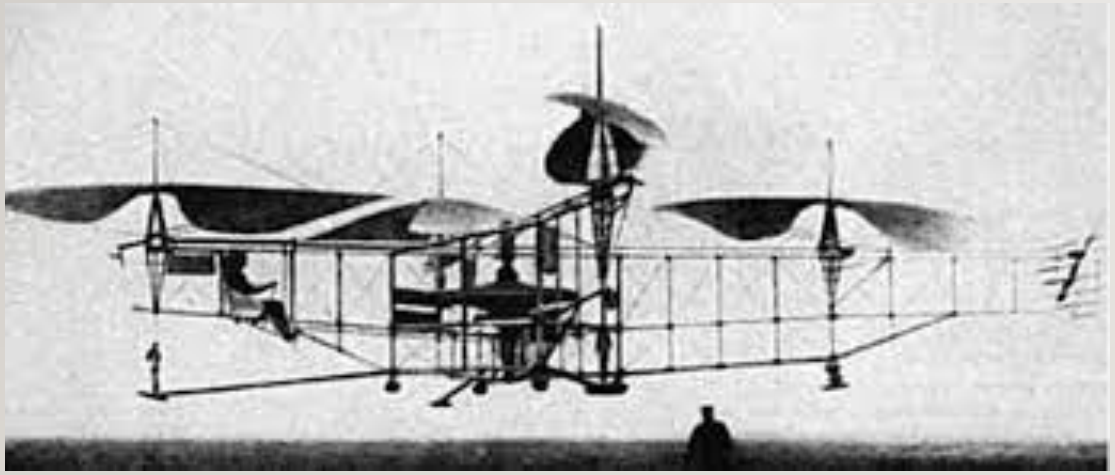
UNMANNED AERIAL VEHICLE

BY: IKHWAN BIN AMIR HAMZAH (1812423)

HISTORY

- First modern drone: De Havilland DH.82B Queen Bee aircraft (1935)
  - A low-cost radio-controlled drone developed for aerial target practice
- First quadcopter: Omnichen 2 by Etienne Omnichen (1920)
  - To solve the problems that helicopter pilots had with performing vertical flights, engineers developed quadcopters.

