

UNMANNED AERIAL VEHICLES (UAVS)



Table Of Content

- **Introduction**
- **Uses of UAVs**
- **Advantages of
UAVs**
- **UAV Components**

What is UAV

Unmanned aerial vehicles (UAVs), also known as drones, are remote-controlled aerial vehicles (RCAs) that can fly autonomously once a mission is programmed. UAVs are used in a variety of industries, including agriculture, mining, construction, and military. The use of UAVs is expanding rapidly due to their ability to gather critical data, reduce costs, and mitigate risks.



Uses of UAVs

Agriculture

capture images of crops, detect crop stress and identify weed infestations.

Mining

map mining sites, measure stockpiles, and monitor mining activity

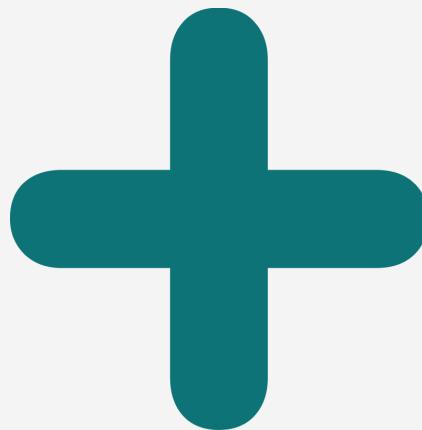
