

Designing a General-Purpose Communication-Modular Drone Platform for C-UAS Testing

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Fig 1. Rendered Model - Top Corner View

OBJECTIVE AND MISSION

Design and Fabricate an in house UAS testing platform with the follow qualities:

- Robust construction
- General use size for various missions
- Modular external payload railing system and internal mounting capabilities
- Modular communication support (Radio Communication and Fiber Optics Communication)
- Manufacturable completely in-house with Blue UAS safe Components



Fig 2. Rendered Model - Top Corner View

HARDWARE DESIGN

Base Hardware details:

- M3 screw construction, in-house CNC-cut carbon fiber plating for body construction, 37 mm thickness spacers along with custom 3D-printed CF arm mounts, and carbon fiber tubing for arm stiffness
- 4 × 400 KV motors, 2 × 3 Ah capacity (24 A burst), and at max draw 18 kg thrust power
- 4-screw removable top hatch accessing all internally mounted avionics, including Cube Orange, Nvidia Jetson with avionics peripheral board, ESC, and both traditional RF communication and fiber optic communication electronics

COMMUNICATION MODULARITY

Version 1 is capable of both traditional radio communication (RC) and fiber optic (FO)-based communication

RC details: The base station commands the UAS with a base station transceiver that sends radio frequency communication (at 915 MHz) to the onboard receiver (Jeti Duplex EX Rsat 915 MHz) and transmitter (Jeti Duplex DS-12 915 MHz). These radio waves are inherently imperceptible and interruptible due to their equal propagation.

FO details: The base station will command the UAS with a base Ethernet SFP (Small Form-Factor Pluggable) module that converts Ethernet to bi-directional (BiDi) fiber optic cabling, which is possible through opposite bandwidth propagation. This cable can now stretch up to 20 km to the in-air UAS that has its own SFP module converting FO to Ethernet, then to PPP link internal onboard. This form of communication has no external wave footprint and is undetectable on the EMS.