HISTORY



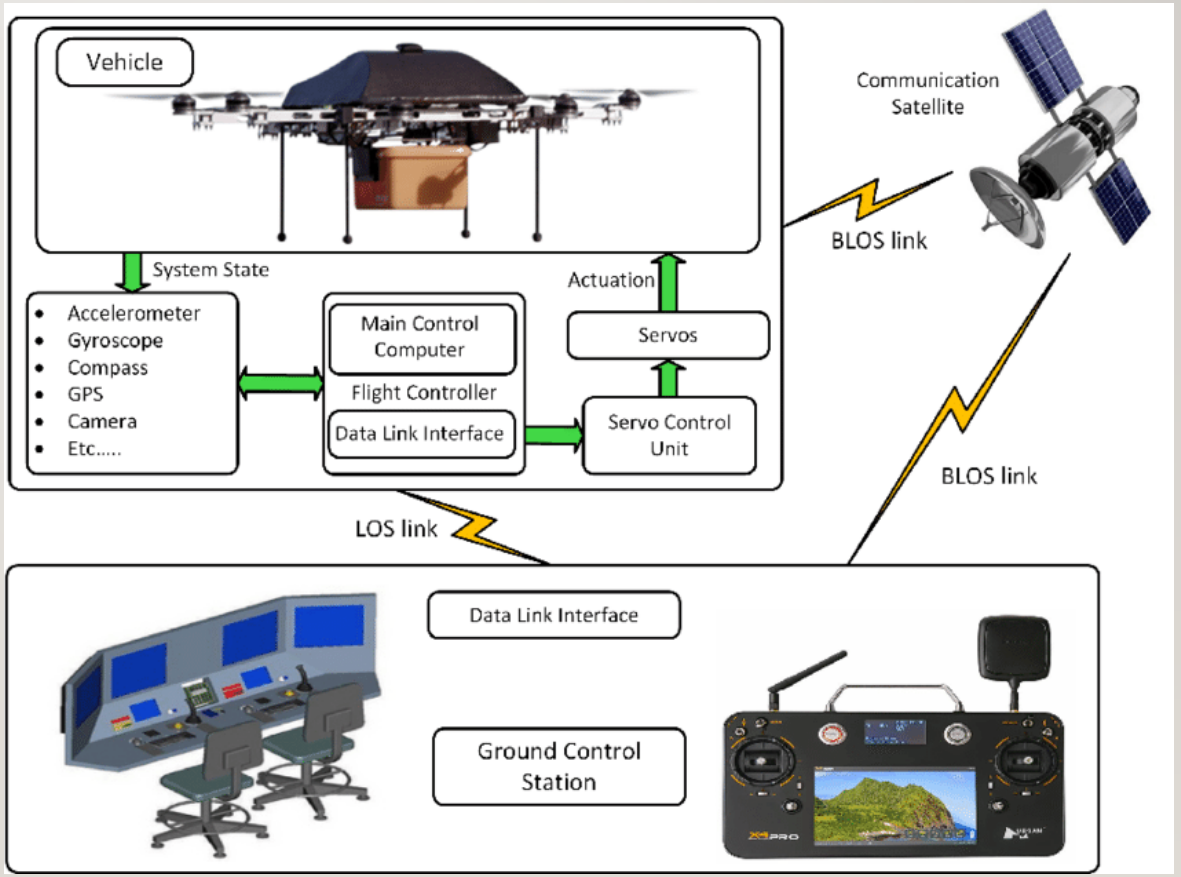
Omnichen 2

De Havilland DH.82B
Queen Bee aircraft

BASIC SYSTEM ARCHITECTURE

Main components of a drone's system architecture:

