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Development and Analysis of High Efficient Soundless Drone

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Abstract: ***In the recent years, as interest in Unmanned Aerial Vehicles (UAVs) has increased, the development in the drone has an important technology for security and military applications. Various missions can be done using this system as it will help in the surveillance in unknown areas, forestry conservation, spying enemy territory. Application which is developed in this research has a purpose to simulate condition in war zone for spying the enemy. Following current trends towards UAV innovative design a small size light UAV quad copter system was design, assembled and tested in flight. The aim is to design a low cost structure and make it comparable with other more expensive.***

Keywords: Unmanned Aerial Vehicles, Rescue mission, design of drone Surveillance.

I. INTRODUCTION

Drone industry is one of the future industries that have potential for limitless application in the future. our group plans on utilizing UAV (unmanned aerial vehicle) technology in a positive way, As UAV is an aircraft that can manoeuvre without a human pilot on board. There has been tremendous progress on development of UAV for military operation which is operated in urban terrain. The aim of this research is to developed simulation of intelligent UAV for military surveillance.

Unmanned aerial vehicle (UAV) also known as drone, are expected to provide diverse military, civilians, commercial and governmental services. Along with this expectations, the development of various protocols based communication devices and flight control providing sophisticated navigation that can be mounted on the UAVs is this Expectations and the development of devices, many UAS operators and developers demanding a system that allows different type of UAVs to control and manage in the same services simultaneously .creating an environment where unmanned aircraft system operators can receive more sensitive services.

II. WHY UAV??

The use of UAV quad rotor for this project because of its flexibility, high learning opportunity and potential of future research. For developing small and compact sized quad copter which can be used to carry out rescue operations and provide audio/video aid to the people in distress. It saves human pilot from flying in dangerous condition that can be encountered not only in military applications but also in others scenarios involving operations in bad weather condition, or near to buildings, trees, civil infrastructure and other obstacles.

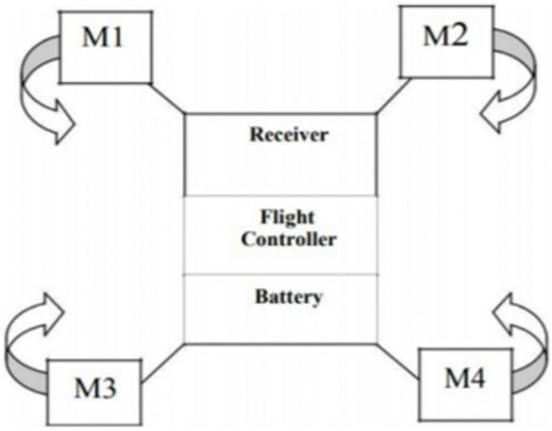


Fig (1) Block Diagram of an UAV

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III. PROBLEM IDENTIFICATION

There are several problems face in while carrying out rescue operations. It is costly to carry out a rescue operation as it requires many resources and expenditure. A large number of skilled manpower is required for operating rescue missions. Topographical aspects may vary from place to place thus putting additional human effects.

Previous drones very inefficient so very less flight time. The greater the capacity of the battery will be the longer is the drone's flight time. This is not the case though, increasing battery capacity means a bigger more heavier battery and that needs more lift so motors will have to work even harder and in turn will draw more current so we have to find a perfect spot between the weight of the battery and its capacity.

IV. METHODOLOGY

The plan on building quad copter measured diagonally from motor to motor. Which means that the drone is small enough to carried out inside a pocket. The proposal drone would have a weight around 200 grams when it is ready to fly making it complaint Indian with drone related regulations. An analog video feed would be streamed via the drone to a screen with very low latency, allowing the operator to pilot the drone without a visual line of sight. The drone would have controllability of around 8 kilometers. Making sure that operators can pilot the drone from a safe distance without any issues. The drone as we group imagined turned out to be a greatly versatile one with uses that are not limited to military only but has a vast number applications