Construction

monitor progress, and inspect structures for defects.

Military

reconnaissance, surveillance, and target acquisition.

ADVANTAGES OF UAVS



Cost-effective

UAVs can perform tasks faster and more efficiently than traditional methods, reducing costs.

Increased safety

UAVs can access hazardous or hard-to-reach areas, reducing the risk of injury or death to humans.



Real-time data

UAVs can capture and transmit data in real-time, enabling faster decision-making.

Precision

UAVs can provide high-quality data and imagery, improving accuracy and precision.

Versatility

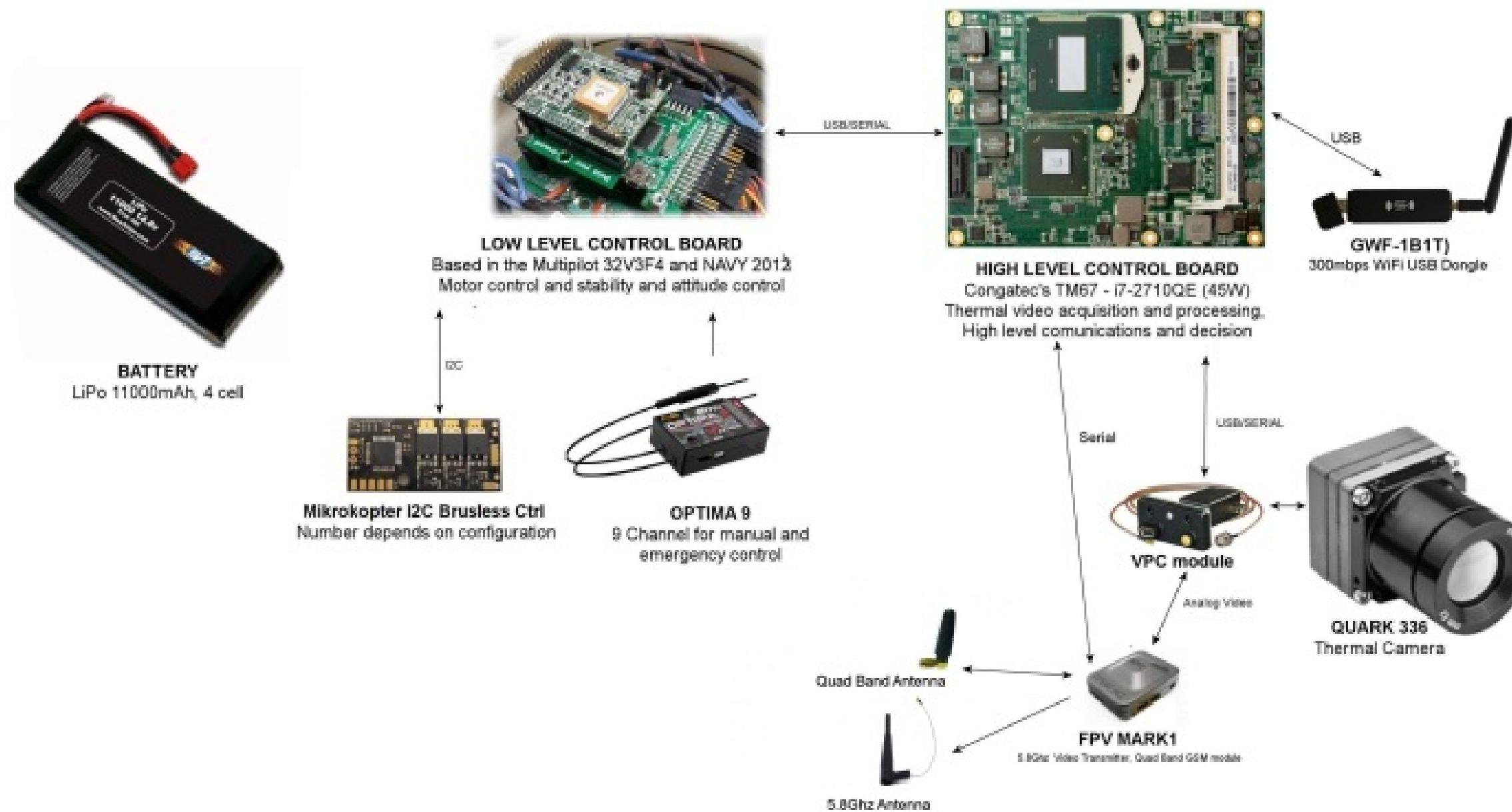
UAVs can be equipped with different sensors and cameras to perform various tasks.

