



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 6, June 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118



9940 572 462



6381 907 438



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Multi-Purpose Exploration Drone

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ABSTRACT: This paper proposed the development of an Unmanned Aerial Vehicle (UAV) also called as DRONE (Dynamic Remotely Operated Navigation Equipment) and underwater vehicle which is controlled by wireless technology. The proposed design is remotely operated.

UAV is an electronic device which is remote controlled based aircraft used to achieve vertical flight with stability and it can be used for a live streaming and also for exploration and as technology advances increase the performance and reduce the cost of micro-controller so that the general public can afford this drone. The main aim of this project is for live streaming and Exploration.

This Drone includes frame, Flight Controller, BLDC motors, Electronic Speed Controller (ESC), transmitter, receiver, Lithium Polymer battery and camera. The individual components are tested and verified. Tuning and calibration of the PID (Proportional Integral Derivative) controller is done to obtain stabilization on each axis. Currently, the work is going to make UAV. The aim of the project can be achieved, resulting in stable flight, live streaming and exploring of various places.

KEYWORDS: drone, unmanned aerial vehicle, flight controller, transmitter, receiver.

I. INTRODUCTION

In present world, UAV is a very familiar & versatile technology. UAV can drift in air as well as water. We can also mount a camera to it in air and water. So that we can use it to do different types of tasks. Now a days drones are used in wars as a weapon and also as a helper of fighters in the war. Scientists use drones as a part of their research assistance. Drones not only help us in society but are also a threat for us, as because many of developed countries use it as a weapon of destruction. So, drones have the ability to perform work such that it becomes important in today's world.

Drone has the potential for performing many exploration tasks at places where humans cannot enter, for example, in high temperature and at high altitude, surveillance in many industries, rescue missions. A drone can have three propellers also known as tricopter, four propellers also known as quadcopter, six propellers also known as hexacopter, eight propellers also known as octacopters with motors that generate the necessary thrust required for lifting the drone. The basic principle behind the quad-copter is that two diagonal motors will rotate in the clockwise direction and other two will rotate in an anticlockwise direction allowing the aircraft to eliminate the reaction torque.

Highly developed drone technology enables the use of drones in a wide variety of areas such as in aerial photography for capturing the beauty of nature, in natural disasters where direct human intervention is impossible, or in agriculture for spraying pesticides to exterminate noxious insects. Further more, Amazon is planning to use drones for delivering packages to customers. In short, drone technology brings innovation and opens new markets. However, these drones are limited to the aerial drones. We believe that underwater drones, can be combined with the technology of aerial drones and hence this study mainly focuses on combining this technology together to make a drone.

1.1. Problem Statement:

In the present world, drone is a very versatile technology. Various drones are available in the market and are limited to a particular task. The drones which can fly in air are not able to swim in water whereas the drones which can swim in water are not able to fly in air. In this project, we want to combine both technologies in such a way that our drone can fly in the air and also swim in the water. There are many endless possibilities where you might need exploration. This is where our

project "Multi-purpose Exploration Drone" will help..

1.2. Objectives of present study:

1. The objective of this project is to build a Multi-Purpose drone in the structure of a quadrotor that can maintain safe and stable flight with wireless transmission system to provide surveillance of the real-time environment.
2. To build a drone which can travel in both water and air to perform a wide variety of tasks including inspection, retrieval and observation, among countless other applications.
3. Design and implementation of our drone in the structure of 'x' shaped quadcopter.
4. Development of flight controller by proper interfacing of sensor and tuning of PID control values.

1.3. Future scope

Over the past few years, drones have become central to the functions of various businesses and governmental organizations and have managed to pierce through areas where certain industries were either stagnant or lagging behind. From quick deliveries at rush hour to scanning an unreachable military base, drones are proving to be extremely beneficial in places where man cannot reach or is unable to perform in a timely and efficient manner. Increasing work efficiency and productivity, decreasing workload and production costs, improving accuracy, refining service and customer relations, and resolving security issues on a vast scale are a few of the top uses drones offer industries globally. Adoption of drone technology across industries leapt from the fad stage to the mega-trend stage fairly quickly as more and more businesses started to realize its potential, scope, and scale of global reach.