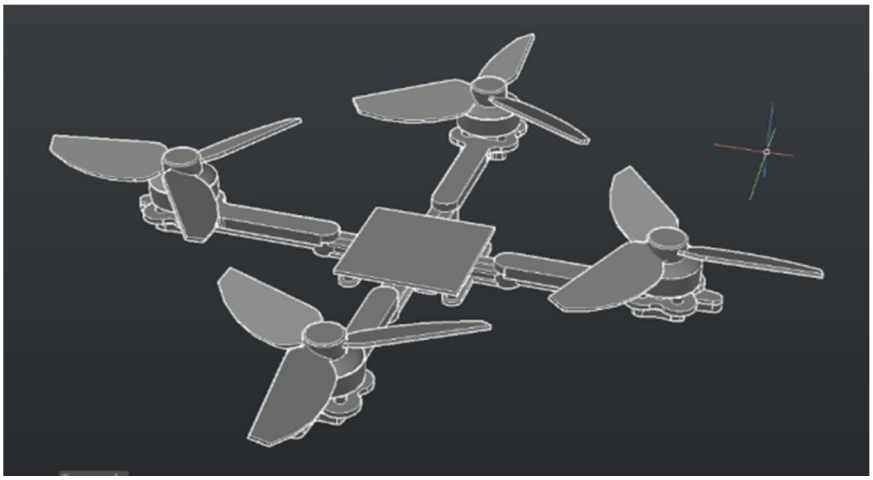
V. COMPONENTS

A. Propeller
B. Control receiver
C. Flight controller
D. FPV camera
E. Carbon fiber sheet
F. Lithium Polymer battery
G. Electronics speed Controller
H. Power distribution board
I. FPV Transmitter
J. Brushless Motor

VI. PROPOSED DESIGN WORK

A. Chassis

The initial work is to design each component parametrically and assemble each component at correct location on frame in modeling software. This is necessary to analyze the strength of a static body and dynamic loading and find the directional deformation and stress develop at each point in frame as well as the thrust, acceleration effects in dynamic condition during vertical takeoff, yawing and during directional moment.

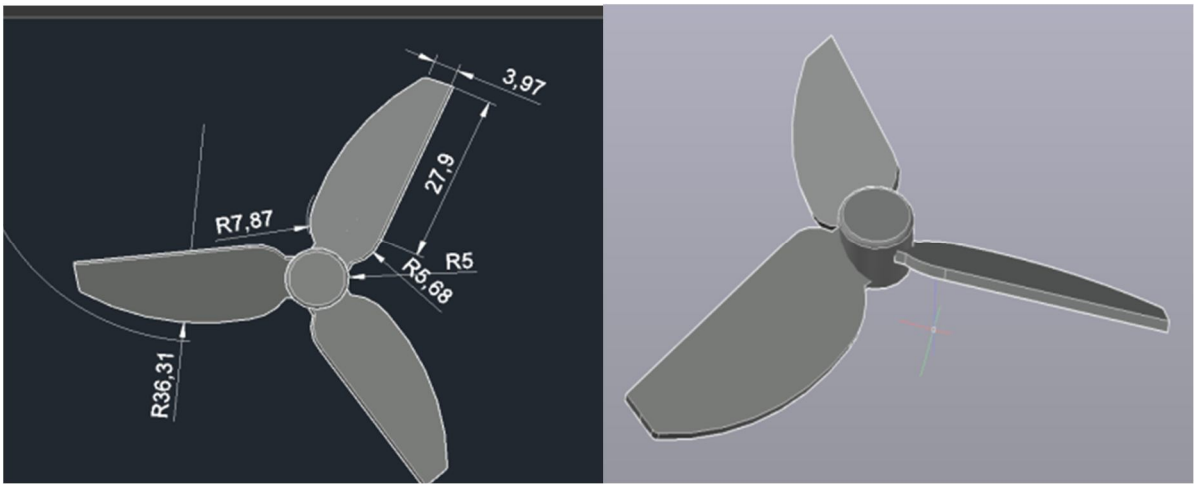


Fig(2): Multi-rotor frame

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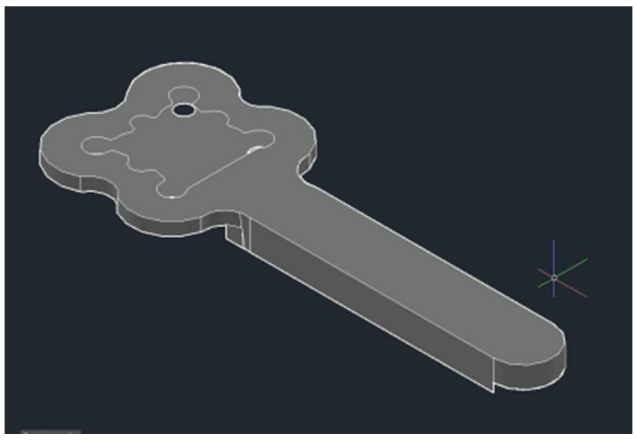
B. Propeller

