



A Review Paper on Medicine Supply and Camera Surveillance in Isolated Areas Using Micro-Air Vehicle

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ABSTRACT

Air transport plays a significant role in supply of various goods. It is used for the carriage of goods e.g. medical supplies. Its role gained particular importance when the covid-19 pandemic led to a drastic decline in air operations. In response to the crisis, many air carriers temporarily converted passenger aircraft to freighter aircraft. Using of airways in such emergency situation can be beneficial as transportation becomes easier, faster and can cover longer distances in short time. In addition to transportation of goods, airways can be also used during natural calamities like flood and for mapping. The future use of planes in healthcare also is very thought provoking. How can the industry best use this technology to improve safety and care delivery? Well for starters, planes already have been trialed to deliver food aid and medical supplies to areas hit by disaster, such as Haiti, by a startup called Matternet. The rapid delivery of vaccines, medications and supplies right to the source could quash outbreaks of life-threatening communicable diseases. Communication equipment, mobile technology, portable shelter comprise the vast list of what could be delivered in a rapid fashion to areas where critical infrastructure damage would prevent ground or typical air transport.

Keywords: GSM Module, Arduino, ESC, BLDC Motor, Servo Motor, Camera, Receiver.

1. INTRODUCTION

Medical supplies transport is a quite critical task. There is a huge variety of medical tablets, vaccines, syrups, devices and parts. There usually is an urgency of certain medical supplies at certain locations as per emergencies. To allow for instant transport of medical supplies from medical stores to hospitals and emergency centres, we here design a medical supply delivery aeroplane. The plane will allow for instant delivery of medical supplies to hospitals and emergency centres without being affected by traffic in the area. The Medical delivery drone offers a wide variety of advantages including:

- Carry Medical Supplies – Tablets, vaccines, devices, medical tools etc
- Plane designed for stable flight with Supplies
- Perforated Medical Supply Box for Easy Filling
- On Board Live Camera for Effective Control

The plane achieves flight as per the users commands using remote controller wirelessly. The camera mounted on the plane is used to transmit live footage back to the user that helps user in flying the plane from over a distance. The plane can be used for rooftop to rooftop deliveries between medical stores and hospitals within 1 kilometers of range using this plane.

This form of automatic plane delivery system can save precious lives in emergency scenarios where the current transportation structure is shattered due to floods, earthquakes, and so on. This project can be beneficial not just in rural areas, but also in fully developed cities. The developed and fast moving cities are majorly bothered with slow moving traffic jams. In India, there are many cases reported where the late delivery of medicines to any health organization proved to be very fatal, therefore this medicine delivery project will come handy in case of efficient delivery of medicine in the cities where traffic congestion and bad conditions of road become a major drawback in all the above mentioned situations.

