INDIAN INSTITUTE OF TECHNOLOGY, ROPAR

TINKERING LAB
(GE-107)

GROUP

AYUSH SINGH-(2021MEB1275)
DEVANSHI SAWHNEY-(2021MEB1281)
DINESH SWAMI-(2021MEB1282)
RICKEY CHOWDHARY-(2021MEB1312)
VAISHNAVI BAREDAR-(2021MEB1334)
YASH RAI-(2021MEB1338)

ORNITHOPTER
OR
RC BIRD DRONE

CONTENTS

1)INTRODUCTION

The RC bird drone project, which combines the capabilities of an RC plane with a bird drone, is a distinctive and creative concept. The objective of the project is to create a drone that replicates the flight and behaviour of a live bird. Due to the drone's ability to fly like a bird, it is the perfect tool for scientists and bird watchers.

2)OBJECTIVE AND DESCRIPTION

The main objective of the RC bird drone project is to design and develop a drone that can mimic the flight patterns and movements of a real bird.
The goal of the RC bird drone project is to create a drone that resembles the motion and behaviour of a real bird using cutting-edge technology. The drone has a strong motor that allows it to fly for long periods of time, just like a bird.
The drone was created by the project team to be lightweight and simple to control. The drone can travel in different directions and fly like a bird thanks to its flexible wings. Additionally, the drone has an adjustable tail that enhances flight stability.

The project team programmed the drone to move like a real bird using cutting-edge technology. The drone can perform aerial acrobatics, fly in circles, and hover in the air, just like a bird.

3)MATERIALS AND CIRCUITRY USED

3.1 ARDUINO NANO

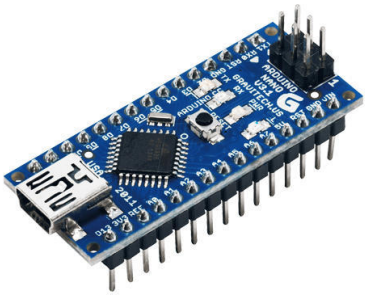

Image 3.1

3.2 SERVO MOTOR

Image 3.2

3.3 FS-IA6B RECEIVER

Image 3.3

4)DESIGN AND FABRICATION

4.1 Operating principle of the flapping wing

Lift is produced on a stretched, flapping wing in a manner akin to that of a front-flown, rigid airfoil. However, the air flow strikes the wing more from above during the wing upstroke and more from below during the wing downstroke. These changes start out small at the wing root and get greater as they reach closer to the tip.

4.2 Thrusts and Forces

- **Weight:** Due to the mass of the drone, the body mass force always acts in the direction of gravity.Higher the weight of the drone, more power is required to lift and move the drone.Weight of drone = mass of drone × acceleration due to gravity
- **Lift**: The vertical force acting on the drone is called liftThis force is due to pressure differences across the drone (in the vertical direction). Hence, the speed, size, and shape of the propeller blade decide the amount of lift force.Lift is essential to lift the body against the gravity.To create this force, all four propellors run at high speed to lift the drone
- **Thrust:** The force acting on the drone in the direction of motion is called thrust. However, for drone dynamics, it is normal to the rotor plane.During hovering, the thrust is purely vertical. If thrust is inclined then the drone will tilt forward or

backward.This force is essential to move the drone in the desired direction at equal speed. To get desired motion, two propellors have been given high speed

- **Drag:** The force acting on the drone in the opposite direction of motion due to air resistance is called drag.This may be because of pressure difference and viscosity of air.To reduce the drag, the aerodynamic shape of the drone is selected