- Drone
- Communication system
- Ground station

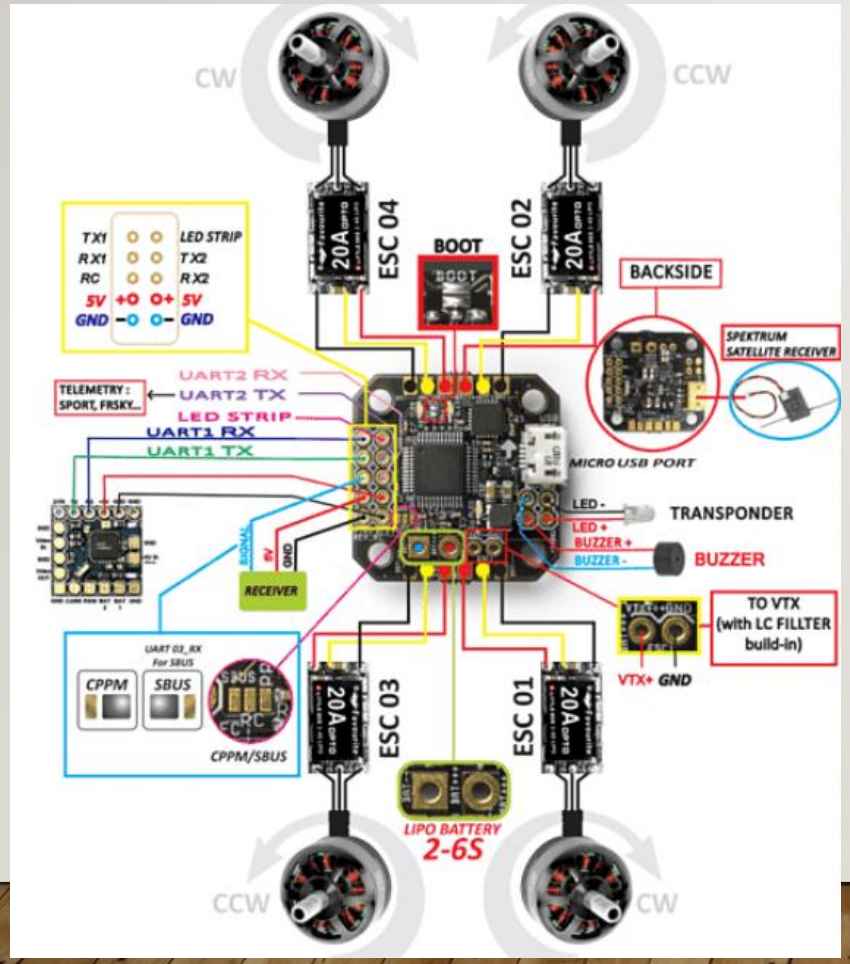


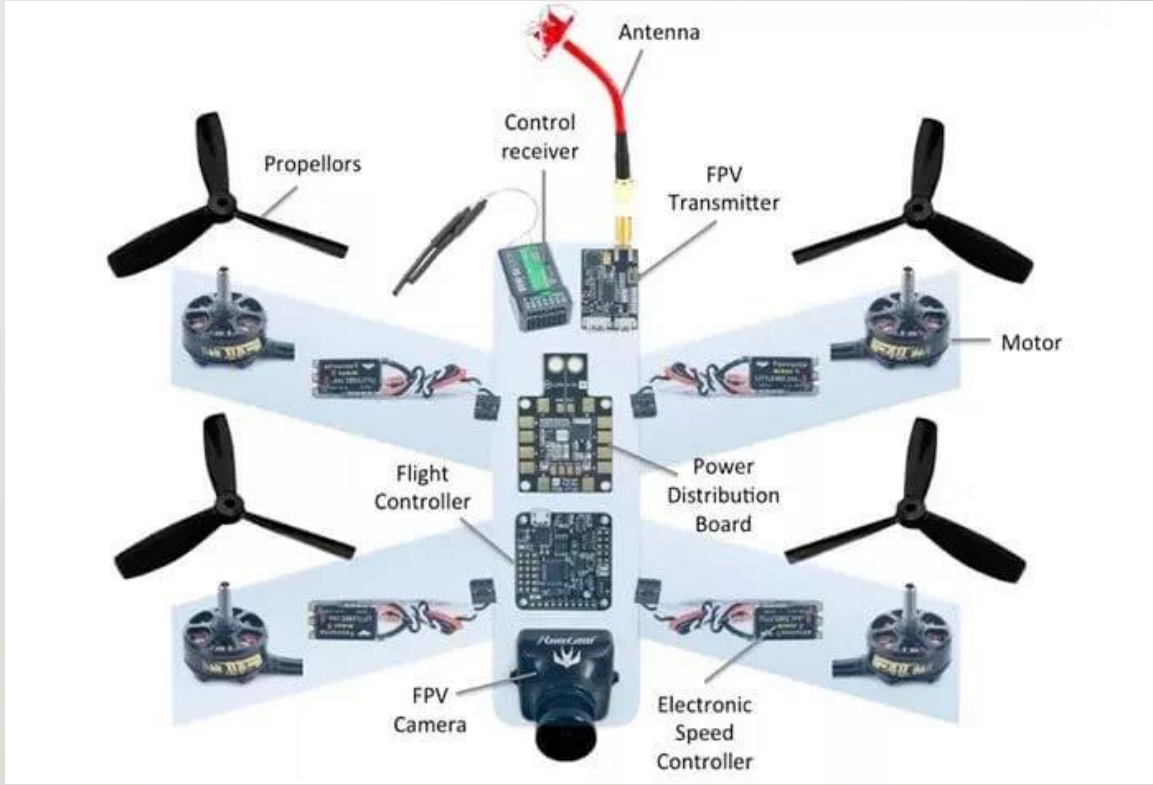
BASIC SYSTEM ARCHITECTURE

A drone consists of the shown components:

- Controller
- Power management system (battery)
- Receiver/transmitter
- Motor, motor driver & propellers
- Accessories (camera, winch, gps etc)

BASIC SYSTEM ARCHITECTURE





ROBOT DESIGN VS TASKS

- Types of delivery drones:
  - Fixed-wing Hybrid Drones
  - Single Rotor Drones
  - Fixed-wing Drones
  - Multi-rotor Drones