2. BASIC METHODOLOGY

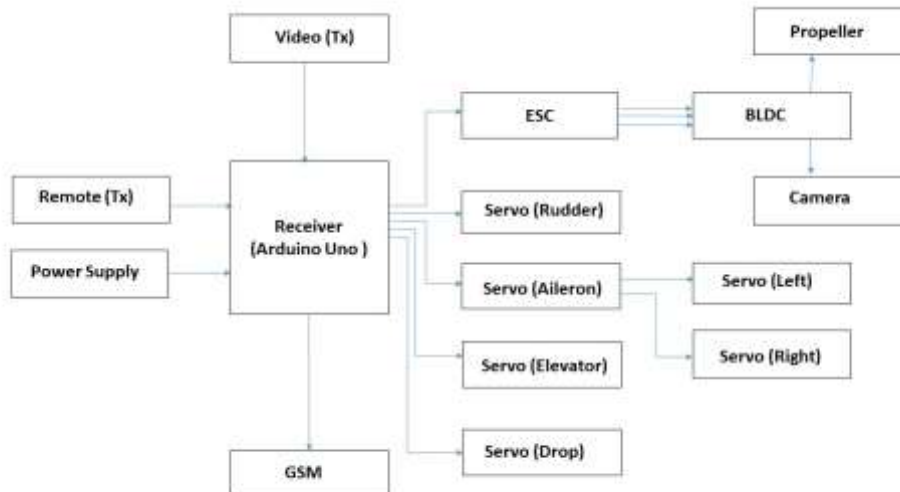


Fig. 1 – Layout Diagram

This system consists of mainly Arduino, GSM module, receiver, BLDC motor, ESC, Camera, battery, servo motor, remote. The receiver has 6 output channels. The first channel is connected to ESC. BLDC motor is connected to ESC which is further connected to propeller and camera. The second channel is connected to the rudder. The third channel is given to aileron of the plane. At aileron two servo motors are connected for left and right movement. The fourth channel is connected to the elevator and fifth channel is given to drop. There are three inputs to the receiver namely video transmitter, remote transmitter and power supply. There are total five servo motors used.

We are going to use GSM modem that works on wireless network. GSM modem supports extended commands such as reading, writing and sending SMS, searching phone book entries etc. Also Arduino is used as a controller which is an open source. The receiver receives a message containing information about where the medicine is required and what are the list of medicine like blood units, vaccines, tablets etc. These are uploaded into the payload after which the plane is launched and controlled by remote.

When we start to operate, the joystick of the remote is used to control the servo motors which are used to give directions to the flaps of the plane. The battery gives power supply to ESC. When ESC is triggered it drives the BLDC motor. Therefore the motor gets on and the fans start rotating and moves in forward direction. As the destination address is already given to the plane, it goes to the desired location and delivers the medicine by means of parachute. Servo motor is used to drop the medicine at location and it reaches to the customer. Surveillance and mapping of the whole process is done using the camera.

3. LITERATURE REVIEW

On June 13, 2017 Haowei Gu, Ximin Lyu, Zexiang Li, Shaojie Shen, Fu Zhang proposed “Development and Experimental Verification of hybrid vertical take off and landing (VTOL) Unmanned aerial vehicle(UAV)” in International Conference on unmanned Aircraft Systems (ICUAS). The paper is about the development of such VTOL UAV systems from all angles, including aircraft design and implementation, integration of onboard equipment, ground station assistance, and long-distance communication, is covered in this study. They conducted an experiment to confirm that this hybrid VTOL UAV possesses the requisite aerodynamic performance, flight stability, endurance, and range. Additionally, the VTOL UAV may accomplish fully autonomous flight in a genuine outside environment with the specially designed flight controller.

In 2020, M. Prathilothamai, Parvathi Sanjana proposed “Drone design for first aid kit delivery in emergency situation” in 6th International Conference on Advanced Computing and Communication systems(ICACCS). The paper is about countless precious lives have been lost as a result of an ambulance becoming trapped in traffic. Statistics reveal that the likelihood of such scenarios is highest in Indian traffic conditions. In this work, we present a solution to expedite the delivery of first aid kits in situations such as, but not limited to ambulances becoming stopped in traffic and war-torn locations with inadequate medical supplies, and so on. A first aid pack can help lower the risk of infection or the severity of an accident, from mild ailments to more serious injuries. When a user books an ambulance for a victim, if the ambulance is stuck in traffic, automated drones can deliver a personalized first aid kit to the user's location so that the victim can be diagnosed by the remedy medicines with the help of a doctor using a web app until the ambulance arrives and transports the victim to the hospital.

In August 2020, Pragati Jain, Ashutosh Rai, Bobby Budhwani proposed “Medicine Delivery Drone” in International Journal of Engineering Research and Technologies(IJERT). The paper is about building a medication drone delivery system with a CC3D flying controller and Open Pilot Ground Control Station software. The drone is designed to transport medicine in rural areas, and its location can be traced using GPS and the Blynk software. The location tracker was created with NodeMCU. This drone can be of tremendous value in areas where the geographical topography is uneven and unsuitable for effective transportation, as well as areas where proper transportation services are still lacking.

