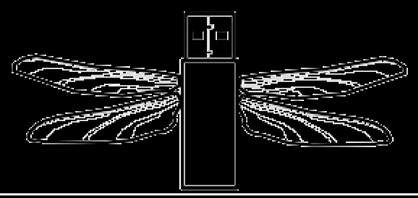


Project Dragonfly

Danny Cardenas | Teagan Connon | Noah Lutz | Jesus Oviedo | Marko Ristic

Background

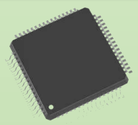
The overhead in designing unmanned aerial vehicles can run a high cost in time and money during the prototyping phase. We propose Project Dragonfly, a modular and cost-effective way of providing state estimation, reducing the individual sensor configuration workload for drone manufacturers and hobbyists.

Overview

Project Dragonfly serves to consolidate several low-profile sensors into a single, peripheral device ready-to-use with open-source software and user manuals.

- L: 3” x W: 1.5” x H: 1”
- USB-A 2.0 connector
- ROS State Estimation Software
- Datasheet/ User Manual

Key Hardware Components



Microcontroller - STM32L412RBT6
❑ Performs reads of sensors and packages data

Inertial Meas. Unit (IMU) – BMI088
❑ Provides translational and rotational measurements

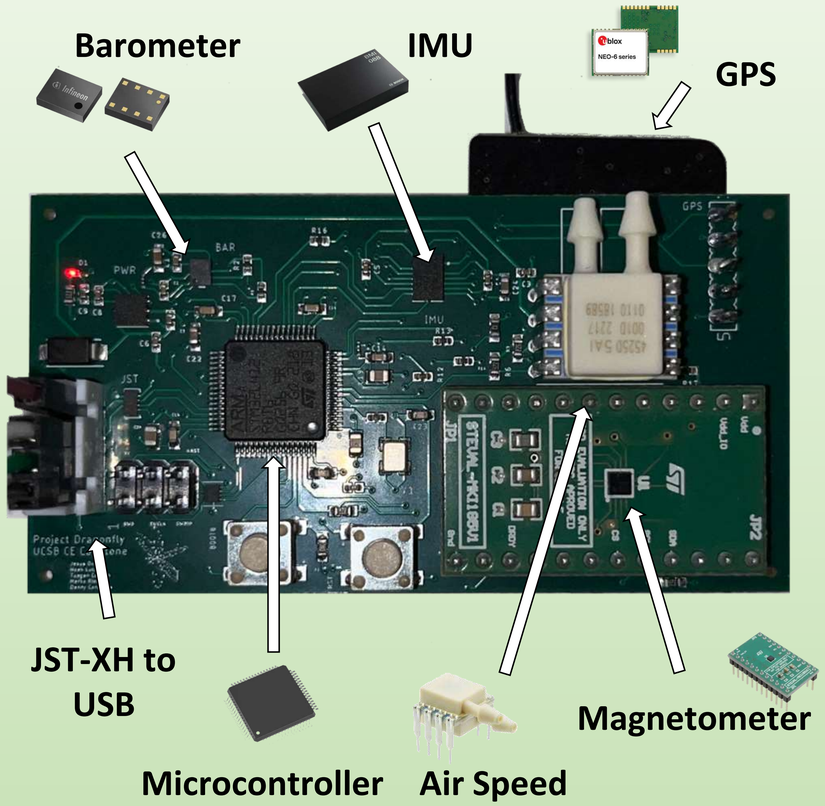
Magnetometer – STEVAL-MKI185V1
❑ Provides 3 axis orientation data