UAV COMPONENTS

- Airframe
- Power plant
- Propulsion system
- Avionics
- Communication system
- Payload
- Control system

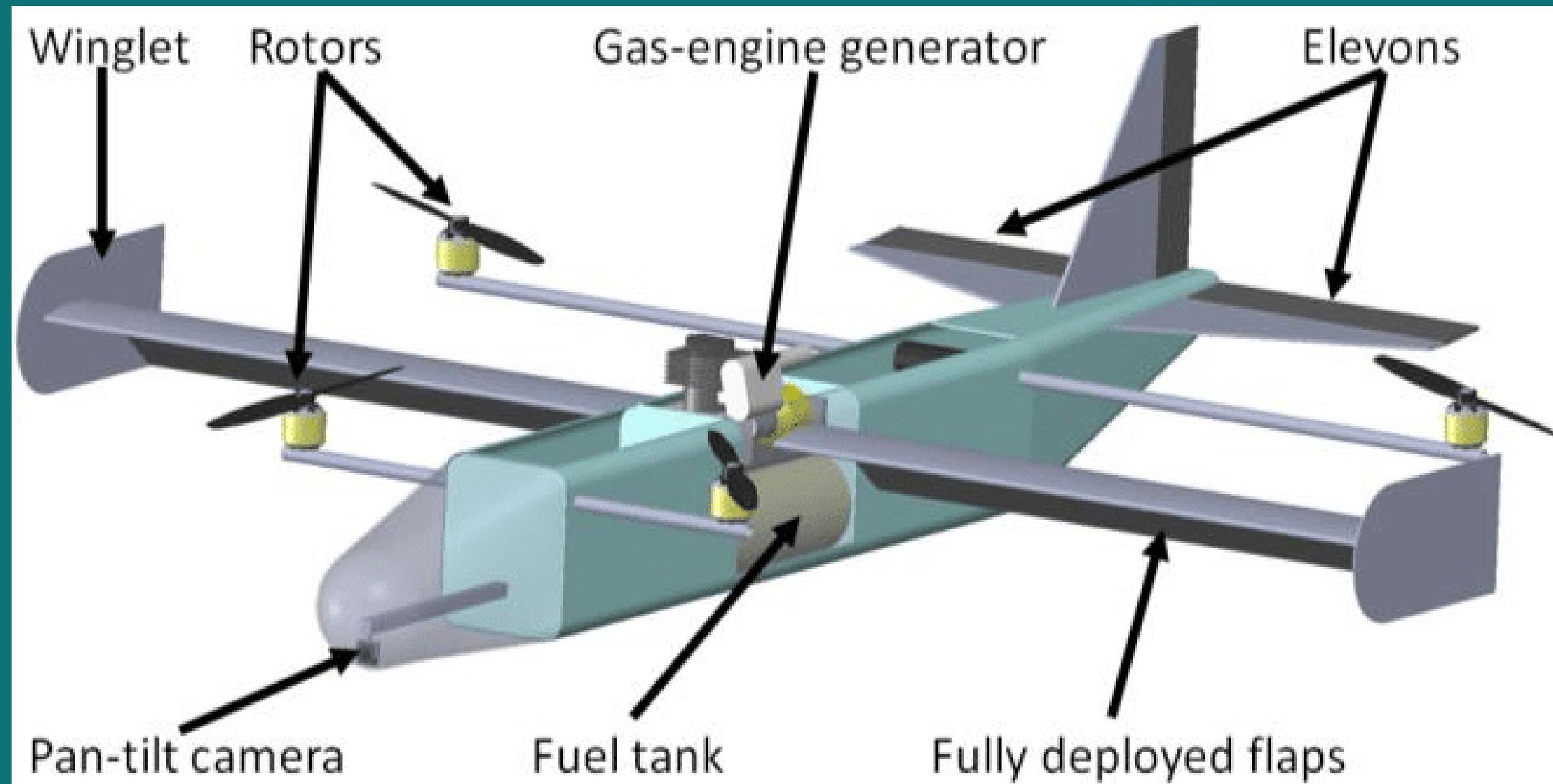


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Airframe

The main structure of the UAV that holds all the other components together and provides aerodynamic characteristics.



