

Wraith FPV Drone

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VIEW IN BROWSER

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Summary

A fully 3D printed 4" drone that stands out in one way and one way only: s e x i n e s s.

Hobby & Makers > RC & Robotics

Tags: quadcopter drone fpv drones droneframe fpvdrone dronefpv fpvframe

The Wraith FPV Drone

This is a 4/3.5 inch drone frame. Mine is printed using carbon fiber PA6 nylon for the body and ABS for the top. I'll list out the specific electronic and mechanical hardware that I used below. This list will also contain the general part specs that will work with this build, but I'll also leave the names of the exact parts I'm using, in case you just want something that's guaranteed to work.

The Electronics:

- **1x 20x20mm flight controller ESC stack**
  - What I used: SpeedyBee Mini F405
- **1x ELRS receiver**
  - What I used: Happymodel EP1

- **4x 14xx brushless motor**
  - Higher KV motor if you want to fly on 3-4s. Lower KV motor if you want to run 6s
  - What I used: iFlight 1404 XING 4600KV
- **1x Analog VTX**
  - Designed to mount one specific VTX, the Zeus Nano
  - Other small VTXs, like the TBS Unify Pro32 Nano can fit
  - What I used: Zeus Nano VTX
- **1x Analog FPV camera**
  - Design fits 19mm width camera
  - What I used: RunCam Phoenix 2 SE
- **1x VTX antenna**
  - antenna stem thickness of 4mm
  - UFL/IPEX antenna connector type
  - What I used: Rush Cherry 155mm UFL antenna
- **1x LiPo battery**
  - Select voltage based on motor KV rating
  - Look for capacity in range of 600-900 mAh
  - What I used: CODDAR 850mAh 4S 15.2V HV
- **1x ELRS Radio controller**
  - What I used: Radiomaster Pocket
  - A cheaper alternative is the Radiomaster T8L

The Hardware:

- **4x 4" / 3.5" propeller**
  - I recommend getting replacement extras though
  - What I used: iFlight 4030 propeller
- **4x M2x20 screw + M2 nut**
  - These are for the FC / ESC stack, and usually come included
- **6x M2x10 screw**
  - These are for attaching the top plate
- **24x M2x8 screw**
  - 16 of these are for attaching the motors
  - 8 are for fastening the propellers
- **4x M2x5 screw**
  - 2 are for the camera
  - 2 are for the Zeus Nano VTX
- **6x M2x4x3.2 insert nut**
  - These are for attaching the top plate
- **200mm velcro strap**
  - For strapping on the battery

Filament Selection:

In case you work at NASA	CF PEEK
Excellent	CF or GF nylon, PPA, PC, PP
Good, but try not to crash too hard	PETG, ABS, ASA
Please don't	PLA, TPU

Weight & Cost Estimate:

- Drone ~ $150
- Controller ~ $40 - $70
- Weight without battery: 150g

Assembly Guide:

(please have some prior drone experience, that said I'll be happy to help just leave a comment or something if you've got a question**)**

1. Go ahead and print off both pieces. I'll wait. Oh, I should mention - use the good settings, no supports needed.
2. Start with the motors. First cut the motor wires down to 10cm. Then, thread the wires through the drone's arms, and tighten the motors down with the M2x8 screws, be careful not to overtighten.
3. Suspend **only** the ESC part (there are two pieces in the stack) of the stack 2cm or so above its future spot in the drone using a soldering helping hand or some other method. **Make sure** the ESC module is facing forward (same for the flight controller when you install it later)
4. **Be careful soldering**, strip all the motor wires and (preferable) using a pair of tweezers, solder them to the ESC pads. **Do not** solder them facing straight outward as this will increase the thickness of the ESC too much, rather having them perpendicular to the plane of the ESC board, or looping in and around the stack screws.
5. Thread an antenna through the hole in the back of the drone, and snap the connector into its place on the VTX. I purchased the Zeus Nano option that comes with a RUSH Cherry Antenna, it is the perfect size and its stem is exactly 4mm in diameter, and the drone was designed to accommodate it, but thinner antennas will fit trough the hole as well.
6. Prepare the XT30 connector that came with ESC (or your preferred connector) and cut the wires down to 80mm each (or whatever

length you prefer).
7. Solder the XT30 wire leads to the ESC, then pass the connector through the opening in the back. Be careful to get the polarity right and not short out any component while soldering. Don't forget to include the capacitor if you're using one.
8. Solder up wires to the VTX, if it arrived unsoldered. If you're using the Zeus Nano as I did, you can snip off all but the closest mounting points, and mount to the built in holes of in the rear part of the drone. The screws go directly into the plastic. Make sure you mount with the antenna port facing up, and the edge with the wires facing back. If you are not using the Zeus Nano, you can edit the .step files to fit your VTX or just kinda mush it in there and hope for the best.
9. Now, lower the ESC module into place and thread through the four M2x20 screws, pop on the flight controller part of the stack too.
10. Using the tweezers, carefully solder the VTX wires to their proper spots on the flight controller. You'll need a wiring diagram to know what goes were, and any manufacturer who knows what they're doing will provide one to you.
11. Excellent! We've got the flight stack and the VTX installed and wired up.
12. Secure the camera to the frame. Whichever one you end up choosing, it must be 19mm wide and have M2 mounting holes. Honestly the RunCam Phoenix 2 SE or RunCam Robin are both perfect, highly recommend.
13. Solder the camera wires to their correct spot on the flight controller.
14. Lastly, the receiver. If it came with wires soldered on already, great! If not, solder them on yourself. I believe all ELRS receivers use 4 wires. Once you've done that, solder the connections to the flight controller. If your receiver has a T-antenna, pop it out the two circular holes in the back of the drone.
15. With that, you've completed all of the electrical connections. Congrats!
16. You can line up the cover and tighten it down.

Ok ok ok. I know. There's still a lot of configuration to do, but you've just assembled a damn furious little wraith and you have my permission to feel proud. Now, betaflight is the name of the game and fortunately the setup thereof has gotten tremendously easier these past few years, so even a newbie is only liable to lose half his hair during the process. Find a guy named Joshua Bardwell on youtube. He was once a great help to me with his videos for beginners and he will be to you too. Soar high, my propped up comrades.

Model files



wraith-body.stl



wraith-cover.stl

wraith-fpv-drone.step

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