An Energy Efficient Drone for Medicine and Food Delivery in Tribal Areas

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***Abstract*—The health indicators of Tribal communities are worse than the general population, as they often lack access to medical and food facilities, making them more vulnerable to diseases. To address this issue, we propose an Unmanned Aerial Vehicle that can deliver medicines and food to remote Tribal communities based on their location and health needs. Our drone uses a Pixhawk Mini flight controller configured with Mission Planner Ground Control Station software and is optimized to deliver medicine to rural areas. The drone's location can be tracked using GPS, making it particularly useful in areas with uneven terrain and limited transportation services.**

Overall, the use of drone technology in healthcare delivery has immense potential to improve health outcomes in remote areas, particularly for marginalized communities like the Tribals in India. It is essential to continue exploring and implementing innovative solutions that can address the healthcare disparities and improve the lives of those who need it the most.

***Keywords*— unmanned aerial vehicles (UAVs), Remote sensing, Healthcare access, Disaster relief, Flight Controller, Drone Frame, Electronic Speed Controller (ESC).**

I. INTRODUCTION

Accessibility is a fundamental aspect of sustainable development and a basic right for everyone. People living in rural areas often face significant challenges due to the long distances between their community and the nearest healthcare facility, which is further complicated by the lack of reliable transport options. Rural areas also tend to have limited contracting capability and logistics processes, leading to territorial and socioeconomic marginalization. To address these challenges, we are proposing the use of a quadcopter drone to deliver goods and medical supplies efficiently and quickly.

According to a recent study, rural territories in India suffer from inadequate access to basic services, amenities, and opportunities, leading to marginalization. There is also a gap in income and health status between rural and urban populations. To overcome these challenges, our drone delivery system can deliver goods and medicine faster, even in congested cities where traffic can delay deliveries.

Our GPS-enabled drone is programmed using Node MCU technology and can accurately provide real-time locations and estimated delivery times. We have also developed a Blynk app to interface the device with a mobile screen. By using a drone delivery system, we can overcome the inefficient transportation of goods and medical supplies and improve the lives of people living in rural and urban areas alike.

II. LITERATURE SURVEY

Unmanned aerial vehicles, or UAVs, also referred to as "drones," are being studied more and more in a range of surveillance situations. Drones are a developing technology, so there are still several obstacles to overcome before they can be used in real applications with stringent performance, dependability, and privacy requirements.

One crucial area where drones could be extremely helpful to cut expenses and potentially increase the granularity of surveillance is the monitoring of transit infrastructures.

Drones also open the door for the implementation of smart-sensing functionalities that will extend current railway monitoring capabilities and support automation, operational safety, prognostics, and even forensic analyses. In this article, taking into consideration technical difficulties and environmental limitations, we present a survey of current drone technology and potential applications to automated railway surveillance. We'll talk about a recent experiment with drone intelligent video, showing some early findings and potential directions.[1]

The goal of the study for this paper is to create an unmanned aerial vehicle with contemporary different civil and military applications of technology. It operates automatically. Microelectronic devices' decreasing size and rising powers in recent years have made it possible for advocated for a more capable autopilot and more real-time UAV uses. By 2020, the market for unmanned aerial vehicles (UAVs) is expected to expand significantly as more and more military, civil, and business uses emerge. The development of knowledge is among potential modifications to air traffic control. A UAV is described as "an aircraft that is management system to exchange information among Air" in the definition. Users and providers of traffic management, the introduction of navigation, and the creation of alternative separation processes.

