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Phantom Bat for Military Applications

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Abstract: ***The aim of this project is to minimize the cause of death of military man and innocent people by gathering their secret informations . The Phantom bat act as spy because it looks similar like a bat. It is fixed with ESP 32 WIFI camera to monitor the activities of the enemies. This bat design does not create any doubt to the enemies we are watching. It flies using a BLDC motor. The BLDC motor help the bat to lift from the ground and allow it to fly in the sky by creating 3 flaps per second to the wings which is fixed with the body of the bat. The two servo motors are used to control altitude and direction. All the electronics components present in flight board are controlled by the Arduino pro micro which is connected with RF receiver. RF transmitter will act as a remote controller and control the operation of bat. Here mobile phone will act as a display for the camera which we used. This bat will play a major role in military to save life. In future it will work on its own by implementing Artificial Intelligence and does not need manual control for this bat.***

Keywords : flapping, flight, Ornithopter, dynamics, stability, experiments.

I. INTRODUCTION

Every year the military man lost their lives during terrorist attack, this is because the people are not able to know what enemies are planning. To overcome this robots can be able to play a major role in collecting information about the activities of the terrorist and also save lives of the innocent people.The dream of flying is one of the oldest known to humankind. In this respect, we have always looked at the animal world with fascination – a world that shows how it is done in all sorts of ways. This is how it made to use phantom bat because flying is possible only by innovative technology which would play the major role in future.

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A. The Working of the project

For those who do not know, an ornithopter is a machine designed to achieve flight by flapping wings like a real bird. Flapping mechanism is the most critical part of the ornithopter. It converts the electric power from the battery to the flapping motion of the wings.
This system is the most complex to design and fabricate because it must withstand vast forces which reverse direction several times a second while at the same time being extremely light and durable.

B. Flapping Mechanism

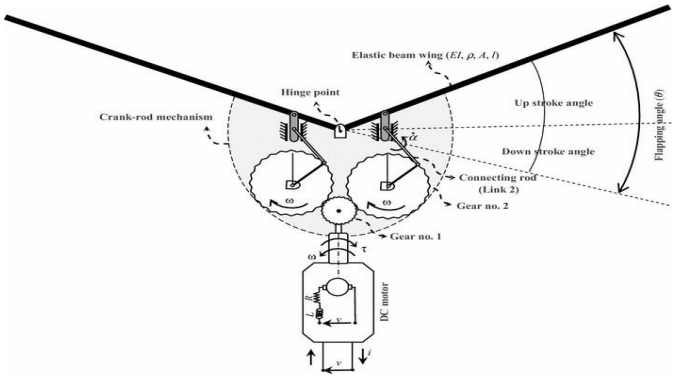

Fig 1.1 Shows working of the flaps

Flapping Frequency – 3 Flaps per second ,because BLDC motor produces 36800 rpm at full supply voltage, this drives the two gear which is fixed on the main frame this creates the flapping and helps the bat to lift its body from the ground.

Fig 1.2 Shows 3D model proposed for flapping

II. LITERATURE REVIEW

A.Existing System

The Existing system uses a quadrotor drone named AR. Drone 2.0.Sonar sensor and two QVGA cameras on front and back are used for sensing. The system uses Brushless dc motor of 28500 rpm. The system uses QVGA camera and cannot be used during night. The system is of normal construction and could be easily identified.

B. Proposed system

The aim of this work is design and implementation of a robotic bat system. This work is expected to help to understand the basics need for robotics in military for future generation. Fixed with ESP 32 WIFI camera which would helps to see both during day and night and give clear photography view to see what enemies are planning to do. It act as a spy and captures the images and send to the base station without the knowledge of the enemy.

C. Proposed block diagram

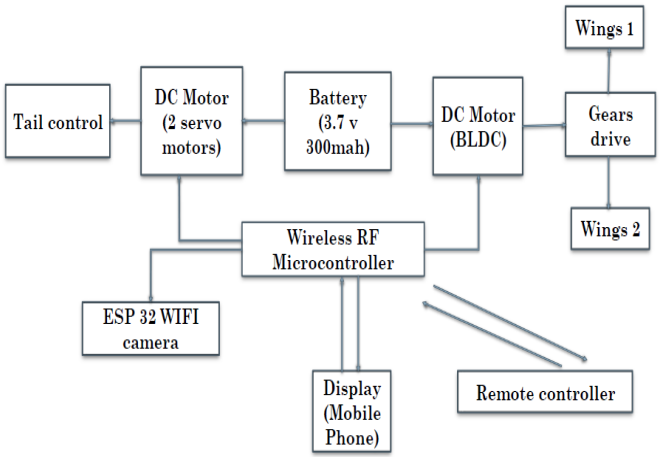

Fig 2.1 shows block diagram proposed for the bat

D. Hardware Used

SI.NO	COMPONENTS	QUANTITY
1.	Brushless DC motor	1
2.	Power supply battery	1
3.	Arduino pro micro	1
4.	Servo motors	2
5.	RF Transmitter	1
6.	RF Receiver	1
7.	ESP 32 WIFI Camera	1

Fig 2.2 Shows components used in the bat

1) The BLDC motor should be sturdy to provide enough torque to overcome air resistance. To increase the torque and reach the necessary flapping frequency, we are going to use a gearbox. In this case, we can take a weaker motor with a higher revolution per minute (rpm) value.

2) To power the motor we use a Li-Po battery. The capacity-to-mass coefficient of such cells is really high. Also, they are able to output a high current value which is so required for brushless motors.

3) Arduino pro micro is the brain of the flight board,it controls the overall operation of the bat ,the weight of this component is very less compared to other arduinos.