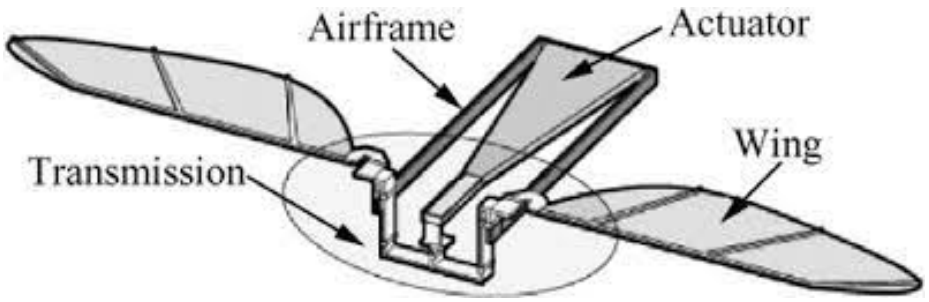

Fig 3.1

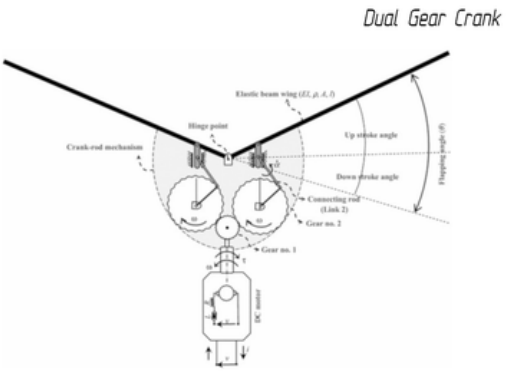

Fig 3.2

5)MECHANISM

An RC bird drone's mechanism consists of a number of parts that work together to simulate the motion and conduct of a live bird. The essential elements of an RC bird drone are as follows:

Motor: The drone has a strong motor that gives it the thrust it needs to soar through the air like a bird.
An RC bird drone's wings are made to be lightweight and flexible so that it can move in a variety of directions and imitate the flight of a real bird.
Tail: The drone's tail can be adjusted and offers control and stability while in flight.
Rechargeable
Battery: The drone's engine and other parts are powered by this battery, which also powers other parts of the device.
Remote Control: The drone can be moved and pointed in any direction using a remote control, which is how it is operated.

Mechanism

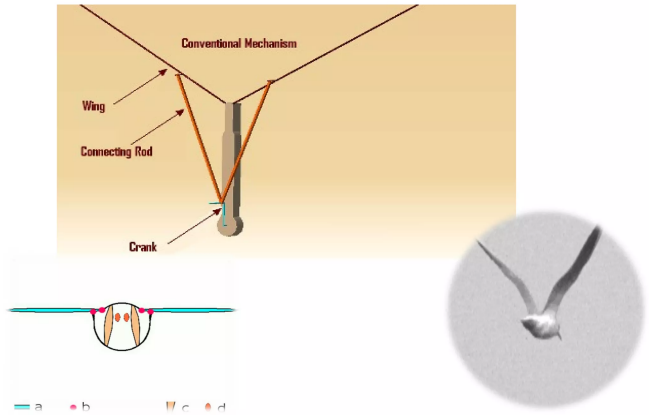

Fig 5.1

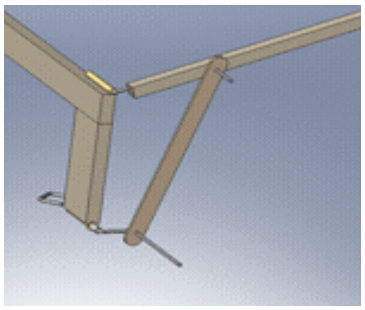

Fig 5.2

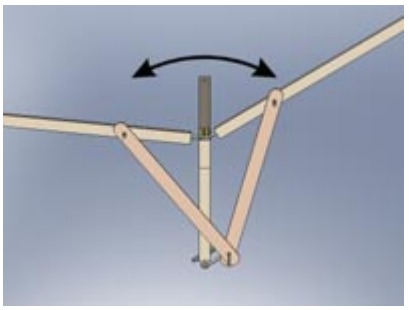

Fig 5.3

6)CONCLUSION AND LEARNINGS

The RC bird drone project is a creative and fascinating endeavour that fuses nature with cutting-edge technology. The drone is a great tool for academics and bird watchers since it can simulate the flight and behaviour of a real bird.

In this project, we created a model of an unmanned ornithopter that resembles a bird in the area.

This will enable us monitor other nations or terrorist organisations, strengthening our defences in the process.

The way a bird operates is similar to how birds naturally fly, so no one would suspect they were being watched.

In these situations, engineers can benefit the nation by creating robots of this type, which are very useful in bolstering our defence.

7)REFERENCES

1)https://www.grdjournals.com/uploads/conference/GRDCF/010/001/GRDCF010001.pdf

2)https://www.researchgate.net/publication/282665883_Design_and_Implementation_of_a_Biologically_Inspired_Flying_Robot_-_An_EPSISEP_2014_Spring_Project

3)https://www.slideshare.net/korchipatisphysics/ornithopter-project

4) https://blog.arduino.cc/2019/04/16/arduino-powered-ornithopter-takes-to-the-skies/

5)https://www.instructables.com/Opensource-Ornithopter-Prototype-Arduino-Powered-a/

6)https://theconversation.com/learning-from-nature-a-new-flapping-drone-can-take-off-hover-and-swoop-like-a-bird-143343

7)https://www.researchgate.net/figure/Ornithopter-and-Arduino-Circuitry_fig1_282356285

****