II. LITERATURE REVIEW

2.1 Literature Survey 1:

2.2 Path planning in UAV in Advanced, Unmanned aerial vehicles are employed in numerous real life applications such as exploration in underwater, mapping, and surveillance. The use of UAVs in any of these applications necessitates the planning of feasible and optimal trajectories for the motion of the vehicles [1]. Decreased battery life, Having a functioning battery is one of the foremost important parts of flying a drone. This is why it is vital to properly charge the battery before trying to require flight. When the drone isn't in use, it is best to store the battery during a cool, dry place — the battery shouldn't be left within the drone when it's not in use. This can help maintain the charge and increase the lifespan of the battery. Additionally, it is vital to not overcharge the battery, which may drastically decrease its lifespan. All in all, taking excellent care of the battery will ensure it lasts as long as possible.

2.3 Literature Survey 2:

A Survey on Civil Applications and Key Research Challenges, we present UAV civil applications and their challenges. The use of unmanned aerial vehicles (UAVs) is growing rapidly across many civil application domains, including real-time monitoring, providing wireless coverage, remote sensing, search and rescue, delivery of goods, security and surveillance, precision agriculture, and civil infrastructure inspection. We also discuss the current research trends and provide future insights for potential UAV uses[3].

2.4 Literature Survey 3:

A review on object detection in unmanned aerial vehicle surveillance, A detailed literature review has been conducted focusing on object detection and tracking using UAVs concerning different applications.[4]. The drones and possibilities of their using, There was discussed construction of the drone, which the most important elements are frame, propellers, Electronic control System and FPV Camera, Flight controller, Receiver[5]. Underwater-Drone with Panoramic View, In a word, drone technology brings innovation and opens new markets. However, these drones are limited to the unmanned aerial vehicles. We believe that underwater drones and aerial Drone, which are autonomous robots capable of moving and operating in the water as well as aerial and find a market in the near future.[6] The proposed drone plane is based on self-monitoring and self-targeting on the basis of real time object detection and classification techniques. UAVs have been used for surveying, disaster management, search operations and communications but in near future it will not stop only for given tasks, now it's time to use them for targeting/shooting inside narrow streets, detect electromagnetic emission to find the

harmful things at invisible ranges and many more.

III. COMPONENTS

Component of Multipurpose Exploration Drone given below,

COMPONENT NAME	MODEL DESCRIPTION
Frame	450 mm
Propellers	Propellers 1045(10X4.5) ABS DJI Black 2CW+2CCW-2pair-Premium Quality
BLDC Motors	A2212 6T 1000KV Brushless Motor for Drone (Soldered Connector)
E Electronic speed controller	SimonK 30A BLDC ESC Electronic Speed Controller with Connectors
Battery	2200mAh 3S 30C/60C Lithium polymer battery Pack (LiPo)
Flight Controller	KK 2.1.5 with connectors
Transmitter and receiver	Flysky FS-i6S 2.4GHz 6CH AFHDS 2A RC Transmitter With FS-iA10B 6CH Receive
Landing gear	PVC pipes
PP Power distribution board	100A Multirotor ESC Power Distribution Battery Board for Quadcopter
Waterproofing	Waterproof tape
Propeller	Three wing propeller

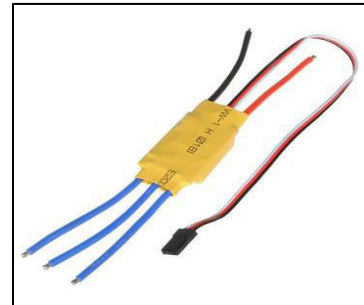
Component Images:



