

## **CS Ruben 183174001 ( Individual Report) Group 14**

**Consultation:** Aeromodelling association of India, RC Sector, Hadapsar,Pune

### **Types of drones:**

#### **1. Depending on Range**

##### **(a) Very Close Range**

Toy drones usually come under this category. These drones have a range of around 5km. They can stay in the air for 20 minutes or longer, up to an hour.

##### **(b) Close Range**

These can be controlled from up to 50km away from the user. A powerful battery allows them to stay in the air for up to 6 hours. The military uses these drones often.

##### **(c) Short Range**

The drones which can be controlled from 150km away are known as short range drones. They can stay airborne for up to 12 hours, and are another breed of drones that are popular for the purpose of spying and surveillance.

##### **(d) Mid-Range**

You can control these drones from as far away as 650km! While surveillance is a natural use for these drones, they are also a popular choice for collection of scientific data relating to the weather, and geology of a particular region.

#### **2. Depending on the Type of Aerial Platform**

##### **(a) Multi Rotor**

These drones carry several motors on their bodies. They can stay in a stable position in one spot in the air for a long time, so they are a popular choice for aerial photography and surveillance.

##### **(b) Fixed Wing**

The other major drone design consists of the fixed wing model, where the drone mimics the construction style of aeroplanes. These drones cannot stay in one place, but instead glide on their set path for as long as their energy source permits.

##### **(c) Single Rotor**

A single rotor is used to fly the drone, while another smaller rotor near the tail controls the direction. Also known as RC helicopters, these drones are more efficient than multi-rotor drones. They can fly higher, stay in one position without spinning, and often use gas to power their bodies instead of electricity.

#### **3. Depending on Abilities**

##### **(a) Quadcopters**

The most popular model on the market, the quadcopter uses 4 rotors positioned at the ends of a square on the drone body. This design is used to create toy drones as well as bigger, worker drones.

##### **(b) GPS Drones**

These drones are linked to satellites via GPS. The drones makes use of the satellite to decide the direction of their flight, and return to the owner after running out of battery.

##### **(c) Delivery Drones**

Delivery drones have an anchor or basket attached to their body where the package can be affixed and transported by the drone. While today's drones are limited in terms of the size of the package that they can carry, researchers are working round the clock to create bigger and better delivery drones for transporting larger goods.

##### **(d) Photography Drones**

These drones have a camera/video camera attached to their body. These accessories can take HD quality snaps and videos of the world from the drone's perspective, and are specially built to withstand the damage done by harsh weather to the cameras.

##### **(e) Endurance Drones**

The best drones for flying far and long. Endurance drones can stay in the air for three consecutive days, and can reach mid-boggling heights of 30,000ft above sea level.

**Selection of Motors-** Things to consider when choosing drone motors are appended below:

**1. Weight of your drone:**

Initially find the overall size of frame and then use it to determine right propeller size. The idea about size and weight of propeller will help users to know about the overall thrust of motor that they will need for perfect lifting of drone during flights.

**2. Thrust to weight ratio:**

Selected motor must be capable enough to produce about 50 percent higher thrust as compared to multi rotor. This is a very essential parameter as it means your motor is going to have additional thrust to keep your drone safe during windy weather or at the time of flight maneuvers.

**3. Efficiency**

The formula used for calculation of motor efficiency is “thrust/power used in W”; its overall unit becomes g/W. now, if you have higher value of g/W rating that means your motor is more efficient and it will assist drone in longer flights.

**4. Torque**

The torque range helps to define the ability of motor to shift between RPM values. This change ultimately decides responsiveness of drone in air. If your motor has high torque value then it will naturally lead to snappy response as RPM will accept faster changes. It will also lead to lesser propeller wash. If you have high torque value for your motor then it means it is capable enough to run much heavier props but will also suck more current.

**5. Pole Count:**

(a) Quadcopter motors with higher pole count. These types of motors are able to produce greater torque value but at the same time it will demand more voltage for operation. Note that these motors are able to produce lower RPM.

(b) Quadcopter motors with lower pole count deliver higher RPM. Now, these motors will be accompanied by smaller blades and will serve with smaller lift from ground. If you want to get rid of additional gear box then it is essential to start with higher pole count.

**Commonly used drones:**

**1. Delfly Explorer**

The Delfly Explorer is an ornithopter drone developed by Delft University of Technology in the Netherlands.

**2. Hubsan x4 Drone**

3. The Hubsan x4 is a small multirotor drone developed by the Chinese company Hubsan.

**4. Parrot AR Drone**

The Parrot is a drone mainly built for recreational purposes.

**5. DJI Phantom**

The Phantom drone is a multirotor drone with four rotors and is mainly built for recreational purposes. The drone comes with a camera and can be controlled using a smartphone or a WiFi controller.

**6. Raven**

The Raven is a fixed-wing drone developed in 2002. The drone was originally developed for the US Army but is frequently used by many other countries as well, making it one of the most widely used drones in the world at this moment.

**7. ScanEagle**

The ScanEagle is a fixed-wing drone dating from 2004 and is mainly used as a surveillance tool. Contrary to most fixed-wing drones, the ScanEagle needs little space to take-off or land.