A multirotor flying controller board is its most crucial part. the flight control panel microcontroller and IMU sensors work together to execute control tasks. What does it currently control? To hover in mid-air, a UAV needs to be stable on the three dimensions of pitch, roll, and yaw. IMU devices detect the aircraft's orientation and transmit the information to the microcontroller, which uses

the raw data to calculate the angles and provides error correction to return the aircraft to its starting location. And it does this at an astoundingly fast and accurate rate.[2]

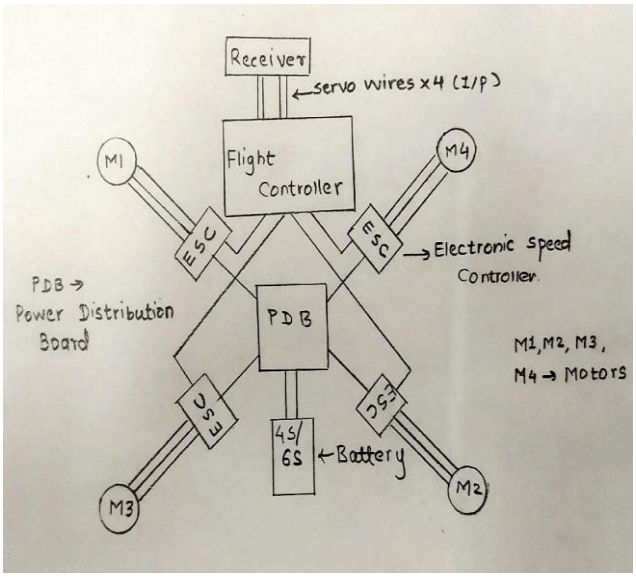
We are going to present a new proposed system, which is an unmanned aerial vehicle, to address the numerous problems the world faces today with surveillance and security management. This method aims to decrease labour requirements while increasing productivity. In surveillance, a drone is used to fly a camera over a target location or target individual while recording videos. Video captured can be sent to a Raspberry Pi for processing, and data processed there can be sent from the drone to a neighbouring station with the aid of an RF single. Unmanned aerial vehicles (UAVs), which are the main method of aerial remote sensing, have found wide-spread application in several different fields thanks to their special technological advantages, including adaptability, suitability, low cost, and high-resolution digital surface models.[3]

Drones, a term that is frequently used in today's technologically advanced and expanding world, have been wonderful. In the past ten years, innovation and use have been greatly demonstrated. The armed organisations have used it to patrol dangerous areas and look out for potential threats, for example.
possible danger or illegal activity. When it comes to offering effective and easy surveillance, it is very useful. Drones have been used in farming equipment to spread medications in organic areas and conduct out simple, secure pesticide disposal over crops.[4]

In a comparable way, we have created a drone that can deliver essential and vital medications in places where locals lack access to appropriate transportation. This drone can carry medicine to locations where it cannot be delivered by any mechanical vehicle used by all transportation services.
This Unmanned drone medicine delivery system can be used as a potent weapon in the fight against the pandemic in any pandemic situation where human contact is not recommended and social distance is the key in health management structures. This kind of automatic drone delivery system can save valuable lives with much less and minimal effort in emergency circumstances where the current transportation structure is destroyed due to flood, earthquake, etc.

This project can be extremely helpful not just in rural areas but also in completely developed cities. Slow moving traffic jams are a major annoyance in the developed and dynamic towns. As a result, this drone delivery project will be useful for the efficient delivery of medicine in cities where traffic congestion and poor road conditions become a major hindrance in all the situations. In India, there are many cases where the late delivery of medicines to any health organisation proved to be very fatal. This project is one modest step towards the development of a better air transportation system because rising urban populations and the use of private vehicles will lead to heavy traffic on city roadways.

III. CIRCUIT DIAGRAM WITH COMPONENT VALUES AND ITS DESCRIPTION



i.MOTOR: 2205 Racer sky

- MAX THRUST: 1204 GM.
- KV rating: 2300 RPM/V

ii.BATTERY: LiPo 2200MAh

- Cells: three cells
- Voltage: 11.1v
- 2200MAh

iii.FLIGHT CONTROLLER: PIX MINI

- Radio link Pix Mini
- Output voltage: 5v
- PWM input: 6

iv.PROPELLERS: ORANGE HD

IV.WORKING PRICIPLE

The flight controller and operating system are the two most crucial components of a drone. The rotors are driven by batteries, which cause them to spin the propellers and produce lift. To maintain altitude, the flight controller relies on information gathered by accelerometers, barometers, magnetometers, gyroscopes, and the controller.

