



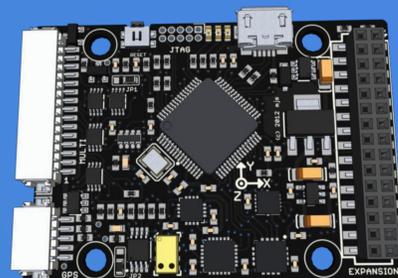
GauchoHawk

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Motivation

Pixhawk is an open-source project that provides high-end autopilot hardware and flight control software. But, Pixhawk does have some room for improvement.

- No high quality IMU
- No magnetometer
- No ethernet port
- No RTK capable GPS
- No precise timestamp



PX4FMU

Overview

GauchoHawk is a fully-featured flight controller with custom hardware and software that greatly improves the Pixhawk's capabilities.

Hardware

Features a custom PCB shield that mounts onto the Nucleo microcontroller, adding new sensors:

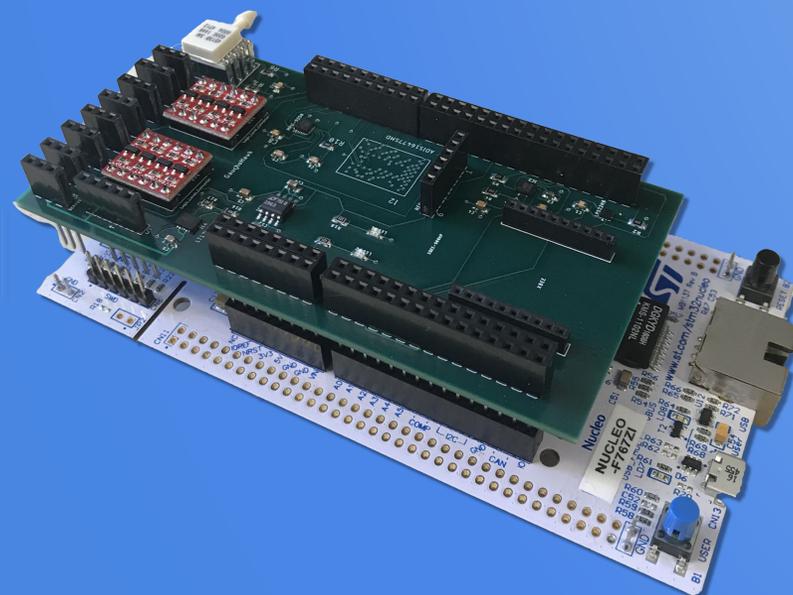
- LPS22HB Barometer
- MS4515DO Pressure Sensor
- QMC5883L Magnetometer
- ADIS16477 IMU
- MPU-9250 IMU
- XBEE 900HP Radio
- NEO-M8P RTK GPS

Software

Features an open-source, customizable flight control software called Betaflight, responsible for interfacing with GauchoHawk's high-precision peripherals. Betaflight captures sensor output to control and fly any compatible drone.



Components



Nucleo F767ZI

This microcontroller features a variety of unique extensions and abundant communication interfaces which make it ideal for the development of a shield board.

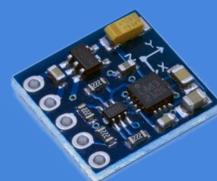
MPU 9250

A very small chip featuring a 9 axis accelerometer. It uses 1 MHz SPI for dynamic and precise motion tracking.



QMC 5883L

Features an extremely responsive 160 Hz max output rate while providing precise compass headings within 1° of accuracy.

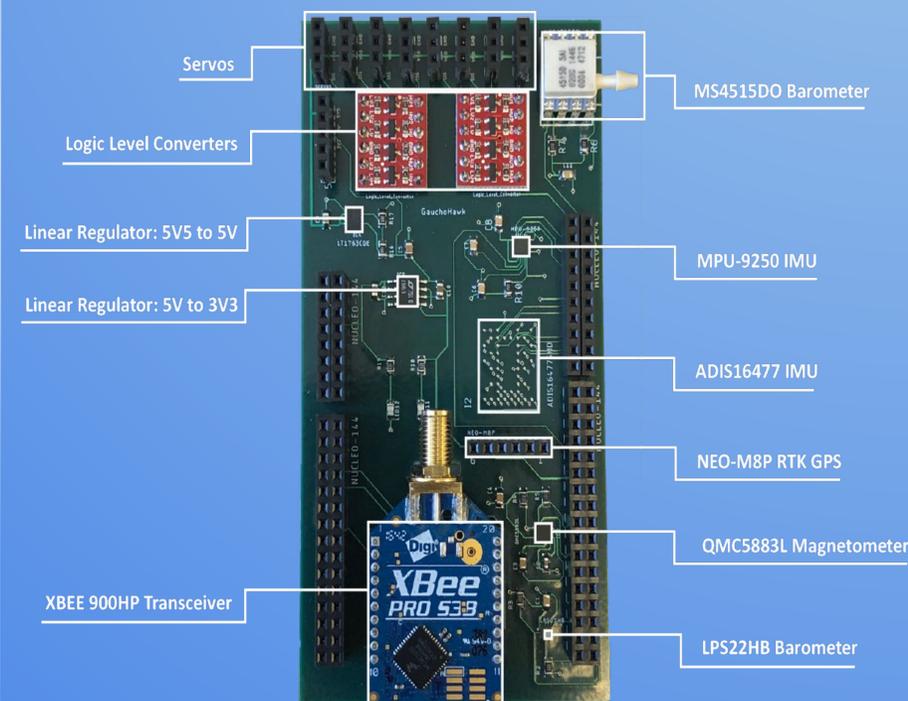


ADIS-16477

Includes a triaxial accelerometer and a gyroscope to provide precise delta angle and delta velocity measurements for extremely accurate stabilization and navigation.



Circuit Board Design



Betaflight



We extended Betaflight's driver suite to support GauchoHawk's on-board sensors. Betaflight's portability makes it ideal for prototyping and testing our shield design for commercial viability. Our development of the flight controller software demonstrates the versatility of our PCB and its potential market applications.

Acknowledgements:

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