsa.edu%7C1d0876efd31e44b6531608db2357e836%7C3a228dfbc64744cb88357b20617fc906%7C0%7C0%7C638142632696457719%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=G%2F5YXrf%2Fg6kGOLZOizgQwG08ZSITOoafJV3UE25jpNo%3D&reserved=0)
* Ball Bearings: [https://www.amazon.com/uxcell-Groove-Bearings-Double-Shielded/dp/B0819B49JY/ref=sr\_1\_3?crid=3SZGRR8LDGEKA&keywords=693ZZ+3+x+8+x+4+mm+Deep+Groove+Ball+Bearing&qid=1678594749&s=industrial&sprefix=693zz+3+x+8+x+4+mm+deep+groove+ball+bearing%2Cindustrial%2C89&sr=1-3](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.amazon.com%2Fuxcell-Groove-Bearings-Double-Shielded%2Fdp%2FB0819B49JY%2Fref%3Dsr_1_3%3Fcrid%3D3SZGRR8LDGEKA%26keywords%3D693ZZ%2B3%2Bx%2B8%2Bx%2B4%2Bmm%2BDeep%2BGroove%2BBall%2BBearing%26qid%3D1678594749%26s%3Dindustrial%26sprefix%3D693zz%2B3%2Bx%2B8%2Bx%2B4%2Bmm%2Bdeep%2Bgroove%2Bball%2Bbearing%252Cindustrial%252C89%26sr%3D1-3&data=05%7C01%7CConrad.Obeng%40my.utsa.edu%7C1d0876efd31e44b6531608db2357e836%7C3a228dfbc64744cb88357b20617fc906%7C0%7C0%7C638142632696457719%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=7Etyd%2BIDLSm8S7gkSr2ZBg02FzIl64AOJD3wKYUHdkw%3D&reserved=0)
* iFlight Motors: [https://www.amazon.com/iFlight-2806-5-Brushless-Quadcopter-Unibell/dp/B086MQ3C3B/ref=sr\_1\_3\_sspa?crid=2K2MFTFAVTF0P&keywords=2806.5+1300KV+Avenger+motors&qid=1678594298&sprefix=2806.5+1300kv+avenger+motors%2Caps%2C109&sr=8-3-spons&ufe=app\_do%3Aamzn1.fos.18ed3cb5-28d5-4975-8bc7-93deae8f9840&psc=1&smid=APE1PBQE6ZIBF&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUExNDQ4NU0wVjY3QVdXJmVuY3J5cHRlZElkPUEwNjk1NDA4MUNZUEU2SURWT01ZSyZlbmNyeXB0ZWRBZElkPUEwNzM4NDcwMURMS1YyUUE3T1ZSMyZ3aWRnZXROYW1lPXNwX2F0ZiZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.amazon.com%2FiFlight-2806-5-Brushless-Quadcopter-Unibell%2Fdp%2FB086MQ3C3B%2Fref%3Dsr_1_3_sspa%3Fcrid%3D2K2MFTFAVTF0P%26keywords%3D2806.5%2B1300KV%2BAvenger%2Bmotors%26qid%3D1678594298%26sprefix%3D2806.5%2B1300kv%2Bavenger%2Bmotors%252Caps%252C109%26sr%3D8-3-spons%26ufe%3Dapp_do%253Aamzn1.fos.18ed3cb5-28d5-4975-8bc7-93deae8f9840%26psc%3D1%26smid%3DAPE1PBQE6ZIBF%26spLa%3DZW5jcnlwdGVkUXVhbGlmaWVyPUExNDQ4NU0wVjY3QVdXJmVuY3J5cHRlZElkPUEwNjk1NDA4MUNZUEU2SURWT01ZSyZlbmNyeXB0ZWRBZElkPUEwNzM4NDcwMURMS1YyUUE3T1ZSMyZ3aWRnZXROYW1lPXNwX2F0ZiZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU%3D&data=05%7C01%7CConrad.Obeng%40my.utsa.edu%7C1d0876efd31e44b6531608db2357e836%7C3a228dfbc64744cb88357b20617fc906%7C0%7C0%7C638142632696457719%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=iAtUMtUwH6pl5r35%2B%2FgUSxh67tO1FAbAiWtD2RvwcJg%3D&reserved=0)
* 3300mAh Battery: [https://www.amazon.com/HRB-3000Mah-Battery-Airplane-Traxxas/dp/B06XKNM73N/ref=psdc\_2234134011\_t5\_B08NDV319J](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.amazon.com%2FHRB-3000Mah-Battery-Airplane-Traxxas%2Fdp%2FB06XKNM73N%2Fref%3Dpsdc_2234134011_t5_B08NDV319J&data=05%7C01%7CConrad.Obeng%40my.utsa.edu%7C1d0876efd31e44b6531608db2357e836%7C3a228dfbc64744cb88357b20617fc906%7C0%7C0%7C638142632696457719%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=byUW%2BaarwpzkARuKL7z7kZTbmVb9Jf6%2FTCoeatYgJ2M%3D&reserved=0)
* Carbon Fiber Rods: [https://www.amazon.com/dp/B08MZHPPN7?ref\_=cm\_sw\_r\_apan\_dp\_MHA3570KRC3GT29Q7KT5](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.amazon.com%2Fdp%2FB08MZHPPN7%3Fref_%3Dcm_sw_r_apan_dp_MHA3570KRC3GT29Q7KT5&data=05%7C01%7CConrad.Obeng%40my.utsa.edu%7C1d0876efd31e44b6531608db2357e836%7C3a228dfbc64744cb88357b20617fc906%7C0%7C0%7C638142632696457719%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=4qJtz7PleQObrHaSdZxZN3gLe5ZyGD0XK6VMZePnXx0%3D&reserved=0)