

PROJECT OVERVIEW

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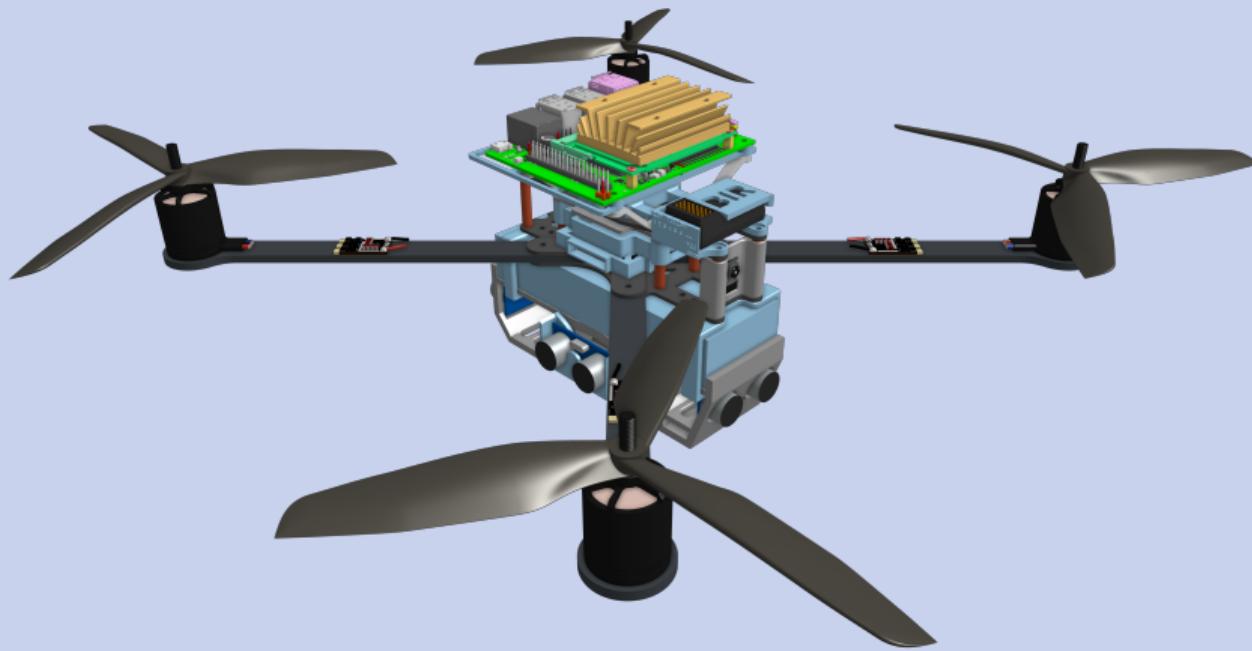
January 2022

Sistema FIEB



PELO FUTURO DA INOVAÇÃO

Introduction



Introduction - Applications

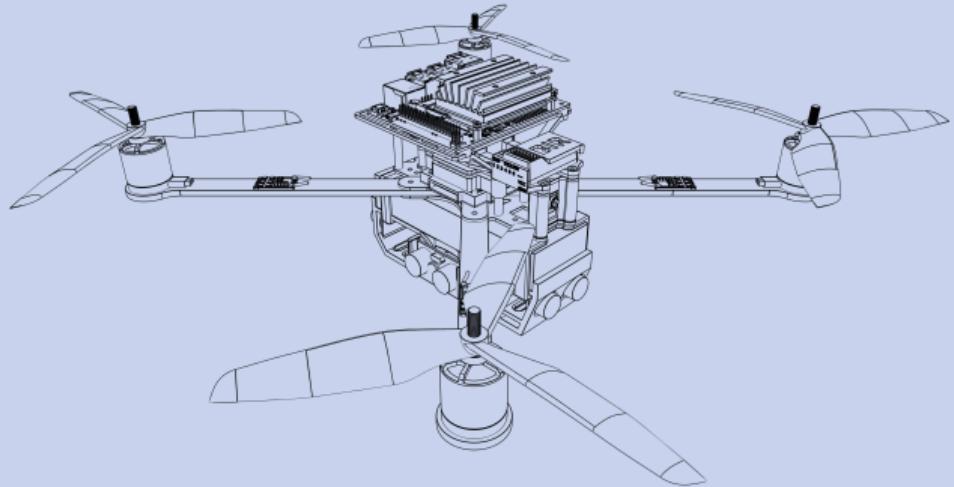
- Mapping
- Transport
- Disaster monitoring
- Pesticide applications
- Inspection of transmission lines
- Infrastructure inspection



Figure: Automated Inspections.