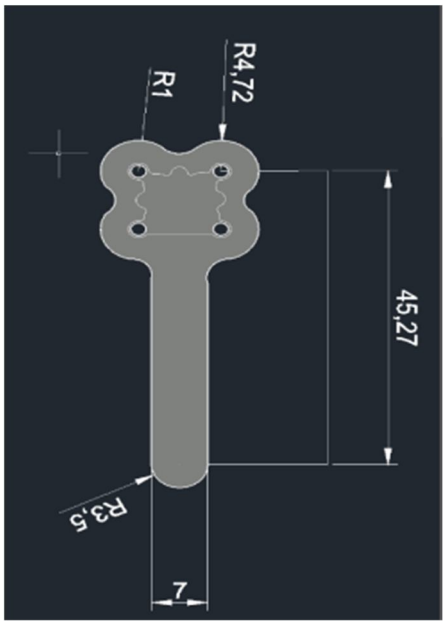
Sr. No.	Part Name	Dimension in (mm)
1	Inner diameter	10
2	Outer diameter	38
3	Angle of inclination	30
4	Thickness of blades	1
5	Height of propeller	10



Drone propellers provide lift for the aircraft by spinning and creating an airflow, which results in a pressure difference between the top and bottom surfaces of the propeller. This accelerates a mass of air in one direction, providing lift which counteracts the force of gravity.

C. Frame





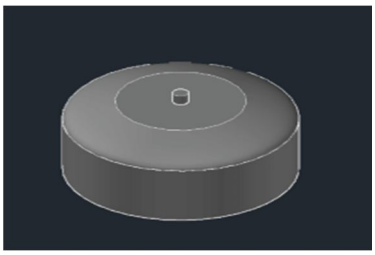
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Sr. No.	Part Name	Dimension in (mm)
1	Length	53.5
2	Width	7
3	Fillet on long part	R 3.5
4	Thickness	3.5

A light weighted designer frame made of carbon fiber and synthetic components is very strong and enables excellent flight handling characteristics it is possible to use it indoor or outdoor.

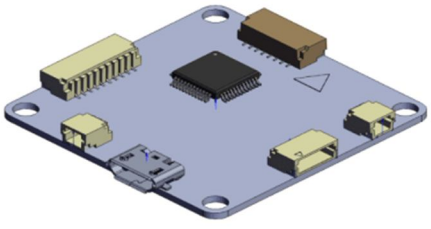
D. Brushless motor

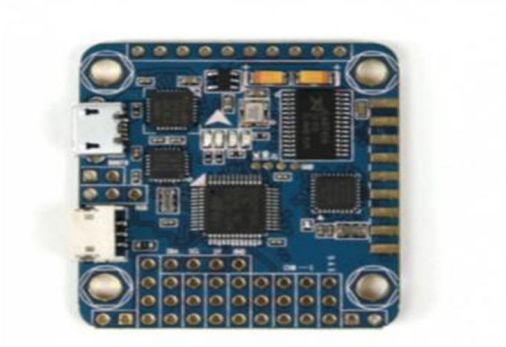
Sr. No.	Parts Name	Dimesnsion in (mm)
1	Inner dia.	R 5
2	Outer dia.	R 9
3	Height	9



A brushless motor is a direct current (DC) electric motor that operates without the mechanical brushes and commutator of a traditional brush motor. It has distinct advantages over a brush motor and is more economical in the long run, although the initial costs are higher.

E. Flight Controller



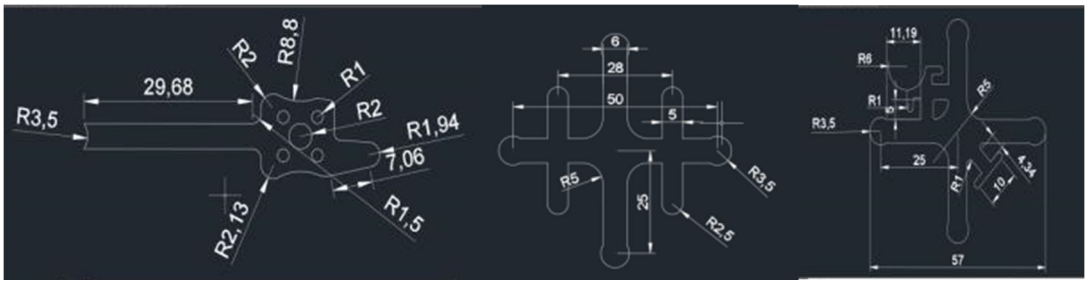


- 33mm * 33mm
- 1mm thickness

It is the brain of the drone, which used to transmit and receive the signal. A flight controller is a small circuit board of varying complexity. Its function is to direct the RPM of each motor in response to input.