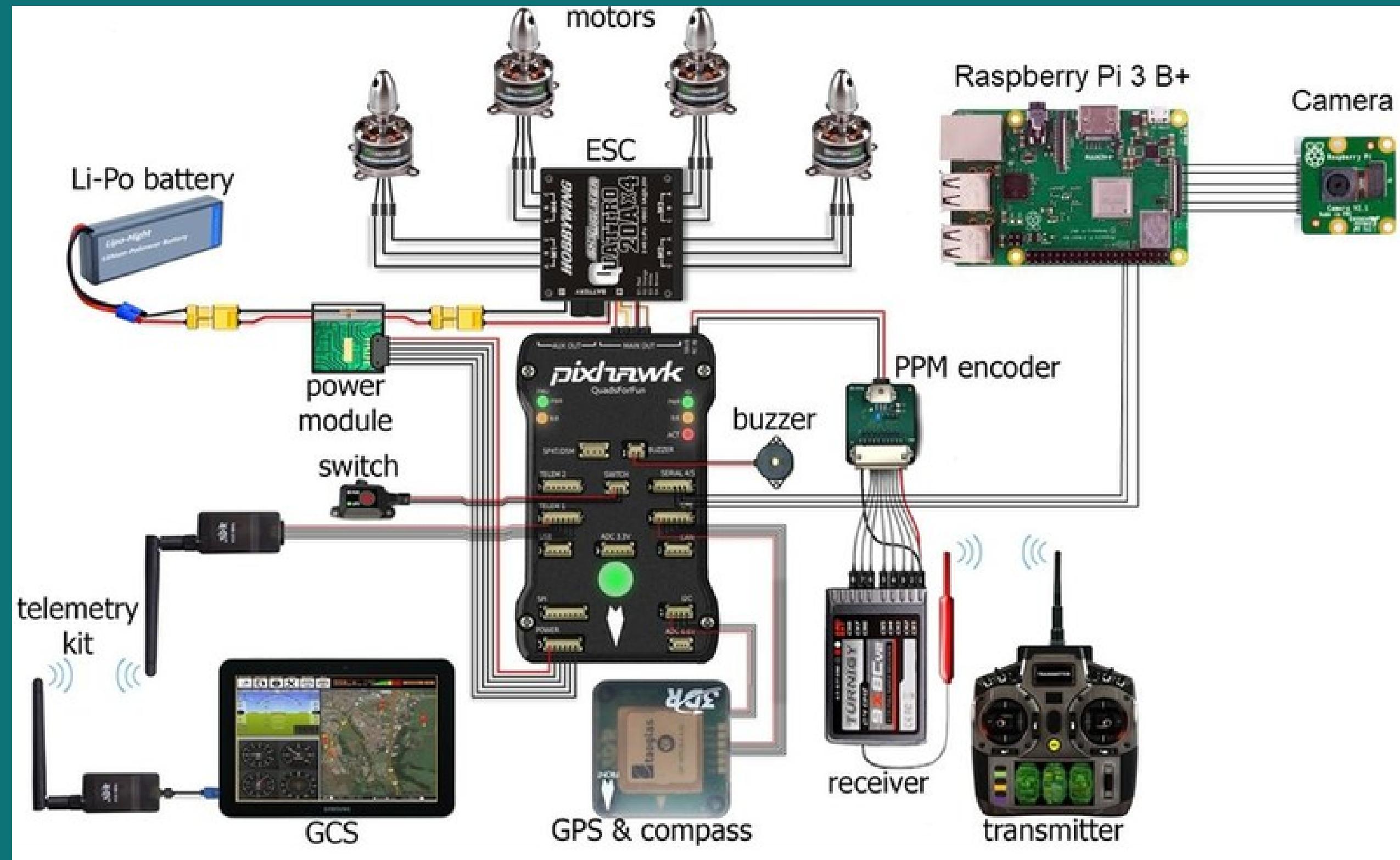


THYNK UNLIMITED

Power plant

Provides electrical power required to operate the UAV. It could be an electric motor, combustion engine, or a fuel cell system.