ROBOT DESIGN VS TASKS

Multi-Rotor Drone

Fixed-Wing Hybrid Drone

ROBOT DESIGN VS TASKS

Single-Rotor Drone

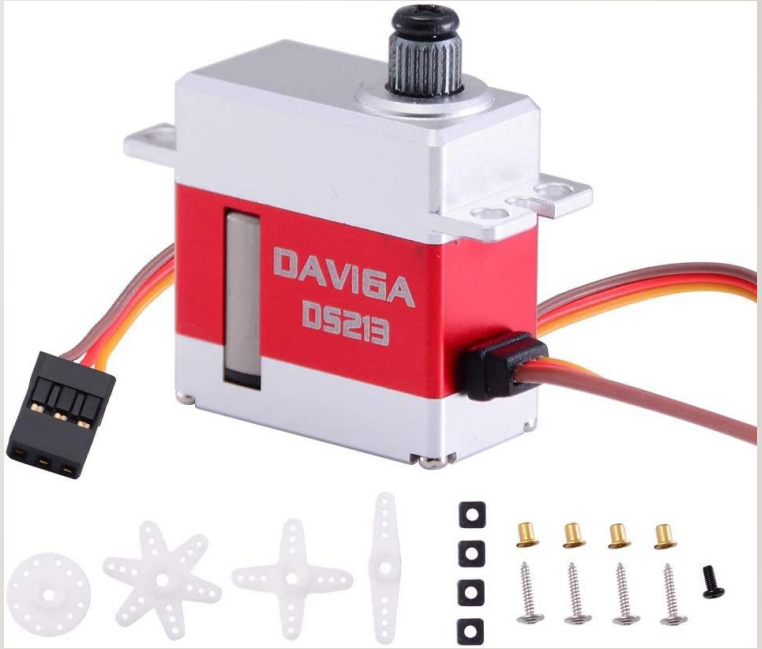
Fixed-Wing Drone

ACTUATORS AND LOCOMOTION

- Actuators of a UAV consists of:
  - Brushless DC Motor
    - High efficiency, wide speed ranges, high speed-torque, affordable & low maintenance
  - Servo Motor
    - For drone aerial control/movements
  - Servo Cylinder
    - For control surface and linear actuator applications
  - Winch
    - For carrying good especially for delivery droness

ACTUATORS AND LOCOMOTION

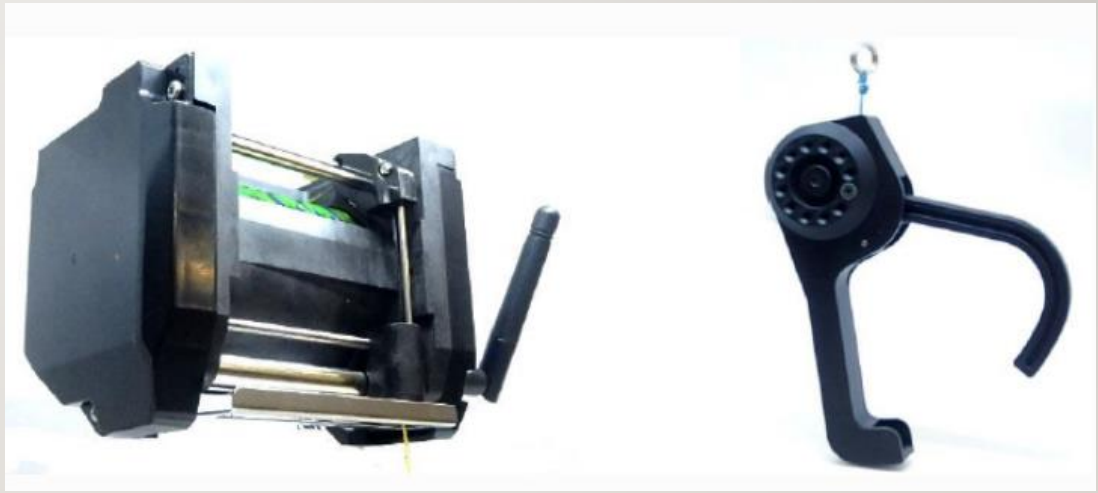
Brushless DC Motor



Servo Motor

ACTUATORS AND LOCOMOTION

Servo Cylinder



Winch

NAVIGATION SYSTEM AND CONTROLLER

GPS

GNSS

NAVIGATION SYSTEM AND CONTROLLER

Remote Controller

NAVIGATION SYSTEM AND CONTROLLER

Flight controllers

- The brain of the drone
- Conducts for the UAV:
  - Sensing – UAV's height, orientation, and speed
  - Controlling – UAV's motion
  - Communicating – sends UAV's info to the pilot