GPS – NEO-6M
❑ Provides Latitude and Longitute

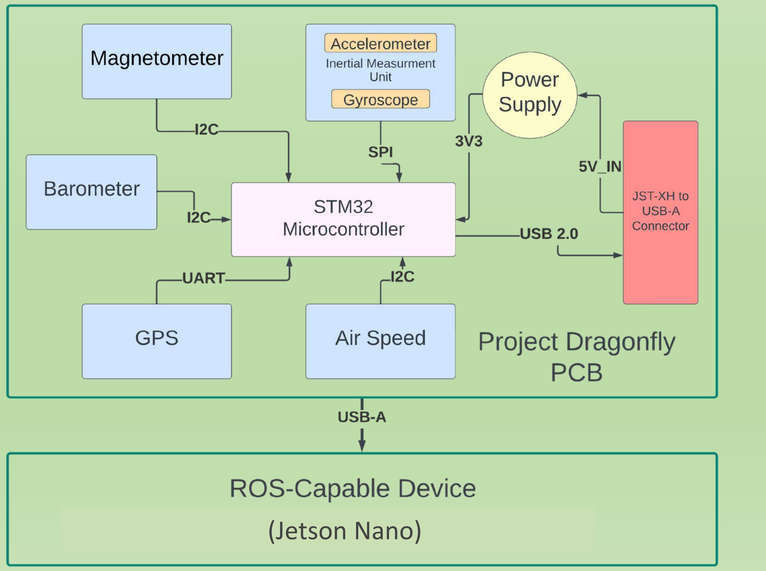
Barometer – DPS310XTSA1
❑ Provides current altitude

Air Speed – 45525DO
❑ Provides speed relative to air

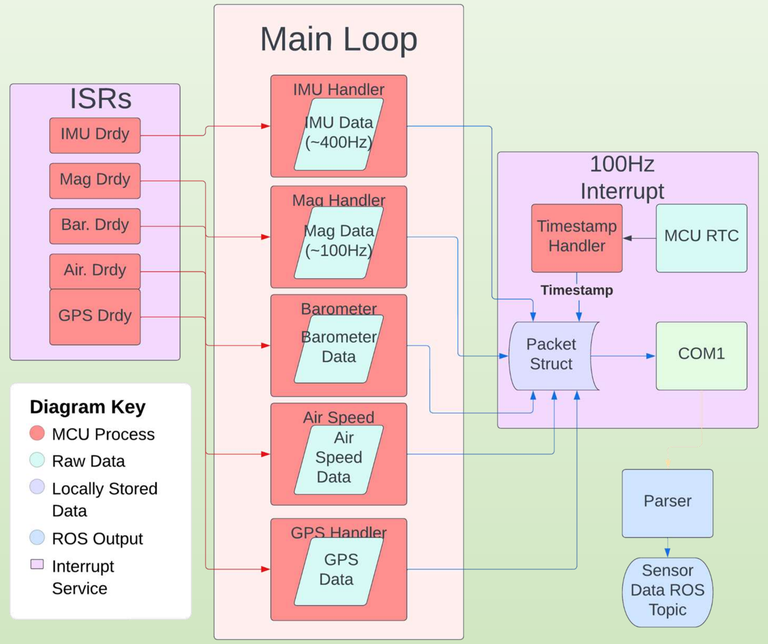
Printed Circuit Board



Hardware Block Diagram

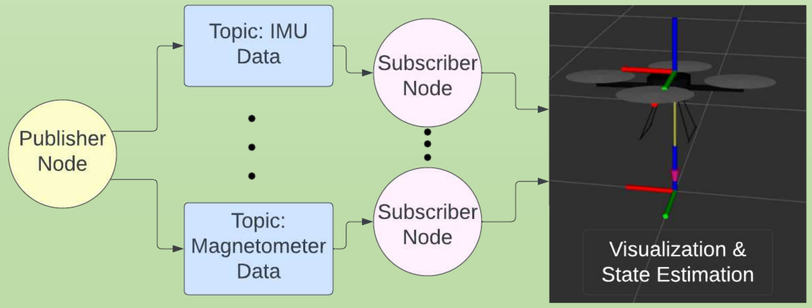


Firmware



Sensors generate data ready interrupts triggering a read from the MCU. This data is timestamped, turned into a packet, and transmitted over USB. The packet contains all fields simultaneously and indicates validity using stale bits.

Visualization & State Estimation



ROS Melodic will be used on Jetson Nano. Data packet reaches Nano and from here publisher nodes publish a topic for each sensors data. Subscriber nodes subscribe to a topic and this data is then used for a virtual demo visualization as well as state estimation via ROS packages and plugins.

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