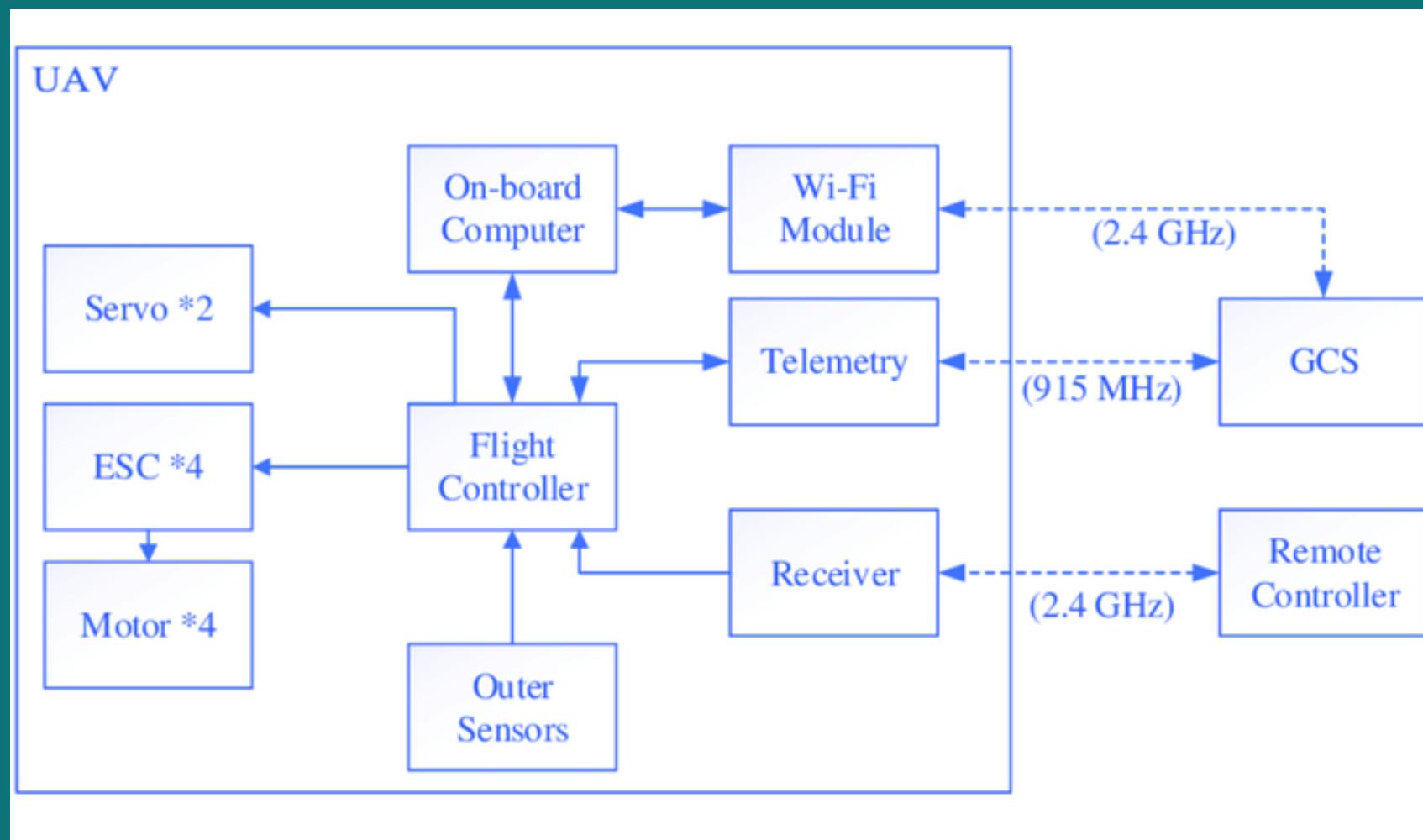


PROPELLION SYSTEM

- Provides the necessary thrust that enables the UAV to move and change direction. It usually consists of a set of propellers or rotors.
- The propulsion system typically consists of an electric motor, a propeller, and a power source such as a battery. The electric motor powers the propeller, which creates the necessary thrust to lift and propel the UAV forward. The size and shape of the propeller, as well as the power output of the motor, determine the speed, power, and efficiency of the UAV.
- There are several different types of propulsion systems used in UAVs, including electric motors, internal combustion engines, and gas turbines. Depending on the size, weight, and application of the UAV, different propulsion systems may be used to optimize performance and endurance.
- UAV propulsion systems:
 - Fuel propulsion system
 - Hybrid fuel-electric propulsion system
 - Pure electric propulsion system
 - Electric propulsion system