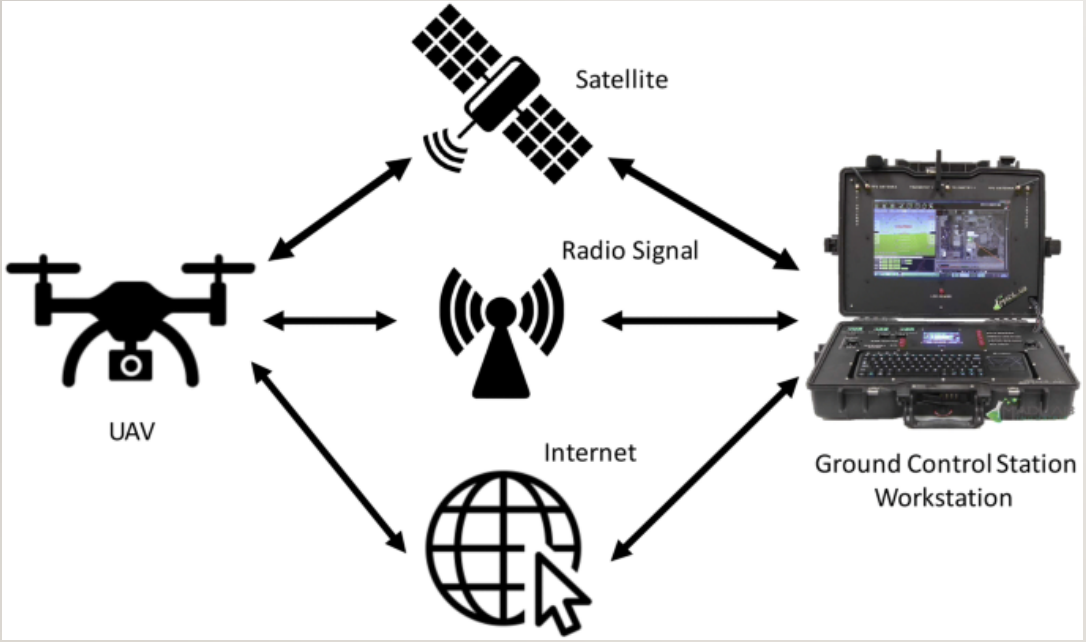
DATA COLLECTION

Thermal Mapping Camera

Remote Sensing Camera

Multispectral Camera

DATA TRANSMISSION

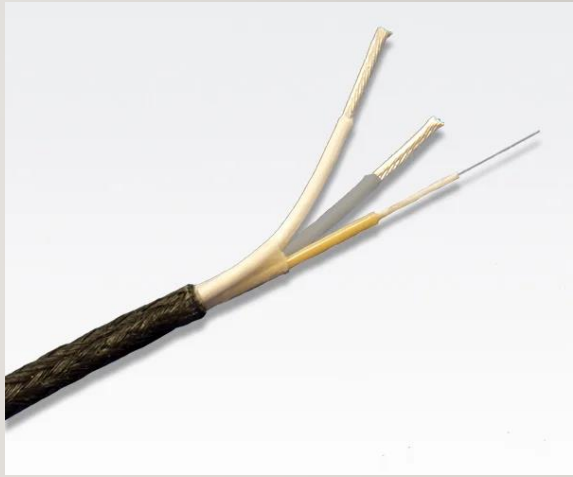


- UAV has various data transmission means whether wired or wireless
- Use to transfer important information obtained while in the air
- Example of data:
  - Mapping of surrounding area
  - Surveillance
  - Clouds growth for weather forecast

DATA TRANSMISSION

2.4GHz Radio Signal

Wi-Fi



LAN Cable

POWER AND SYSTEM MANAGEMENT

- UAV are powered with:
  - Rechargeable battery pack
  - Fuel engine (For larger UAV)
- These power sources often provide high output power to support the UAV's high powered motor and its other various components

POWER AND SYSTEM MANAGEMENT

Battery

UAV Multi-Fuel Engine