1. Landing gear



2. BLDC Motor



3. Electronic speed controller (ESC)



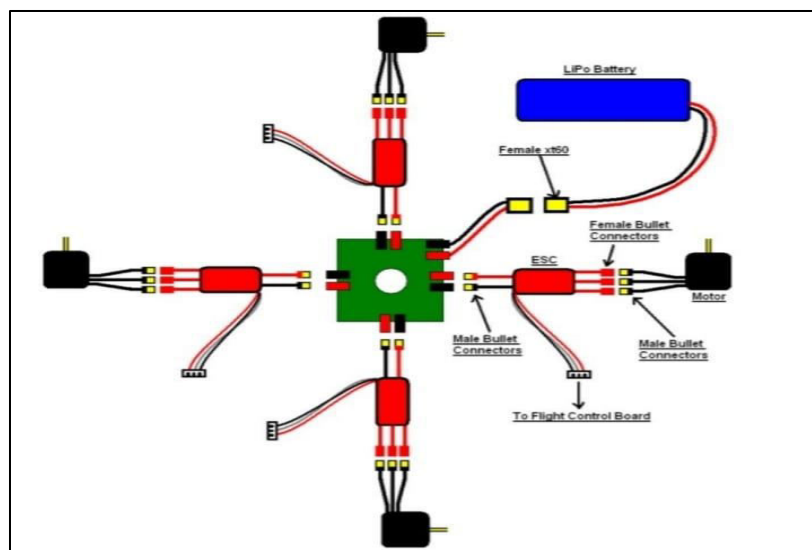
4. Frame



5. Lithium Polymer Battery



6. Transmitter and receiver



Basic Layout

IV. WORKING PRINCIPLE

The 4 propellers of a quadcopter are fixed and vertically orientated. Each propeller has a variable and independent speed which allows a full range of movements. Shown below is the different propeller combinations that facilitate different drone movements.

This is unlike conventional helicopters which are controlled by propellers with blades that dynamically pitch around the rotor hub. The components required for blade pitch are expensive which is one of the reasons quadcopters are becoming so common with recreational UAV enthusiasts.

The core components of a quadcopter are as follows;

- **Chassis** – the skeleton of the drone which all componentry is fixed to. The chassis design is a trade-off between strength (especially when additional weight such as cameras are attached) and additional weight, which will require longer propellers and stronger motors to lift.
- **Propellers** – principally effect the load that the quadcopter can carry, the speed it can fly, and the speed it can manoeuvre. The length can be modified; longer propellers can achieve greater lift at a lower rpm but take longer to speed up/slow down. Shorter propellers can change speed quicker and thus are more manoeuvrable, however they require a higher rotational speed to achieve the same power as longer blades. This causes excess motor strain and thus reduces motor life span. A more aggressive pitch will allow quicker movement but reduced hovering efficiency.
- **Motors** – 1 per propeller, drone motors are rated in “Kv” units which equates to the number of revolutions per minute it can achieve when a voltage of 1 volt is supplied to the motor with no load. A faster motor spin will give more flight power, but requires more power from the battery resulting in a decreased flight time.
- **Electronic Speed Controller (ESC)** – provides a controlled current to each motor to produce the correct spin speed and direction.
- **Flight Controller** – the onboard computer which interprets incoming signals sent from the pilot and sends corresponding inputs to the ESC to control the quadcopter.
- **Radio Receiver** – receives the control signals from the pilot.
- **Battery** – generally lithium polymer batteries are used due to high power density and ability to recharge.

Further to this, sensors can be used such as accelerometers, gyroscopes, GPS and barometers for positional measurements. Cameras are also frequently mounted for navigation and aerial photography

Flying of aDrone:

A quadcopter is controlled manually with a hand-held radio control transmitter which manually controls the propellers. Sticks on the controller allow movements in different directions and trim buttons allow the trim to be adjusted to balance the drone. Screens can also be used to receive live video footage from the on-board camera and to display sensor data.

Further to this, on-board sensors can provide helpful settings such as;

- Auto altitude where the quadcopter will move at a fixed altitude, and;
- GPS hold, where the quadcopter will remain at a fixed GPS position.

Quadcopters can also be flown autonomously, where modern flight controllers can use software to mark GPS waypoints that the vehicle will fly to and land or move to a set altitude. This kind of autonomy is becoming increasingly common and contributes to much of the increased interest in civilian drone technologies that has been observed in recent years.

