



The Autonomous Payload Delivering Dronely Raven

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PROJECT OVERVIEW

Our team developed an autonomous drone quadcopter capable of delivering a payload to a marked target. The use case for our drone is for package delivery to become more efficient because there will be no need for manual controls.

Our team plans to enter Dronely Raven into the CSU California Unmanned Aerial System Competition on June 22, 2024, in the Mojave Air & Spaceport. The three parts of this competition include waypoint navigation, image recognition, and payload delivery. The team will execute these tasks using the Mission Planner GCS Software for waypoint navigation, python libraries such as OpenCV and Dronekit for image recognition and movement toward the target, and a servo motor for delivering the payload.

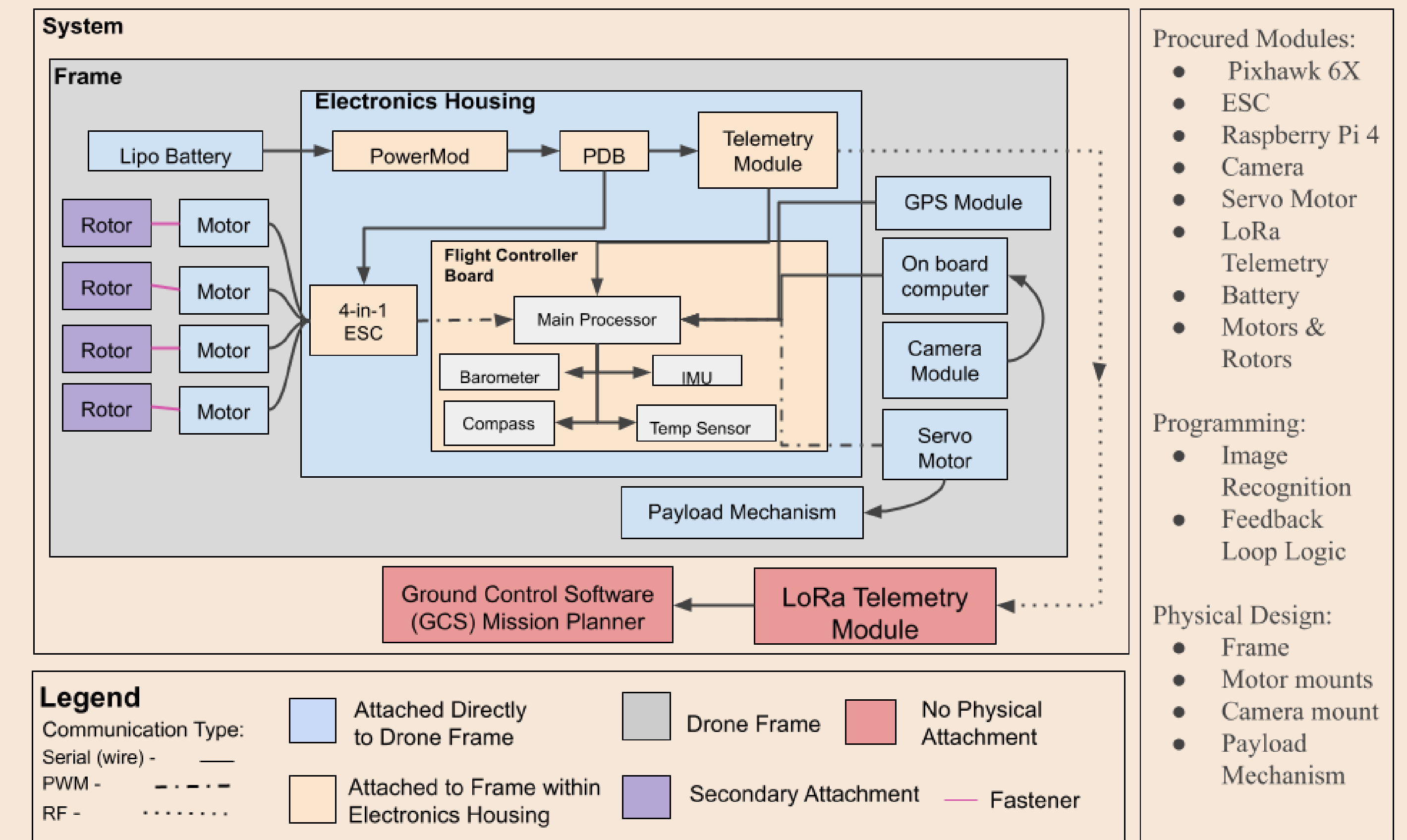
THE DREAM TEAM



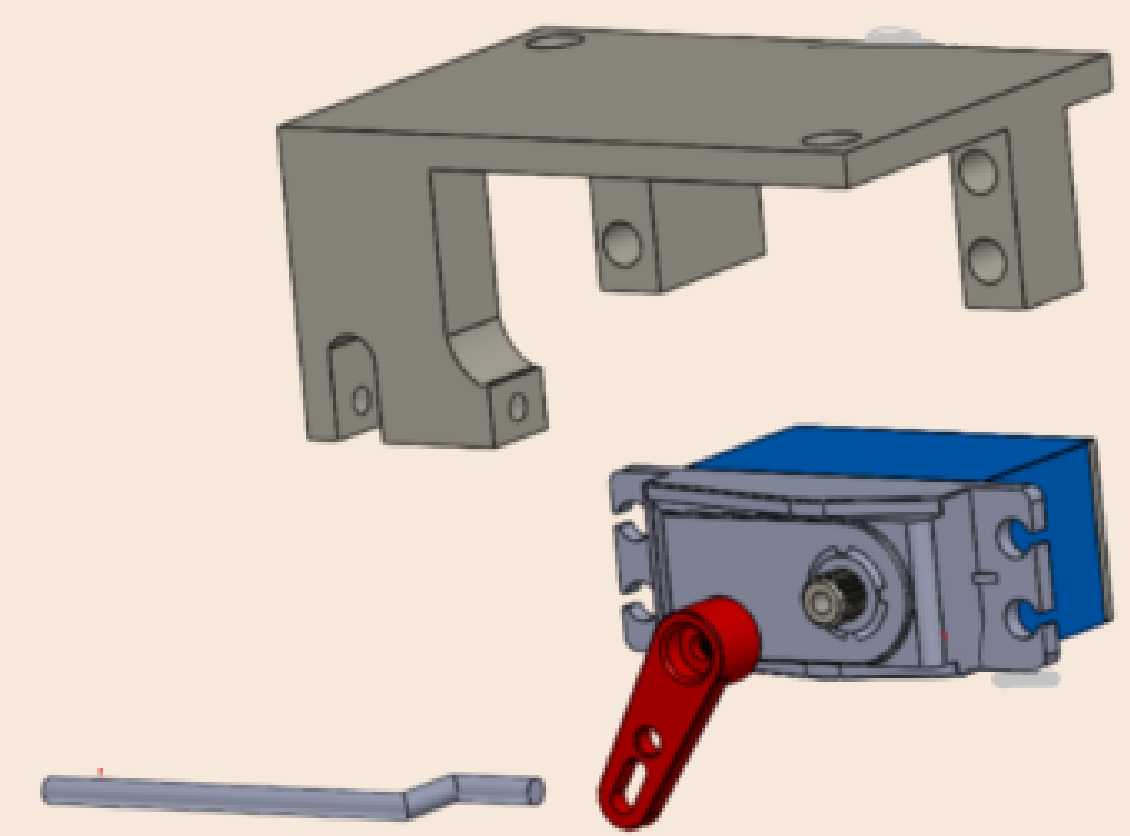
RELEVANCE TODAY

1. Meeting E-commerce Demands: Autonomous drones ensure efficient and timely arrival of packages. This enhances customer satisfaction and the growth of e-commerce businesses.
2. AI-Powered Navigation: Leveraging advanced artificial intelligence (AI) and machine learning algorithms, autonomous drones minimize the need for human intervention, reducing operational costs.
3. Advanced Sensor Integration: Equipped with sophisticated sensors, autonomous drones can detect and avoid obstacles in real-time. By mitigating the risk of accidents, the reliability and feasibility increases.
4. Enabling Remote Access: In regions lacking adequate transportation infrastructure, drones offer access to essential supplies and medical aid, which is crucial during emergencies.
5. Technological Convergence: Autonomous drones incorporate cutting-edge technologies, including robotics, wireless communication, and energy storage systems. By integrating state-of-the-art technologies, drones pave the way for future advancements in automation and robotics.