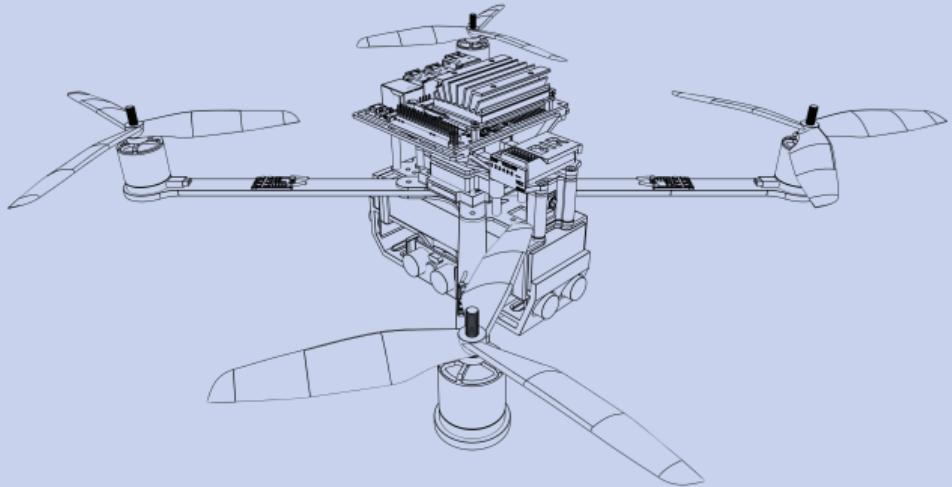
Project Requirements

- ROS 2 framework
- Flight stability
- Real-time image processing
- SLAM
- Obstacle avoidance
- Autonomous navigation and landing



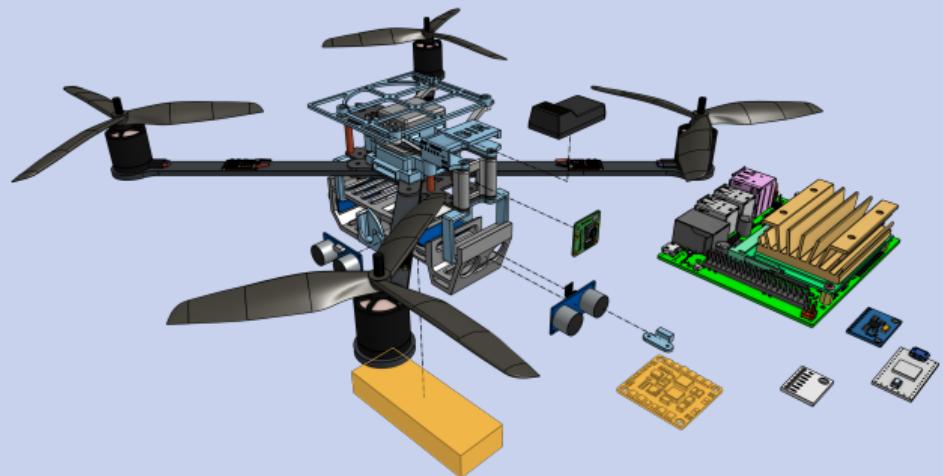
Objective

- Build a research drone with the potential to autonomously explore unknown environments, avoid obstacles and detect areas of interest.