V. ADVANTAGES

The advantages covered by the proposed system are listed as,

- 1) It would help in underwater as well as land-based exploration.
- 2) It will help us find a way in case we are lost in some place.
- 3) It is a completely eco-friendly vehicle.
- 4) It would allow physically disabled people to explore various places within a certain range.
- 5) It will help in keeping a watch on the underwater activities.
- 6) It will help soldiers in finding obstacles in front of them such as land mines, water mines, etc.
- 7) And there can be many more applications of this drone.

VI. APPLICATION

Some of the applications for the proposed system are listed follow,

- 1) Exploring underwater stuff like fishes, sunken ships, historical monuments which have been drowned by water.
- 2) To track animals, particularly dangerous animals, without putting humans at risk.
- 3) They can also be used to watch for poachers and trespassers, increasing security in areas where there's simply too much ground to cover.
- 4) Additionally, drones can be used to provide aid when natural disasters strike.

VII. LIMITATIONS

- 1) We cannot make a wireless connection underwater.
- 2) The range of Wi-Fi connectivity is limited to particular distance.
- 3) The camera that we are using will support only streaming and not recording.

VIII.CONCLUSION

In the project, we calculated the thrust which would be required to lift our drone and based upon that we have selected the components required for proper working of our drone.

REFERENCES

1. M. Dumiak, "Lice-hunting underwater drone protects salmon," IEEE Spectr., vol. 54, no. 4, pp. 9–10, Apr. 2017.
2. S. Bhattacharyya and H. H. Asada, "Single jet impinging vertical motion analysis of an underwater robot in the vicinity of a submerged surface," in Proc. OCEANS Shanghai, Apr. 2016, pp. 1–8.
3. Piotr Kardasz, Klaster B+R&I ul. Pilsudskiego 74, 50-020 Wroclaw, Poland, Tel: +48 668 419 147; E-mail: p.kardasz@klasterbri.pl Received March 14, 2016; Accepted March 17, 2016; Published March 19, 2016 By Caleb Bergquist. Accessed: March 23, 2019.
4. Available: <https://dojofordrones.com/build-a-drone/>
5. Piotrowski P, Witkowski T, Piotrowski R (2015) Unmanned remote-controlled flying unit. Measurement Automation and Robotics 19: 49-55.
6. Bouabdallah, S. (2007). Design and control of quadrotors with application to autonomous flying. Lausanne: Escuela Politecnica Federal de Lausana.
7. Brown, W. (s.f.). Brushless DC Motor Control Made Easy. Recuperado el 25 de Octubre de 2013, de Microchip: <http://ww1.microchip.com/downloads/en/appnotes/00857a.pdf>
8. S. W. Colton (2010, June) Design and prototyping methods for brushless motors and motor control. Massachusetts, United States. Accessed: October 2012.
9. R. F. Graf, "Dictionary of electronics," 1974., accessed: January 2013. . Available: <http://www.rc-airplane-world.com/spread-spectrum.html>
10. For more information on India's drone laws, see <http://dgca.nic.in/cars/RPASDo's%20and%20Don'ts.pdf> SAMANTA
11. J. Liu, B. Kuipers, and S. Savarese, "Recognizing human actions by attributes," in Computer Vision and Pattern Recognition (CVPR), 2011 IEEE Conference on, 2011, pp. 3337–3344
12. "Performance Study of Modified Savonius Water Turbine with Two Deflector Plates" by Golecha Kailash, T. I.Eldho, and S. V. Prabhu, Hindawi Publishing Corporation International Journal of Rotating Machinery Volume2012,Article ID 679247,12pagesdoi:10.1155/2012/67924..
13. and current status . In: Proceedings of IEEE international conference on electric machines &drives.vol.
14. 2:2007.p.1407–1412.
15. Hermann S. Design of a micro-hydro-powered battery charging system for rural village electrification: Master's
16. thesis.Carl von Ossietzky University Oldenburg: Postgraduate Program Renewable Energy; 2006.
17. Kumar D, Sarkar S. A review on the technology ,performance ,design optimization , reliability, techno-economics and environmental impacts of hydro-kinetic energy conversion systems. Renew Sustain Energy Rev 2016;58:796–813.
18. Laws ND, Epps BP. Hydro-kinetic energy conversion: Technology, research, and outlook. Renew Sustain Energy Rev 2016.



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