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VII. DIMENSION OF PHASE



VIII. CALCULATIONS

A. *Battery Calculation*

A LiPo battery Consist of multiple cells: 1s,2s,3s,4s
Considering
1s= 1 cell of 3.7v
2s= 2 cells*3.7v =7.4v
3s= 3 cells*3.7v =11.1v

The maximum current I =(capacity*discharge rate)
The capacity range of the motor used is T-motor 5.1
Discharge rate of motor -10

I =5.1*10
I= 51A

B. *Battery Running Time*

T=C/I*60

Where
C=Capacity of battery
T= Time
I= Current

T=10/51*60
= 11.79min

C. *Distance Calculation*

V= D/T
Where V= velocity
D= distance
T= time

V= 40km/hr
= 40/60
V=0.66km/min
T= 12
0.66=D/12
D=0.66*12
D=8.12Km

IX. FORMULATION OF PROBLEM

In this project we increased efficiency of the drone by using higher voltage battery instead of higher current battery. In this project we used higher quality radio control link to get better range. Use of a low latency camera to allow pilot to fly drone even when the drone is not directly visible to the pilot. In this project we reduces the size as well as weight of the drone so that it would become more efficent.

X. LITERATURE REVIEW

In order to perform this project, literature review has been made from various sources Like Journal, books, article and others. This chapter includes all important studies which have been done previously by other research work. It is important to do the literature review before doing the project because we can implement if there are information that related to this project.

A. Rajeshwari Pillai Rajagopala "Drone: Guidelines, Regulations and policy gaps in India" (ISBN journal)

This paper examines drone operations in India and analyses the major policy gaps in the country's evolving policy framework. It argues that ad-hoc measures taken by state and central agencies have been ineffective, whether in addressing issues of quality control, or response mechanisms in the event of an incident, questions of privacy and trespass, air traffic, terrorist threat management, and legal liability.

B. Gordon Ononiwu, Arinze Okoye, James Onojo, Nnaemeka Onuekwusi "Design and Implementation of a Real Time Wireless Quadcopter for Rescue Operations" (AJER, vol-5)

This paper proposes the real time security surveillance system using IoT. The system design uses Motion Detection algorithm written in Python as a default programming environment. This significantly decreases the storage usage and save investment cost.

C. Dhriti Raj Borah et al., " A review on quadcopter surveillance and control", (ADBU- Journal of engineering technology, 4(1), 2016, 116-119

A quad-rotor helicopter (quad copter) is a helicopter which has four equally spaced rotors, usually arranged at the corners of a square body . The quad copter is the advanced form of helicopter. A helicopter is a flying vehicle which push air downwards by using rapidly spinning two rotors. The quad copter uses four rotors.

D. Samba Siva, B. Prudhviraj Kumar, et al., "Development of Mini Unmanned Aerial Vehicle", (IOSR Journal of Mechanical and Civil engineering), 12(2), 2015, 16-19

The main objective of this paper is to describe the importance and need of UN manned aerial vehicle instead of manned aerial vehicle.For this we developed proto type mini unmanned aerial vehicle.Unmanned aerial vehicles are the vehicles which were operated without human.

E. Amarjot Singh "Eye in the sky : Real- time Drone Surveillance (DSS) for Violent Individuals Identification using Scatter Net Hybrid Deep Learning Network "

The paper proposed the real-time Drone Surveillance System (DSS) framework that can detect one or more individuals engaged in Violent activities from aerial images.

F. K.VV.M ani Sai Kumar, M d Sohail and Dr. Usha Rani "Crowd Monitoring and Payload Delivery Drone using Quadcopter based UAV System" (2)

1) Quadcopter is designed in this project was used to carry the payload of 250g m cover from one place to another with 6min flight was tested.

2) By mounting high resolution wireless camera, and used for monitoring the crowd in the campus. It can be used for surveillance applications.