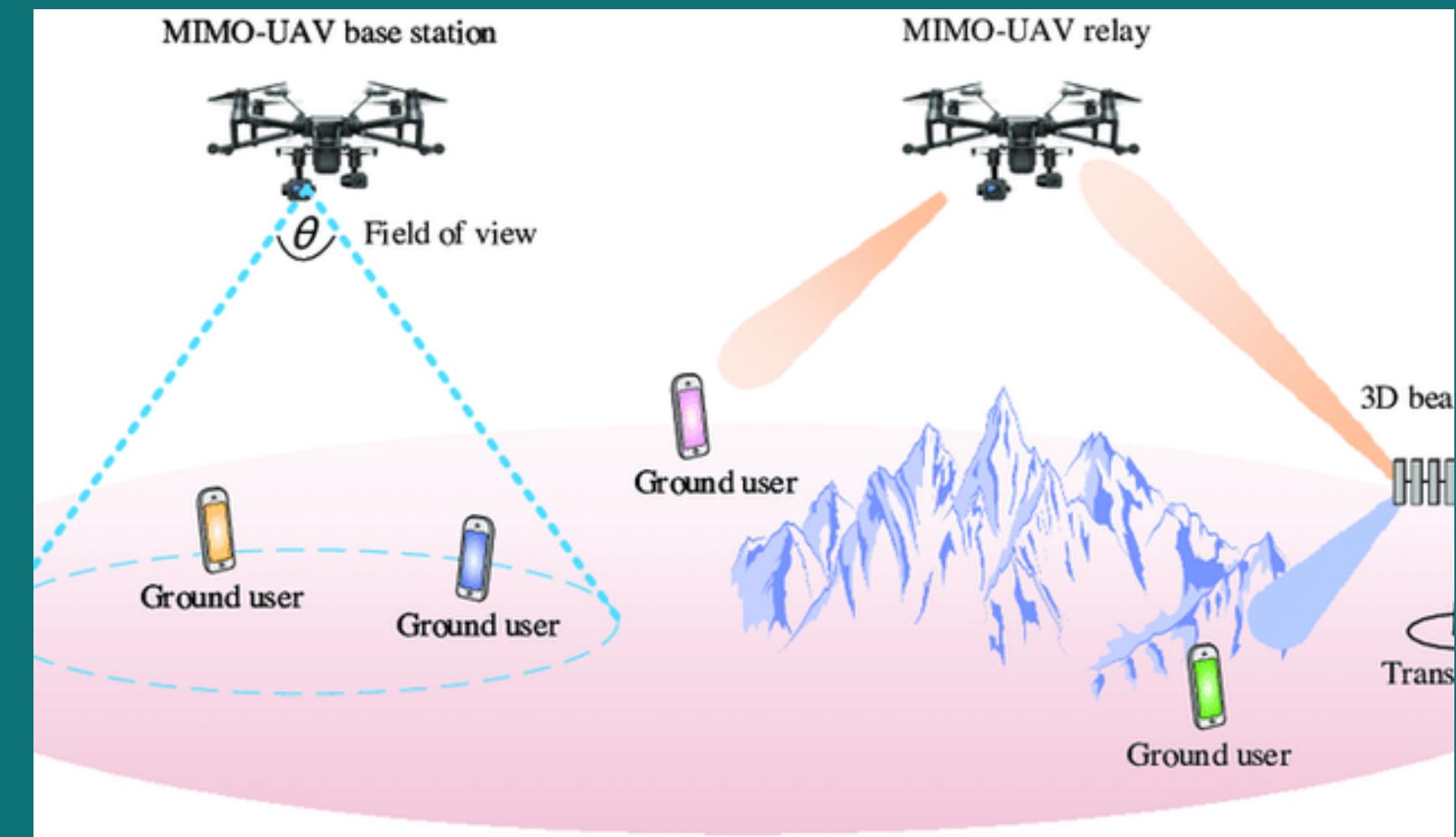
AVIONICS

This includes all the electronic components required for controlling the UAV's flight, such as GPS, gyroscopes, accelerometers, altimeter, and other sensors.



COMMUNICATION SYSTEM

Allows the UAV to transmit data such as audio, video, and telemetry to a ground station.



COMMUNICATION SYSTEM USED IN UAV

- THERE ARE VARIOUS TYPES OF COMMUNICATION SYSTEMS BEING USED FOR OPERATION OF UAV'S SUCH AS
 - TELE COMMAND
 - TELEMETRY(2.3GHZ)
 - TELEVISION(5.8GHZ)
 - SATCOM

FOR A/V SIGNALS, THE FREQUENCY RANGE IS-

- 433MHZ-900MHZ(LOW FREQUENCY, AUDIO SIGNALS)
- 1.2-5.8GHZ (HIGH FREQUENCY, LIVE FEED VIDEOS)



CONTROL SYSTEM

UAV (Unmanned Aerial Vehicle) control system refers to the hardware and software components that are responsible for controlling the UAV's flight path and behavior. It includes various sensors, such as GPS and altitude sensors, as well as communication devices and control mechanisms, such as remote control and automated flight systems.

Sensors

These detect the UAV's position, altitude, and orientation to provide inputs for the control system.

Actuators

These are the devices responsible for controlling the UAV's movement, such as the motor, propellers, and servos.

