My First Attempt Designing a Drone

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1 Overview

In this attempt, I will specifically focus on presenting the electronics and systems architecture design, rather than the full aerodynamics.

In particular, my design will include a flight controller (FC) and its peripherals, as well as a visual presentation of how they interact.

2 System Architecture

The design centers on the Holybro Kakute H7 flight controller. This FC is built around an STM32H743 MCU 480 MHz with an onboard IMU (ICM-42688-P) and barometer (SPA06). It supports both PX4 and Ardupilot firmware, using the MAVLink protocal for ground communication.

Peripheral devices are selected for compatibility with the FC's available buses and logic levels:

- **GPS Module (Holybro M9N)** — communicates via **UART** using the UBX/NMEA protocol.

- **Compass (IST8310)** — connects over the shared **I^{2}C** bus.

- **LiDAR (Benewake TFmini-S)** — uses **UART** (TTL serial) for distance data.

- **Optical Flow Sensor (PMW3901)** — interfaces through **SPI** for high-rate motion data.

- **Airspeed Sensor (MS4525DO)** — uses **I^{2}C**.

- **Telemetry Radio (SiK 915 MHz)** — links via **UART** carrying MAVLink messages.

- **RC Receiver (ExpressLRS)** — connects over **UART** using the CRSF protocol.

3 Schematic
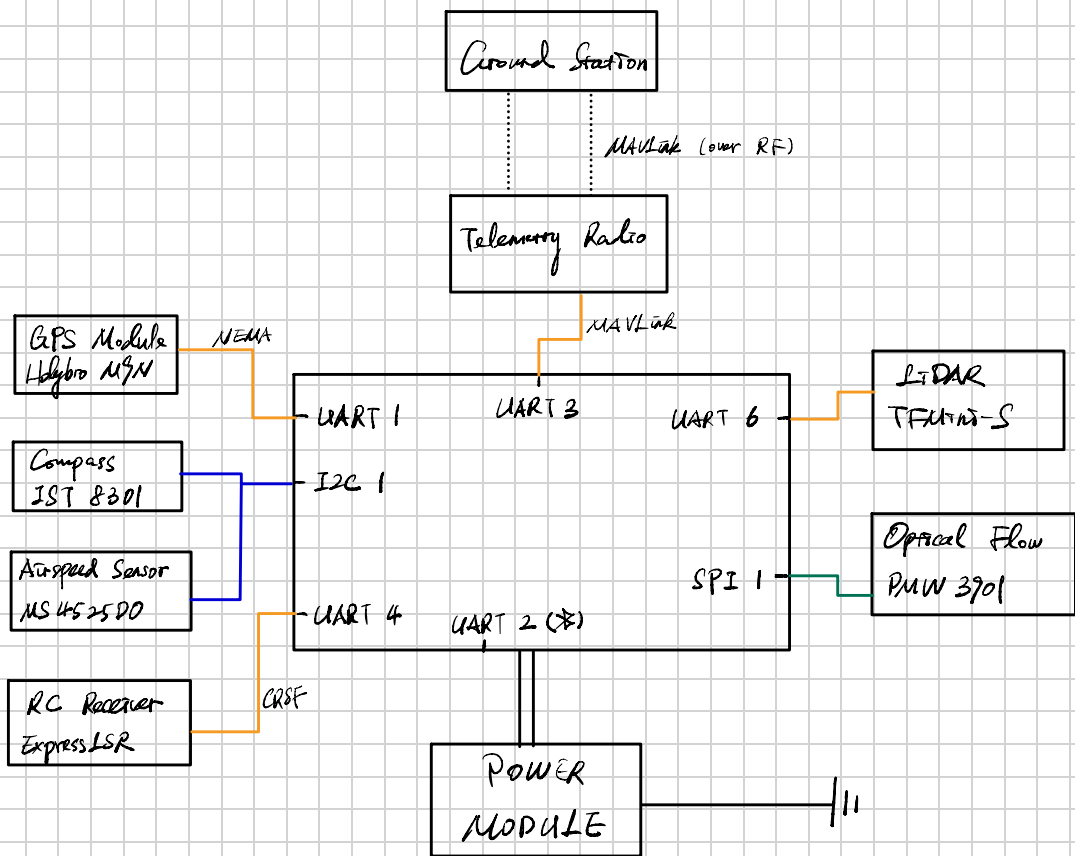
Figure 1: A rough schematic of my drone design