G. Velan Y,Musica "Cost Effective Design and Development of Manned Drone"

Unmanned Aerial Vehicles, referred to as drones are aerial platforms that fly without a human pilot onboard. UAV's are controlled autonomously by a computer in the vehicle or under the remote control of a pilot stationed at a fixed ground location

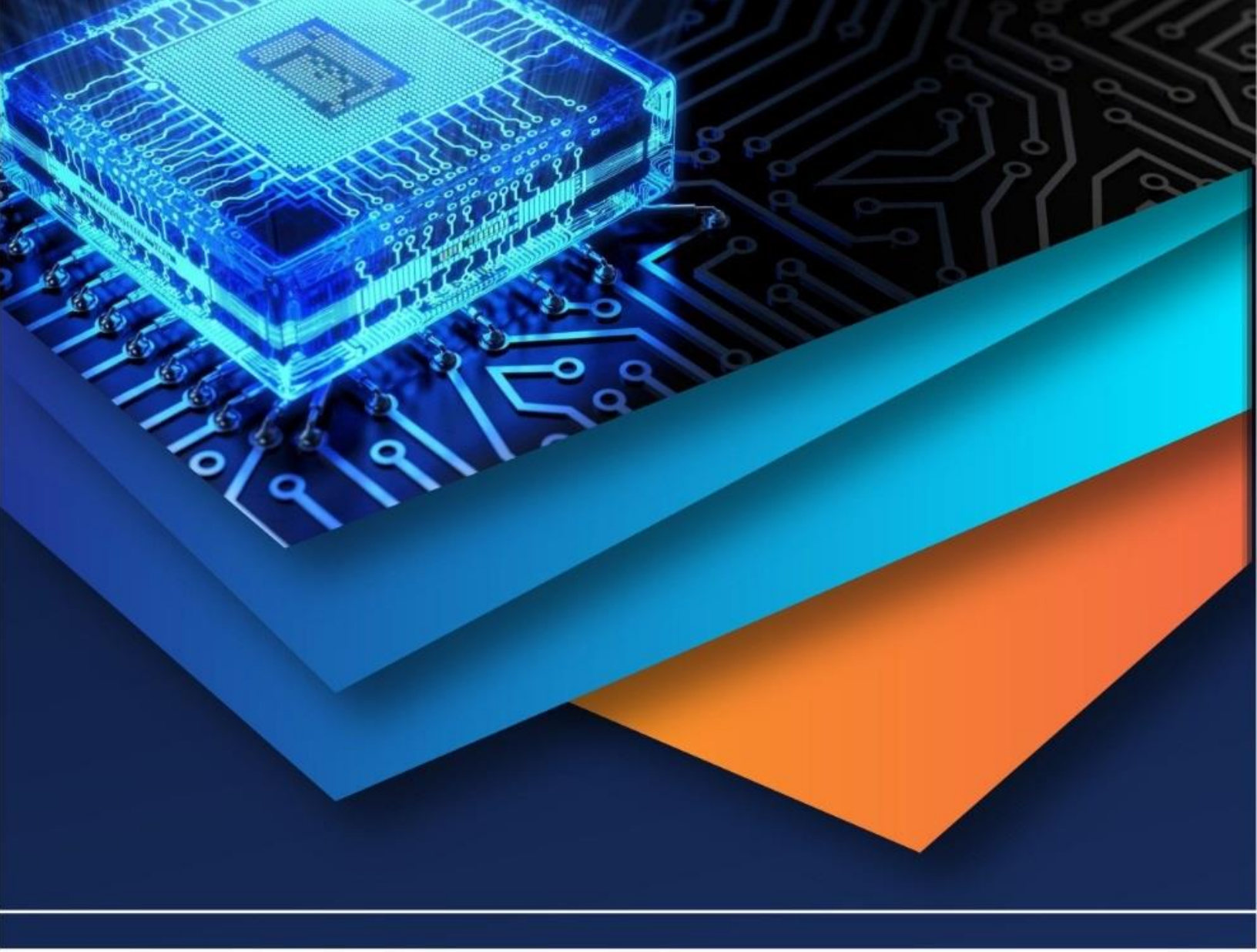
XI. CONCLUSION

This paper presents and approach which could be used for developing a small and compact size which can be used to carry out rescue operations and provide audio/video aid to the people in distress. It could also be used as surveillance system to increase the security system strength specially in the area where human interference is strictly prohibited. We consider that this type of platform is necessary to evolve the drone economy. The most, frequent operational mode includes enterprises drone which are individual. The concept of drone as a service connect the general public to end service broker for different drone operation.

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