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Aerial Distributer Drone

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ABSTRACT

Transporting medical supplies to specific places reliably, safely, and on time is crucial during the COVID-19 epidemic. In order to limit the possibility of encountering COVID-19 patients, the use of drones for medical supply delivery can overcome road traffic restrictions, speed up delivery times, and accomplish contactless delivery. However, the requirements for the delivery of medical supplies in public health situations cannot be met by the current optimization model for drone delivery. Today, aerial drone technology is used to advance healthcare, particularly blood supply. In addition to this, there are many other applications for aerial drones, such as aerial photography, express shipment and delivery, disaster management, search and rescue operations, crop monitoring, weather tracking, law enforcement, and structural assessment. This widespread deployment is expected to hasten and, hopefully, lower the cost of drone technology advancements. By enabling just-in-time delivery of life-saving medical supplies and devices and lowering the cost of normal prescription care in rural areas, drone use offers the chance to improve health care, particularly in remote and/or underserved environments. The delivery drone has the potential to assist underdeveloped nations to advance in personal communication much as the mobile phone did.

Keyword: Drone, Quad-copter frame, Flight Control, Electronic Speed Controller (ESC), Landing gear, Propeller, Radio transmitter, Battery, electronics, and power distribution cables, Motor.

INTRODUCTION

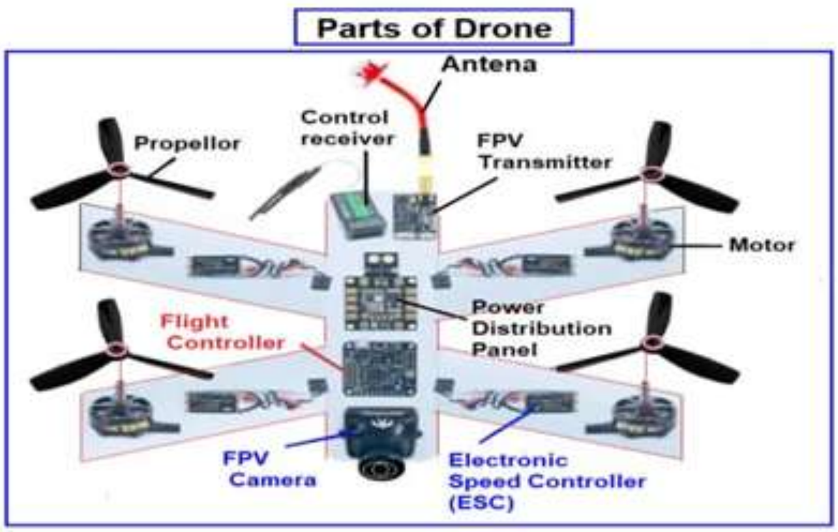
The drone is a significant new technology that will have a disruptive impact on the transportation industry. Similar to how personal communication in developing nations was able to advance thanks to the cell phone, existing transport infrastructure may be replaced by drones. Unmanned aerial vehicles (UAVs) are the general term used to refer to drones [1]. Alternative titles include remotely operated aircraft (ROA), remotely piloted vehicle (RPV), remotely piloted aircraft (RPA), and unmanned aircraft (UA). Recent advancements have been made in hardware, software, and networks specifically for drones. For instance, GPS and lightweight composite materials allow for effective flight. In addition, lithium batteries are advancing quickly, enabling drones to fly farther between charges [3]. Apps for smartphones or tablets can be used by drone software for tracking and navigation [9]. By keeping track of meteorological information from all the ground stations and streamlining the drones' itineraries, the drone operating system controls the network. The routes must stay clear of hazardous weather and other danger factors. Additionally, a control center can be contacted using an on-board webcam [7]. Although there are many different types of drones, everyone agree that a drone is a technology that can fly for an extended period of time without a human being on board, is sufficiently controlled to carry out valuable tasks, and can maintain flight. Delivering tiny products that are urgently needed in regions with limited access is one of the useful drone tasks [11]. We discuss the well-known cases in section three. To our knowledge, this study is among the first scholarly works on drone delivery strategies for healthcare to be published [13].

This work offers two new models for drone delivery in a hospital setting, in contrast to the scant academic literature that has been published on modelling drone delivery, which has primarily concentrated on parcel delivery. A logistics network is created to deliver medical supplies on time utilizing a tandem technique that combines ground transit and drone delivery for the final leg [10]. Finding a warehouse with supplies and drone nests to finish final delivery is the main goal of both versions. In the first model, our goal is to reduce the overall weighted delivery time; in the second model, we aim to reduce the maximum weighted delivery time.

Parts of the Drones

Drones have many parts depending on its type. Below are the parts of the drone.

