RC AIRCRAFT

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Abstract
A **radio-controlled aircraft** (often called **RC aircraft** or **RC plane**) is a small flying machine that is controlled remotely by an operator on the ground using a hand-held radio transmitter. The transmitter communicates with a receiver within the craft that sends signals to servomechanisms (servos) which move the control surfaces based on the position of joysticks on the transmitter.

Introduction

How Does the RC Plane Work?

Fig 1 Forces in flying

Gravity, lift, thrust, and drag are the forces acting on an airplane in flight (Fig. 1). Maintaining a steady flight requires a balance, often described as equilibrium of all the forces acting upon an airplane. By varying this equilibrium, we can make the plane accelerate forward, upward, downward, etc.

Fig 2 Bernoulli's Principle
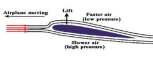
The thrust for our aircraft is provided by an electric motor, and the wings generate the lift. The shape of the wings and the aerofoil decides the lift generation. The lifting force is provided by the difference in the pressure of air flowing above and below the wing and is governed by Bernoulli's principle

Main Objectives

Major functions of different componenets in RC Airplane controls are:

1)Ailerons control the roll **of the airplane about its longitudinal axis.**Ailerons work in pairs and are found on the trailing (rear) edge of the wing, and they work opposite to each other *i.e.* when one aileron moves up, the other one moves down and vice versa.

2)Throttle controls the speed of the engine and hence how fast or slow the propeller turns.

The elevators are the hinged section of the tailplane, or horizontal stabiliser, at the very rear of the airplane and are the single most important control surface.

3)Elevators control the horizontal **pitch attitude** of the airplane, in other words whether the nose of the plane points upwards or downwards.

4)The rudder is the hinged section of the fin, or vertical stabiliser, at the rear of the airplane.
It's used for directional control by changing the **yaw** of the airplane, and works in the correct sense *i.e.* moving the rudder to the left causes the airplane to turn left and vice versa.

Materials and Methods

1.Strofoam 100mm thick
2.Biofoam 10mm thick
3.Servo 180 degree motors- Servos are used in radio-controlled airplanes to position control surfaces like elevators, rudders, walking a robot, or operating **grippers**. Servo motors are small, have built-in control circuitry and have good power for their size.
4.Propellers
5.Electronic Speed Controller
6.Thick metal wires(300 cm)
7.Brushless motors1000KV- The advantages of a brushless motor over brushed motors are high power to weight ratio, high speed, and electronic control. The increased power-to-weight ratio of modern batteries and brushless motors allows models to ascend vertically.
8.T-steel wire(100 cm)
9.Li-Po battery 11.1 V,3000 mAh
10.Transmitter and receiver 2.4GHz - The transmitter, commonly just called the *radio*, is the main box that you hold and use to control your rc aircraft.There are several different configurations of transmitter available within the radio control hobby in general, the common types are shown below and are (from left to right) traditional 4+ch., single–stick 3ch. with slide motor control, two–stick 2ch. and a pistol grip 2ch. (commonly used with surface vehicles)
11.Sand Paper(brown+black)
12.Full Length Tape

Mathematical Section:
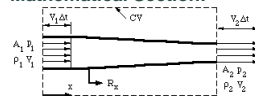
$$p + \frac{1}{2}\rho V^2 + \rho gh = constant$$

where p is the pressure, ρ is the density, V is the velocity,
h is elevation, and g is the gravitational acceleration

$$P_1 - P_2 = \frac{1}{2}\rho(V_2^2 - V_1^2)$$

$$and \quad A_1 V_1 = A_2 V_2$$

Therefore,
$$A_2 < A_1, \quad V_2 > V_1$$
$$V_2 > V_1, \quad P_2 < P_1$$

decreasing area = increasing velocity
increasing velocity = decreasing pressure

Conclusions:

The major use of this Rc aircrafts is in case of
1)Brutal disasters, man made or natural.
2) For providing instant relief to victims .Rc aircrafts can be a major asset in delivering food packets and in aerial surveillance.
3)Forthcoming research areas to contribute such models in defence sector of the country .

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