SYSTEM LEVEL BLOCK DIAGRAM

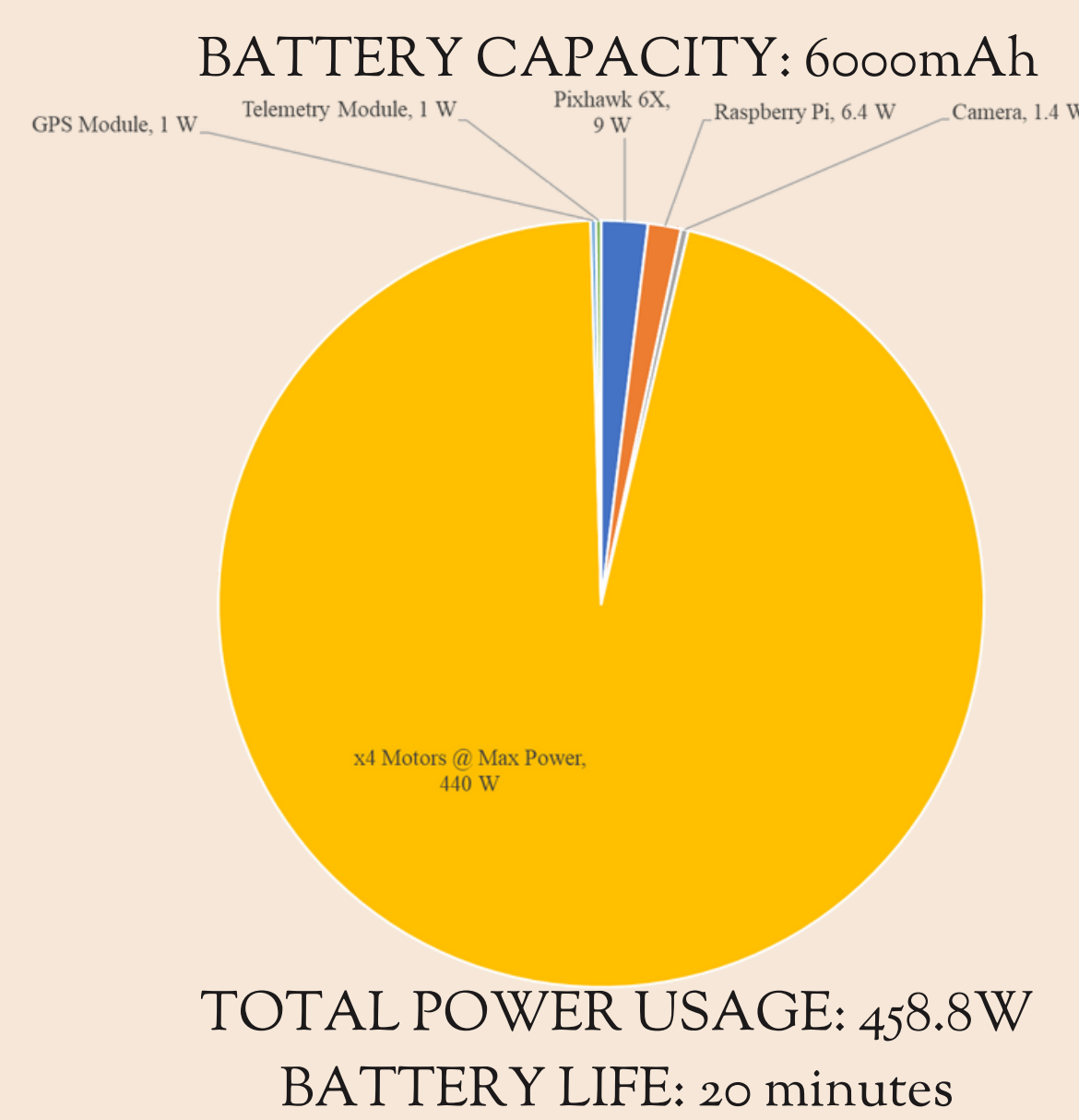


PAYLOAD MECHANISM

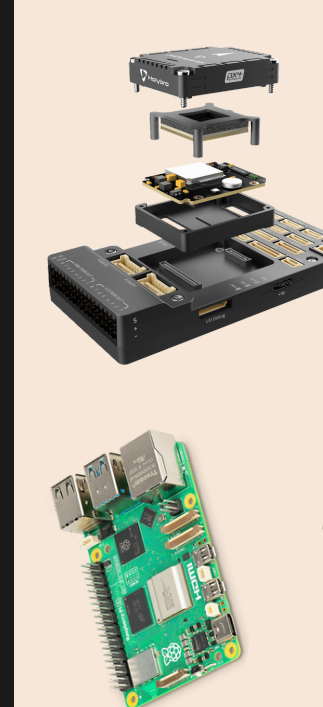


Within this system, a string is suspended from a pin. This string connects to a metal ring, which has four hooks at each end attached.