4) To steer the bat, we need two servos that position the tail. One servo for attitude control (Pitch). Second for turns (Roll). These are powerful and fast servos.

5) To create a connection between the remote control and the bat, we need a receiver and a transmitter. Both of these functions can be performed using RF transmitter and receiver.

6) ESP32-CAM is a WIFI+ Bluetooth dual-mode development board that uses PCB on-board antennas and cores based on ESP32 chips. It can work independently as a minimum system.

III. WIRING DIAGRAM

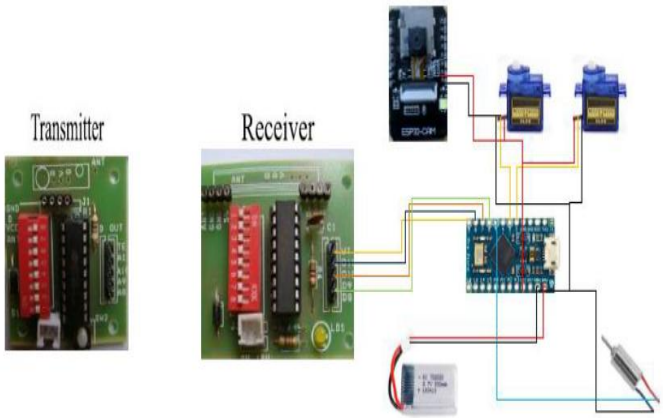

Fig 3.1 Shows electronic connection diagram for the bat

The signal which is transmitted from RF transmitter is passed to RF receiver, then the signal which was received is send to arduino pro micro, this control the overall operation of the bat, because arduino pro micro act as brain for the bat, images captured from the camera is viewed using mobile phone which was simple to use.

IV. ADVANTAGES AND DISADVANTAGES

A. Advantages

[a] It is used for army purpose.
[b] Light in weight.
[c] We can control the mechanical bat through remote.
[d] Compact in size.
[d] We use a wireless camera which can transfer the information to the near display unit.
[e] Capable of taking photographs at good quality and resolution.

B. Disadvantages

[a] It cannot fly stably at high wind.
[b] It requires frequent maintenance.
[c] Need an active and continuous connection.

V. RESULT AND DISCUSSION

For this project result, each components present in the bat were gone under different testing to make the bat to fly stably.

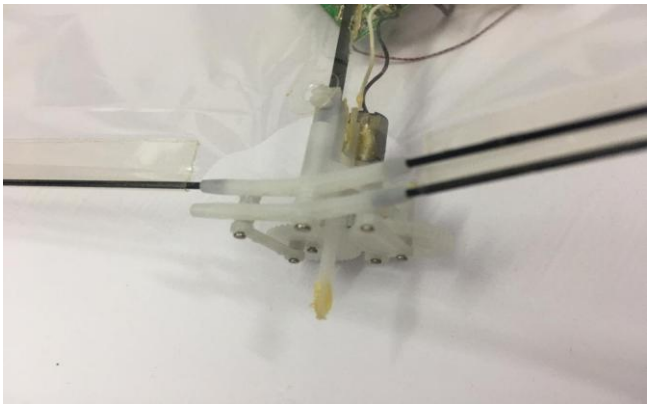

Fig 5.1

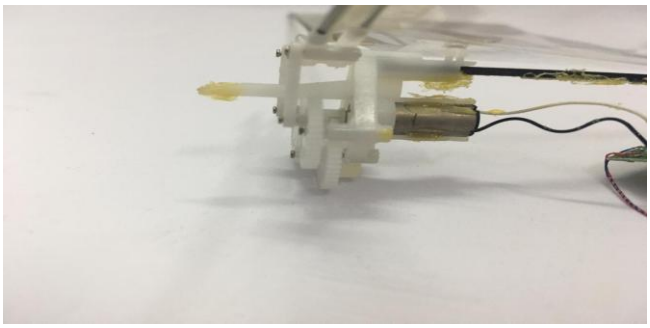

Fig 5.2

Fig 5.1 and 5.2 Shows flapping testing of the bat wings

The bat can able to produce 3 flaps per second under 36800 rpm produced by the BLDC motor and can able to lift the body of the bat above the ground and flies stably.

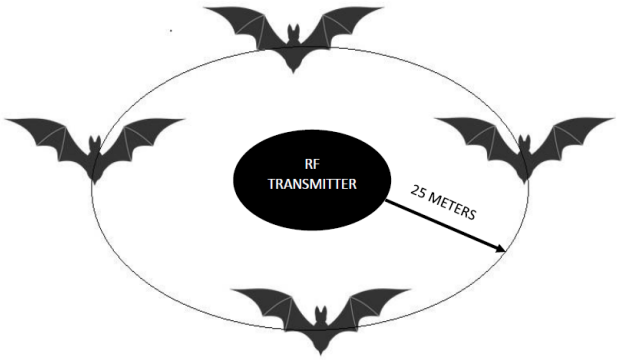

Fig 5.3 Shows control range of the bat

RF Transmitter frequency range is 433.92 MHz .Receiver current supply is 3.5mA and receiver operating voltage is 5v .Due to this features the bat can be controlled a maximum range of 25 meters.so that it can captures the images and send to the base stations which is located within this range and helps the military men to get alerted.

VI. CONCLUSIONS

The implementation of this project is to help the military man to gather the information that what their enemies are planning to attack. This Phantom bat can act as a spy and provide the required information to stop the attack and can reduce the cause of death of innocent soldiers and civilians .It can fly stably in the sky and cannot able to identify that is a mechanical bat.

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