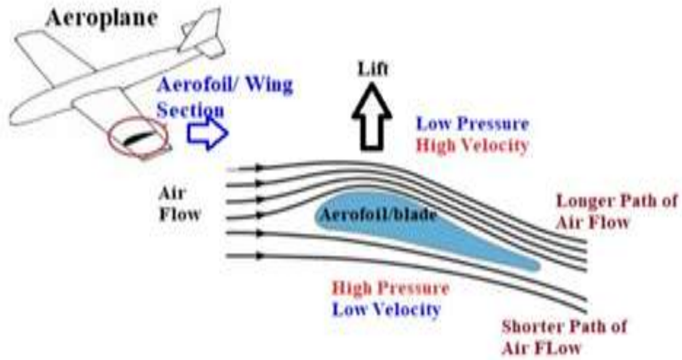
1. **Quad-copter frame:** It is a structure (frame) into which all other drone parts fit.
2. **Motor:** Motors are essential in making drones as they generate the force to rotate the propellers and propel the drone
3. **Electronic Speed Controller (ESC):** It is an electronic control board that varies the speed of the motor. It also works as a dynamic brake.
4. **Flight Control:** Flight control creates a log of the takeoff location that guides the drone and thereby the need to return to the takeoff location. This has become known as the 'back home' feature.
5. **Propeller:** Drones can fly with the help of propellers; propellers are designed to create a difference in air pressure.
6. **Radio Transmitter:** It is used as a channelized transmitter and communicator with drones.
7. **Battery, electronics, and power distribution cables:** This battery acts as the power source for the drone. It supplies power to all electronics through power distribution cables.
8. **Camera:** For video footage, a camera is attached to the drone and used to shoot, save and send video.
9. **Landing Gear:** It is used to land the drone safely. An experienced user can balance the motor speed for a safe landing in emergencies.
10. **First-Person Video:** The control device interface (transmitter)is more expensive than the screen, giving the user an interactive 3D viewing experience. First Person View (FPV) gives an ultimate feeling as if the user thinks he is flying.



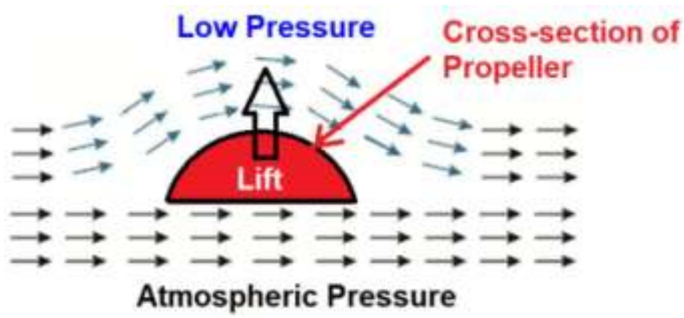
Working Principle of Drone and Flow Pattern

The subject of Fluid dynamics plays a significant role in the design and development of aircraft and drones. This subject consists of the working principle of the aerodynamics of aircraft [2] . A sufficient amount of upward force is required to lift the vehicle against gravity which is named Lift. A force created to move the vehicle or body in motion is called thrust [12] . These forces can be studied using the kinematic laws of fluid flows. When air flows over an aerofoil and pressure, viscous and drag force act on the profiles Force is directly proportional to the velocity of air at the inlet. The flow pattern around the cross-section of the aerofoil or propeller is shown below [6] . High fluid pressure at the bottom and low pressure at the top of the propeller causes an upward force which is called a lift.

This force is responsible for lifting the weight of an aero-plane or drone [5] . The amount of lift force depends on the angle of inclination of the aerofoil or propeller. Based on the principle of conservation of energy in fluid flow (Bernoulli's principle, the sum of all forms of energy in a fluid is constant along the streamline When air flows over an aerofoil or wing, its velocity increases at the top portion [8]. But the pressure of air decreases. In contrast, the air velocity decreases and pressure increase at the bottom side of the blade [4] . The next pressure difference across the aerofoil results in an upward force which is called a lift CFD modeling of flow over an aerofoil has been important in many vehicular and aerospace industries.



Principle of Aerodynamic Lift



RESULT ANALYSIS

Aerial drone technology is now in use to improve medical care, especially blood delivery. The use of aerial drones is broader than just this and includes aerial photography, express shipping and delivery, disaster management, search and rescue operations, crop monitoring, weather tracking, law enforcement, and structural assessment. This wide use promises to accelerate and, ideally, reduce the cost of technological advances of drones. By doing so, drone use offers the opportunity of improving health care, particularly in remote and/or underserved environments by decreasing lab testing turnaround times, enabling just-in-time lifesaving medical supply/device delivery, and reducing costs of routine prescription care in rural areas. A small experiment was conducted in which some of the items were distributed over the area within a certain range.

No.	Range	Min Speed(m/s)	Supply Unit(Kg)
1.	248	10	4
2.	241	10	5
3.	245	10	8
4.	243	10	10.5
5.	202	10	4
6.	23.7	51	7.5
7.	24.8	52	9
8.	23.3	53	12.5
9.	20.7	54	2
10.	21.6	55	8

CONCLUSION

Our proposed system is enabling improved health care delivery by providing faster response times, reduced transportation costs, and improved medical products/services to remote and/or underserved environments. The prehospital care industry is about to change because to drone technology. Drones have the potential to be used for beneficial and helpful purposes, particularly in the field of health care. It will be more and more important in the near future. UAVs can quickly bring life-saving medical care to isolated outposts and places where access is restricted owing to natural forces or hostile causes, despite poor road infrastructure. One of the important uses of drones is the delivery of laboratory samples as well as emergency supplies. Technologies and parts for drones and unmanned aerial vehicles are readily available and advancing swiftly. This study examines a number of cutting-edge applications for drones in healthcare. We designed our UAV to be more timely, effective, and efficient. Time is of the essence in an emergency; a quicker reaction will reduce medical.

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