POWER CONSUMPTION



DRIVING COMPONENTS

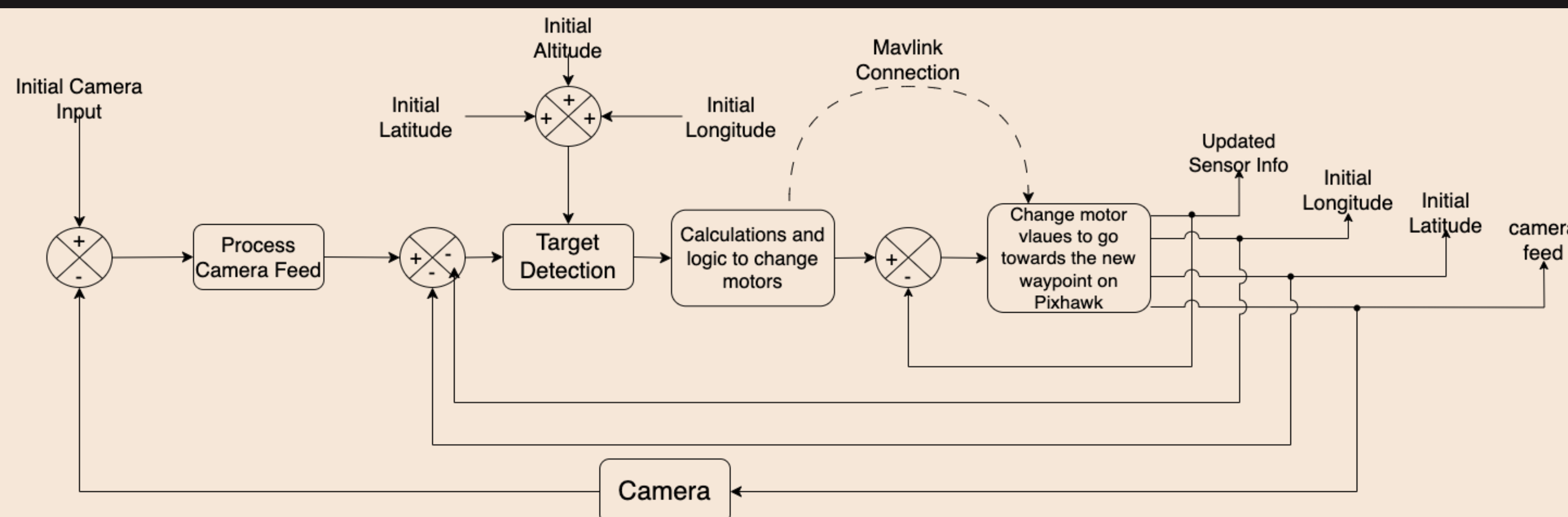


Pixhawk 6X Flight Controller
This flight controller contains a high-performance STM32H753 Processor with a clock speed of up to 480 MHz. The three separated IMU sensors and two Barometer sensors on separate buses ensure better stabilization and reliability, making it well suited for our project.

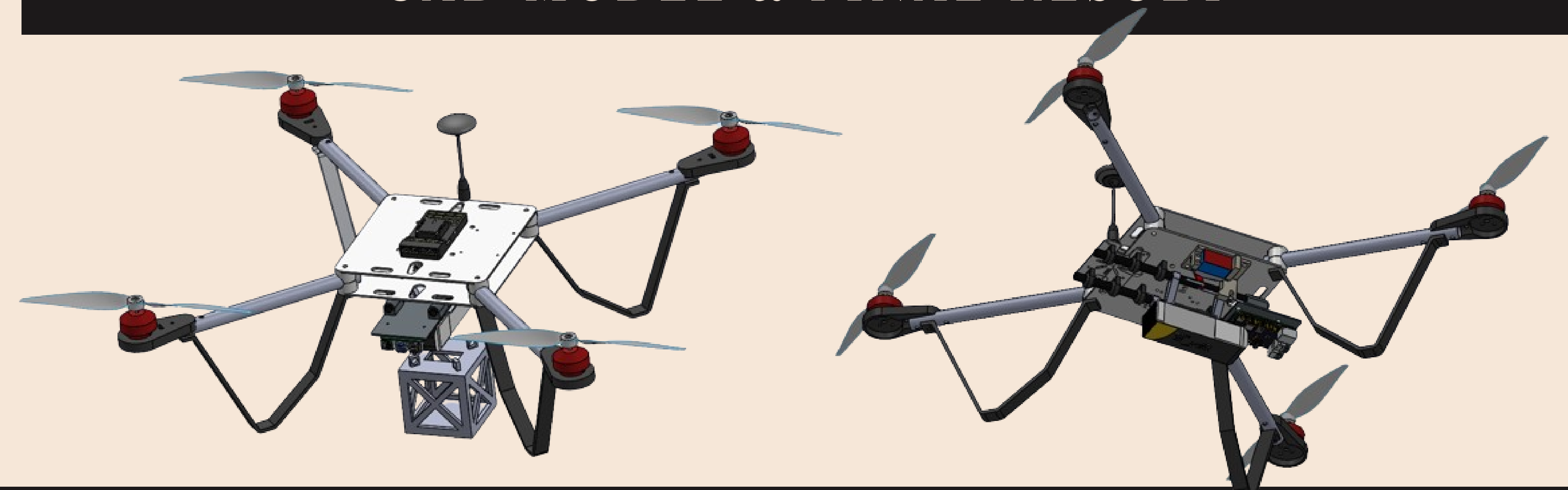
Raspberry Pi 4
This onboard computer has the required power to process and recognize images. Our specific Pi has 8 GB of RAM. Additionally, Raspbian has an operating system with a default Python version compatible with the libraries our project requires (Dronekit-python and OpenCV)

How will the two components work together?
The Raspberry Pi controller utilizes the Mavlink protocol to communicate with the flight controller. Without this, the Raspberry Pi will not have the capability to send necessary commands to the flight controller. Additionally, libraries such as OpenCV and Dronekit-python will be necessary to identify the target and send certain go-to commands to the flight controller.

CONTROL SYSTEM FEEDBACK LOOP



CAD MODEL & FINAL RESULT



MANUFACTURING