CONTROL SYSTEM

COMMUNICATION DEVICES

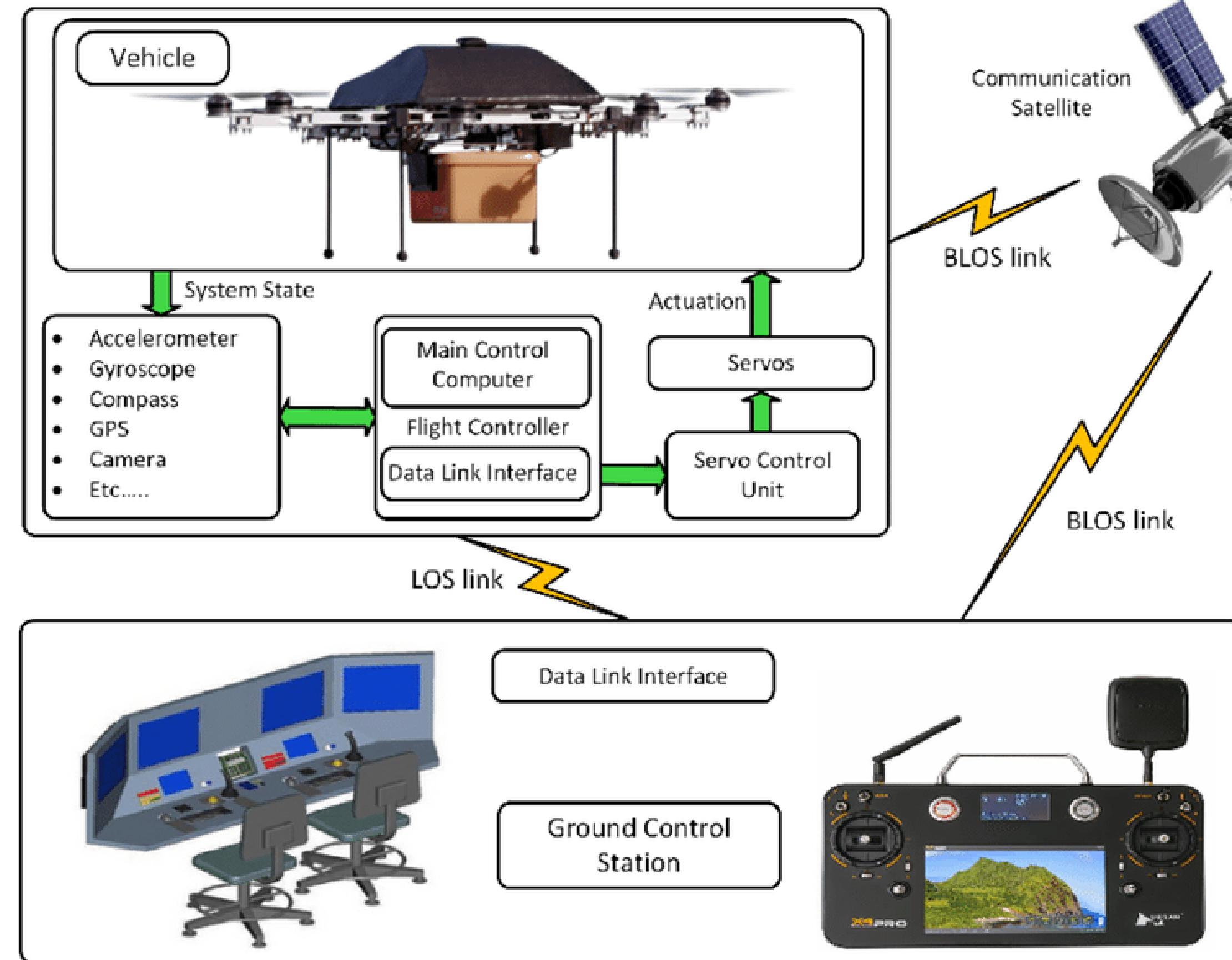
These are used to establish a connection between the UAV and the ground control station, allowing the operator to control and monitor the UAV's flight.

FLIGHT CONTROL SOFTWARE

This is the program that processes inputs from the sensors and communicates with the actuators to control the UAV's movement accurately.

GROUND CONTROL STATION SOFTWARE

This is the software used by the operator to communicate with the UAV and provide commands and instructions.



Payload



- **The payload is any equipment or material that is carried by the UAV.**
- **The weight of the payload is usually counted outside of the weight of the drone itself.**
- **Example:**
 - cameras**
 - sensors**
 - weapons**
 - packages**

PAYLOADS OF UAV

- **SENSORS:-**
- OPTICAL SENSORS
- EOIR SENSORS
- COLOR THERMAL IMAGER
- LIDAR
- SAR
- **ANTENNAS:-**
- DIRECTIONAL
- OMNIDIRECTIONAL
- FOLLOW ME OPTION USING GPS
- **AUTOPILOT**
- **GIMBAL CONTROLLED CAMERA**