In 2018, A. Josephin, Arockia Dhivya, R.J. Hemalatha, T.R. Thamizhvani, Josline Elsa Joseph, Bincy Babu, R. Chandrasekaran proposed "Medical drone – A life saviour in emergency situations". The paper is about proposed prototype that navigates the victim's location using a GPS module. The GSM module is utilised to transmit the measured health data. Every minute, parameters are measured and the results are forwarded to the doctors. The ZIGBEE module is used to transmit the health parameters that have been measured. This information will assist doctors in treating patients on time. The health parameters mentioned will aid in tracking the patient's present status.

In 2020, Mohamed ElSayed, Moataz Mohamed proposed "White Paper – UAV (Drone) Delivery of Medical Supplies during COVID 19 Disruption". The purpose of this white paper is to test the use of Unmanned Aerial Vehicles (UAVs) or "Drones" for medical supply delivery in the City of Hamilton. The study assumes that 1) pharmacies and big medical supply firms will be allowed to fly drones outside of their line of sight, and 2) these institutions will have access to off-the-shelf drones (e.g. MAVIC Pro or Matrice 600 Pro). In this regard, the study is to examine the viability of UAVs for the delivery of lightweight medical goods holistically, as well as to determine the required number of UAVs per pharmacy in the City of Hamilton.

In 2015, Cornelius A. Thiels, DO, Johnathon M. Aho, MD, Scott P. Zietlow, MD, and Donald H. Jenkins, MD Proposed "Use of Unmanned Aerial Vehicles for Medical Product Transport". This article investigates the desire for, practicality of, and risks connected with the use of unmanned aerial vehicles (UAVs) to deliver medical items, such as blood derivatives and medications, to hospitals, mass casualty scenes, and offshore vessels during times of high demand.

4. CONCLUSION

In pandemic situation effectively and inspired innovative ways of increasing access to testing and healthcare delivery to everyone including those in isolated areas of the country by this approach we become able to quickly save lives of general populace. We are deliver the medicine at correct destination. It takes less man power. It covers long distance in small period. Without contact with any person we can deliver medicine safely. Since we are mapping flood affected areas, we can provide help to injured people.

REFERENCE

Haowei Gu, Ximin Lyu, Zexiang Li, Shaojie Shen, Fu Zhang "Development and Experimental Verification of hybrid vertical takeoff and landing (VTOL) Unmanned aerial vehicle(UAV)" June 13-16 2017, International Conference on unmanned Aircraft Systems (ICUAS)

M. Prathilothamai, Parvathi Sanjana "Drone design for first aid kit delivery in emergency situation" 2020 6th International Conference on Advanced Computing and Communication systems(ICACCS)

Cornelius Thiels, Jonathon Aho "Use of unmanned aerial vehicles for medical product transport" Article in journal of air medical transport April 2015

Mo ElSayed, Moataz Mohamed "UAV (Drone) delivery of medical supplies during covid-19 disruption: A white paper" March 2020

A. Josephin Arockia Dhivya, R.J. Hemalatha, T.R. Thamizhvani, Josline Elsa Joseph, Bincy Babu, R. Chandrasekaran "Medical Drone-A Life Saver in emergency situations"

2018, International Journal of Engineering and Technology.

Pragati Jain, Ashutosh Rai, Bobby Budhwani "Medicine Delivery Drone" August 2020, International Journal of Engineering Research and Technologies(IJERT).

X. Lyu, H. Gu, Y. Wang, Z. Li, S. Shen, and F. Zhang, "Design and implementation of a quadrotor tail-sitter vtol uav," in 2017 IEEE International Conference on Robotics and Automation (ICRA). IEEE, 2017(Accepted).

F. Zhang, X. Lyu, Y. Wang, H. Gu, and Z. Li, "Modeling and flight control simulation of a quadrotor tailsitter vtol uav," in AIAA Modeling and Simulation Technologies Conference, 2017, p. 1561.