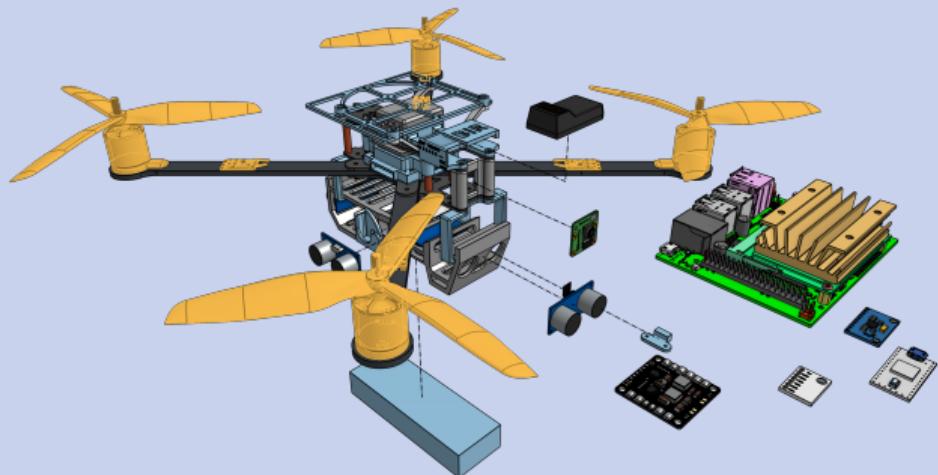
System Specification - Power

- Matek Mini Power Hub
- Lipo Battery 5000mAh 60C 3S



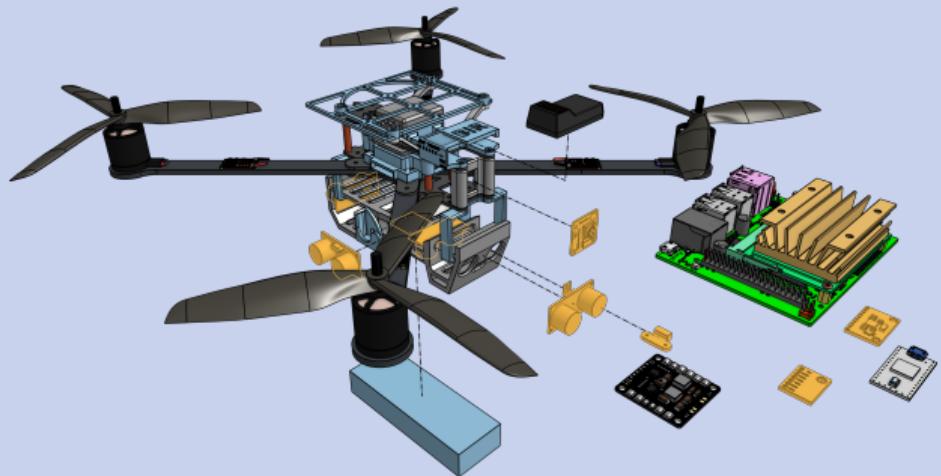
System Specification - Actuation

- 4 x ESC Racestar 30A
- 4 x Brushless Motor X2212 - 13 KV 980 II



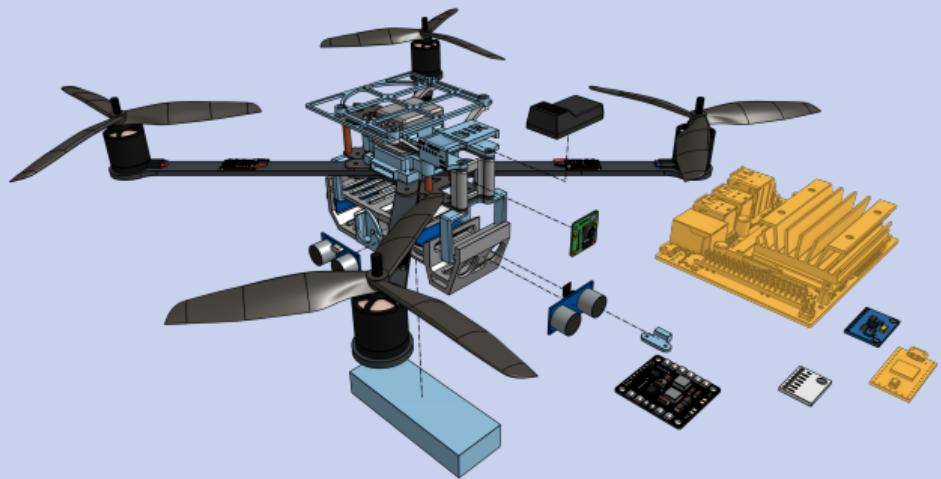
System Specification - Sensors

- IMU - MPU-9250
- Barometer - MS5611
- Laser Range Sensor - TOF10120
- 2 x Camera - Raspberry Pi v2 8MP (IMX219)
- 5 x Ultrasonic Transducer - HC-SR04