- 5-inch propellers

v.ESC

- Current: 30 Ampere
- Input voltage: 11.1 to 11.

V. FLOWCHART

VI.FRAME DESIGN

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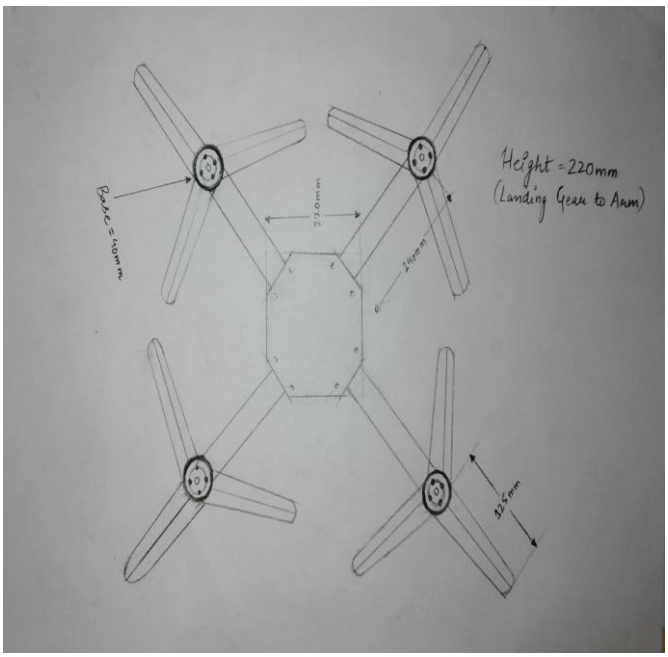

VII. RESULTS ACHIEVED

1. Payload capacity obtained -500gm.
2. Endurance duration –

i. First flight : 25mins
ii. Second flight : 20mins

3. Range –LOS: 1 Km,Height:30meter
4. Four Rotors with 2300kv
5. 6 PWM inputs
6. 2.4 GHz Frequency
7. 6 varied modes of flying

VIII. RELEVANCE

One of the biggest contributions of human ingenuity to raising the standard of living is the contemporary healthcare system. Nonetheless, many individuals in rural and there are still undeveloped regions of the world without access to basic healthcare. The recent pandemic has highlighted the interconnectedness of all our health outcomes, giving closing these gaps a new sense of urgency. The developing world has been at the centre of a waste-versus-access trade-off that has plagued the healthcare logistics industry for decades. Unmanned aircraft are a great approach to upgrade the last mile of medical delivery and close access gaps. Regardless of location, drones can provide just-in-time resupplies of essential medical supplies. Drones can make sure these supplies are ready on demand because some health systems cannot afford to keep cold-chain items like platelets or blood on-site.

Recently, several historical events have involved drones used in healthcare logistics. The first human organ to be delivered by a drone was a kidney, which a University of Maryland team successfully transplanted into a patient with a severe nephrological ailment last year.
Last mile drone deliveries in nations like Rwanda and Ghana demonstrated how unmanned aerial vehicles may transport essential goods to locations rendered isolated by hills and sluggish, twisting roads as "rescue robotics" dominated discussions at the African drone forum in February.

IX. CONCLUSION

This effort is beneficial in getting essential medications to tribal areas where there are no regular transportation services and in places where the terrain is unsuitable for conventional transportation techniques. Second, our medicine drone delivery technology has important uses in emergency scenarios like floods, earthquakes, etc. where residents and doctors require critical medications that can be supplied quickly.
Thirdly, this drone is useful in urban areas as well. It is now more difficult for the old distribution networks to operate efficiently due to traffic congestion brought on by the growing population and the significant increase in private vehicles on city roadways.

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