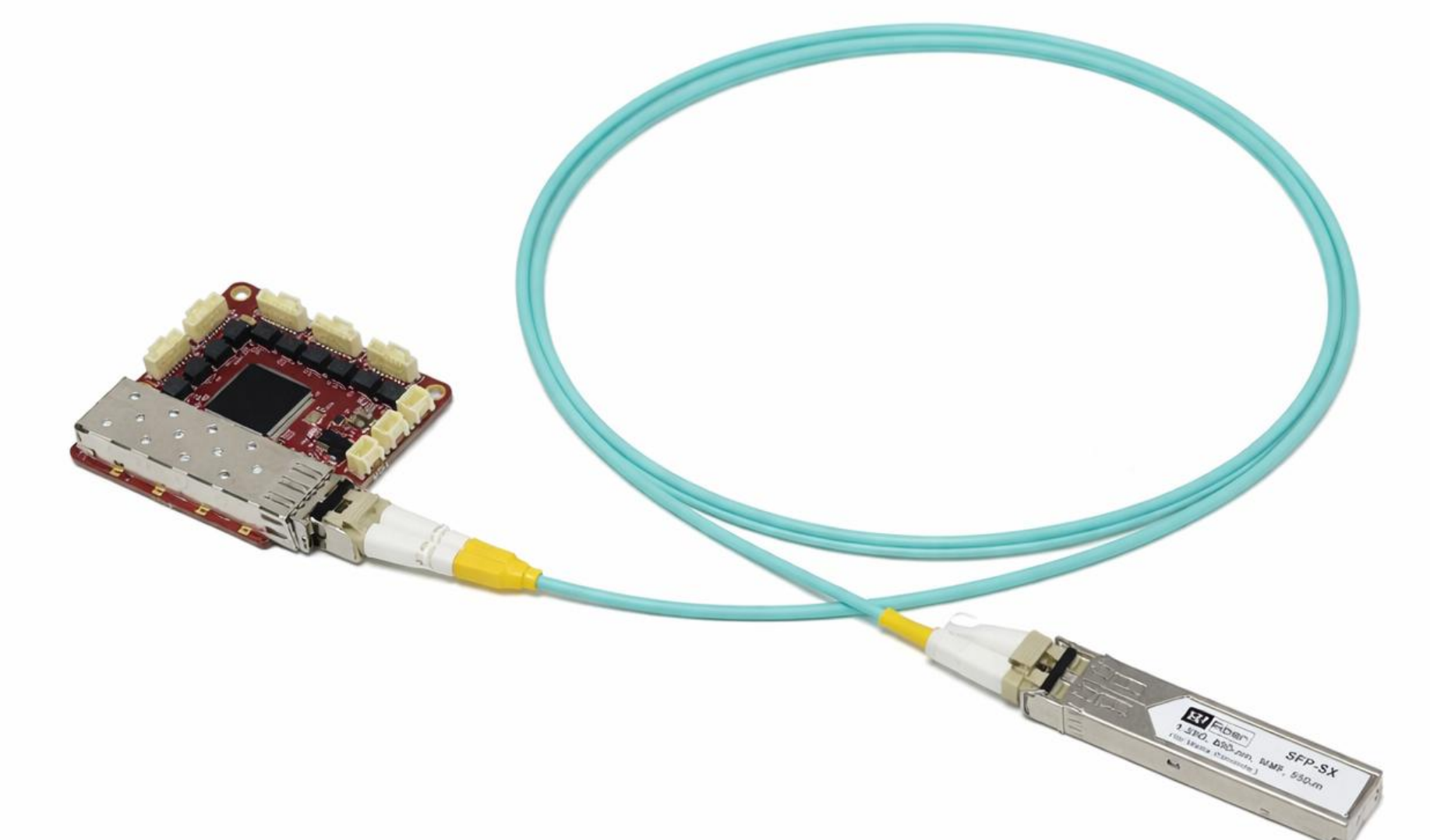


Fig 3. Bi-Di Fiber Optic Cable SFP Module

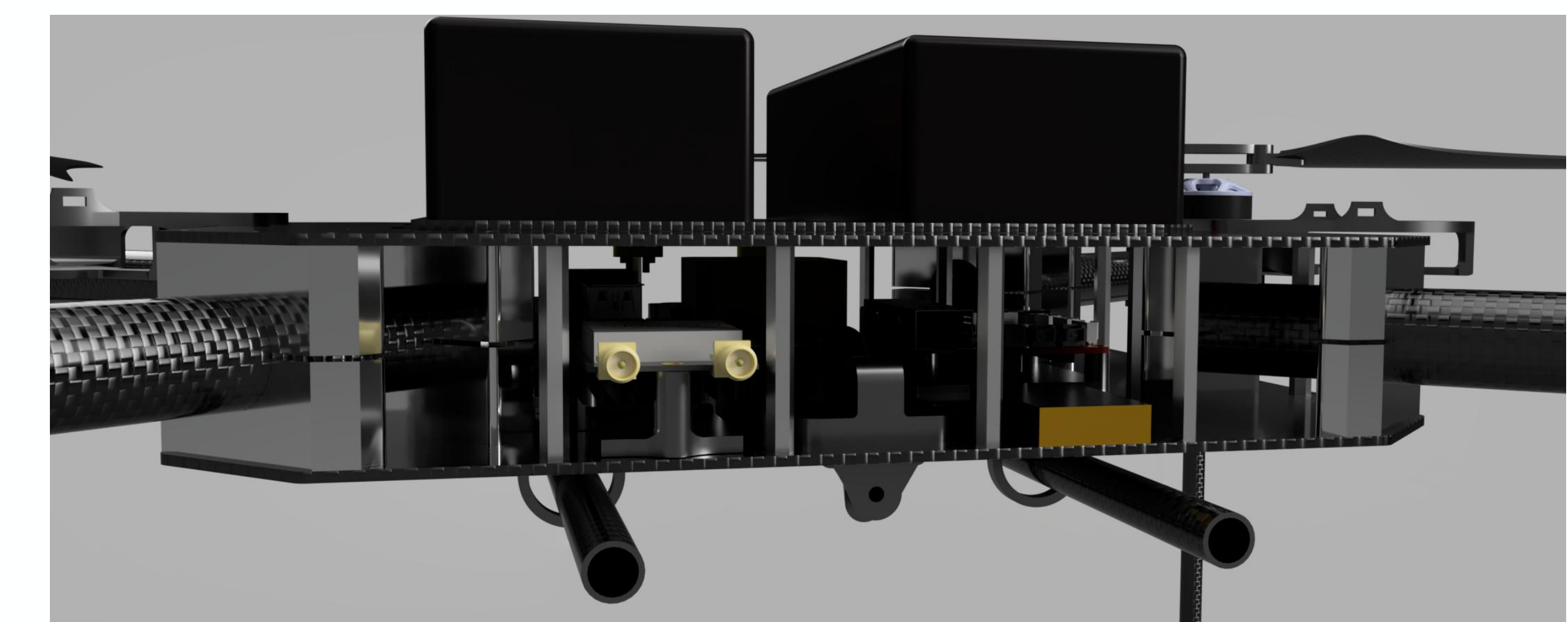


Fig 4. Fiber Optic Communication UAS Port