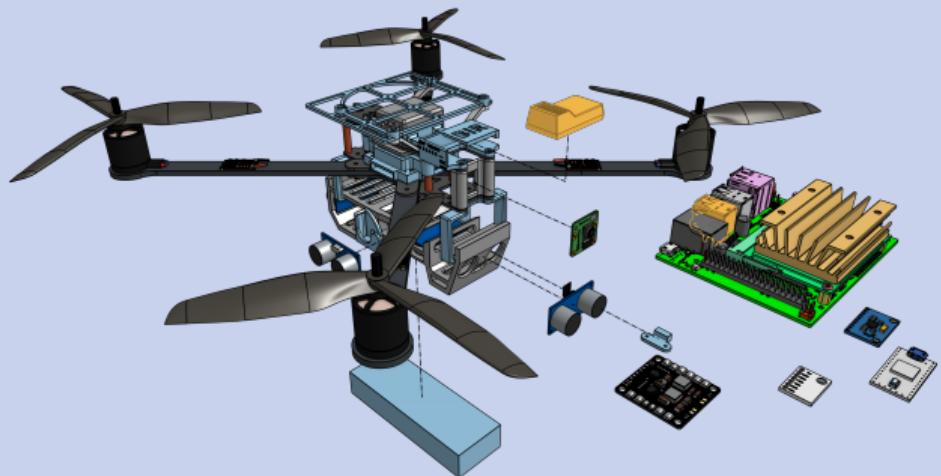
System Specification - Processing Power

- NVIDIA Jetson Nano Development Kit
- Microcontroller Teensy 4.0

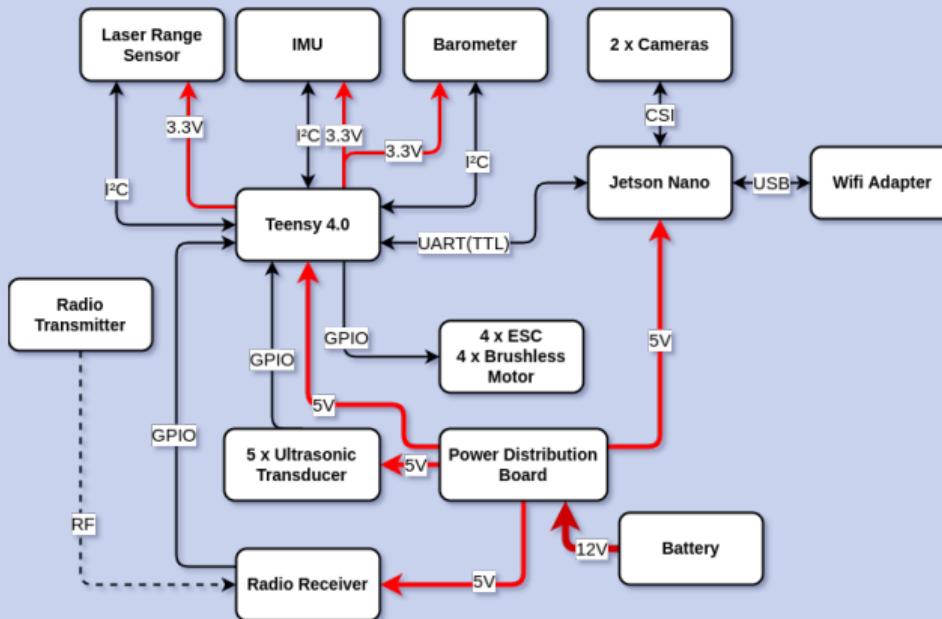


System Specification - Communication

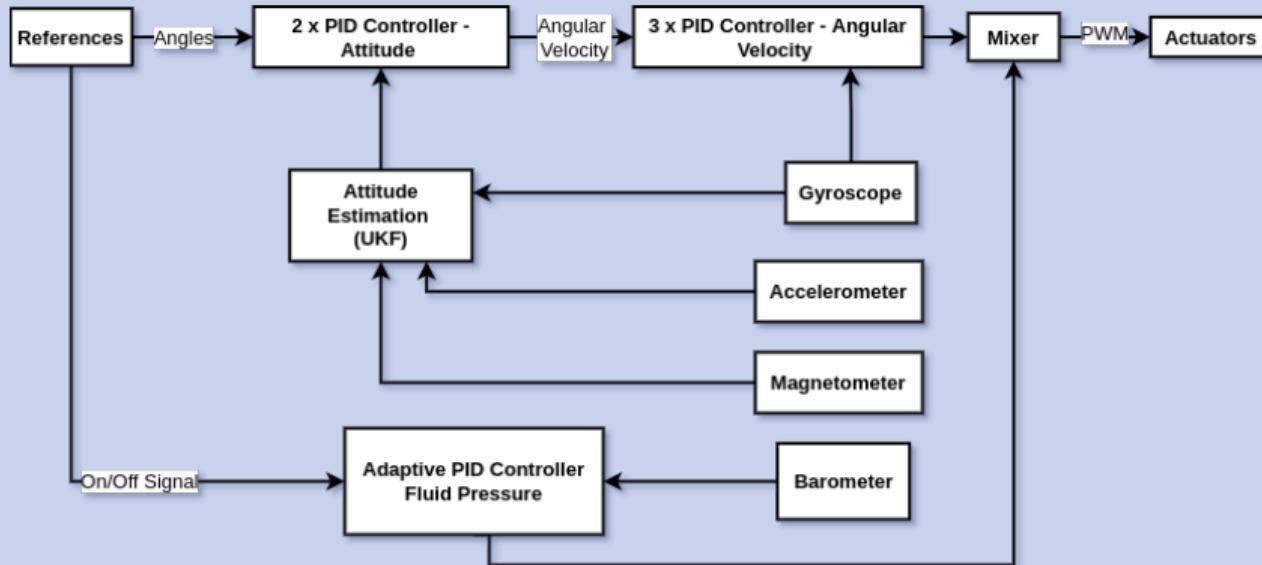
- Radio Receiver (FS-R6B)
- Wifi Adapter (AC600)



Electrical Schematic



Control Strategy



General Architecture

Results - Visualization

Results - Visualization

Results - Visualization

Results - Object Detection

Results - Pose Estimation

Results - ORB_SLAM2

Results - Free Flight

Results - Pusher Configuration (Extra)





Questions?

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