

At the Pendleton Unmanned Aerial Systems Range, I pursued a personal project in my free time, building a FPV drone (**Figure 1**) under the guidance of my supervisor (Range Chief Engineer, Steve Lawn).



Figure 1: Completed FPV Drone

1. Using a carbon fiber frame, I mounted 4 motors and soldered each motor to an electronic speed controller (ESC). Each ESC's power and signal wire were soldered to an all-in-one flight controller (AIO FC) which acted as both a power distribution board (PDB) as well as a flight controller (**Figure 2**).



Figure 2: Drone Motor/ESC/AIO FC Wiring

2. Using CAD, I designed, and 3D printed a mounting board to stack the video transmitter (VTX) atop the AIO FC. I soldered cables to connect the video out pin on the AIO FC to the video pin on the VTX and connect the 5-volt out pin on the AIO FC to the 5-volt in pin on the VTX to provide power to the board (**Figure 3**).

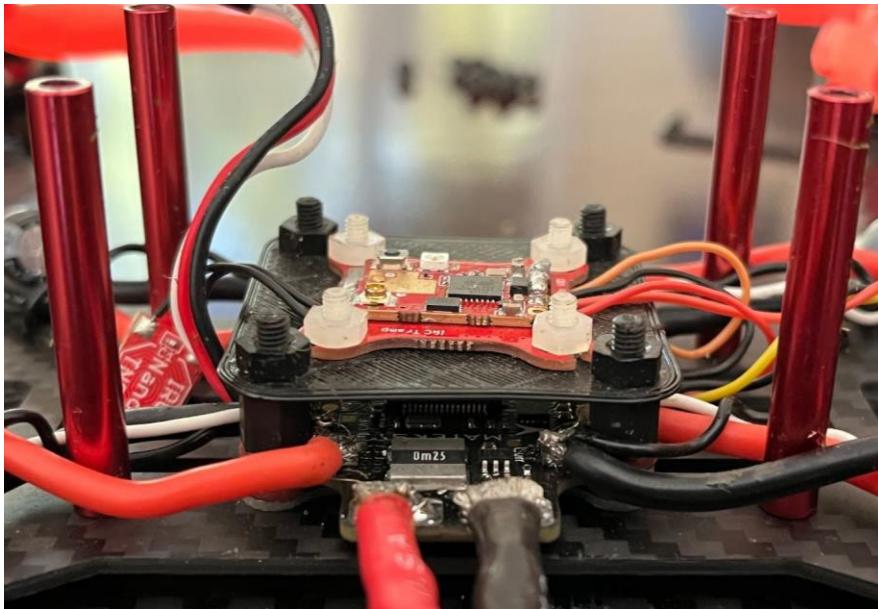


Figure 3: VTX Wiring

3. I then soldered cables between the 5-volt out pin on the VTX and the 5-volt pin on the camera to power it. I also connected the camera's video cable to the video IN pin on the AIO FC (**Figure 4**).



Figure 4: VTX to Camera Wiring

4. To mount the camera to the frame, I used CAD to model and 3D print a bracket that housed the camera (**Figure 5**).



Figure 5: CAD Modeled Camera Bracket, 3D Printed and Superglued to Frame

5. I mounted the antenna connector to the frame's cover and screwed the right-hand circular polarized antenna into the connector (**Figure 6**).
6. An FrSky receiver was necessary to enable a connection between the transmitter and the drone. I wired power to the receiver and routed its signal cable to the AIO FC (**Figure 6**).



Figure 6: Transmitter Wired to AIO FC, Antenna Mounted to Frame Cover

7. Finally, I hooked up an XT60 connector to the main power pads of the AIO FC (**Figure 7**).



Figure 7: XT60 Connector Wired to AIO FC

Clip 1 captures the initial power on of the FPV drone, and **Clip 2** shows flight footage.

This project was rewarding as I was able to learn by doing. I learned more about circuits by looking at pinout diagrams and wiring them. I also was able to expand my shop skills and continue refining my CAD skills. This initial project has turned into a passion for me and I actively fly FPV drones in my free time.