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# Experimental analysis with UAV for Disaster Management

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**ABSTRACT:** All over world 4 billion people affected by disaster.. According to data from the United Nations Office for Disaster Risk Reduction, these staggering figures are the total economic and human impact of global disasters from 2002 to 2016. With a steady growth in annual disasters, especially climate-related ones, emergency management strategies are being put under the microscope. Disaster management technologies, on the other hand, have seen some remarkable breakthroughs in the past decade .Also in India in 2018 Kerala floods. From 8 August 2018, severe floods affected the south Indian state of Kerala, due to unusually high rainfall during the monsoon season. It was the worst flood in Kerala in nearly a century. Over 483 people died, and 14 are missing. Therefore for this we have developed a drone (uav) which can be useful in disaster management.

**Keywords:** Package dropping, flight control, UAV, Disaster management, dc motor, Lippo battery

## 1. INTRODUCTION:

Many disaster management protocols have been tested over the years. While many of these strategies have been successful, they also come with major hurdles. Time is the most important commodity in disaster response. so As debris and rubble piled up on the streets following the biggest natural disaster in the country since 1934, most of the roads were blocked, denying access to outlying areas. In situations like this where land access is off the table, government agencies are forced to deploy manned aircraft to continue immediate search and rescue, and later on, relief efforts. In theory, this sounds like a winner, but resource allocation. The response team had to move quickly. Given all these uncontrollable elements, it was not safe for the ground crew to investigate the scene. To make things worse, only 30 minutes of clear skies were left for helicopters to conduct an aerial survey – not enough time to gain an accurate account of what was happening on the ground. The team did, however, have a drone. The demand and desire for this type of technology to assist in emergency response is apparent as disaster response teams search for strategies to accomplish tasks easier and more efficiently.

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## 2. LITERATURE REVIEW:

Dispersion of natural fibers in the base matrix is called natural fiber reinforced polymer composites (NFRPC). The NFRPC have unique features different from synthetic fibers polymer composites. Due to their excellent physical and chemical characteristics they find wide application in enhancing strength of polymer composites.

J. S. Binoj et al. [1] explained about newly developed blue agave fiber composite (BAFC) material, which exhibit less weight, better mechanical and thermal properties compared with other natural fiber polyester composites. Conclusion drawn from this paper is, optimum weight percentage of dried agave fiber of high tensile strength with unsaturated polyester having distribution (polyester: agave fiber) (60:40) showed good result.

Somashekhar T. M. et al. [2] proved that the utilization of coconut shell powder and tamarind powder as reinforcement with epoxy matrix will increase load carrying capacity. This analysis shows that tensile strength of composite is increased by 50 percent with specific ratio of content in it. Good result was obtained for the following sample having distribution (Coconut shell powder (CSP): tamarind shell powder (TSP): epoxy) (50: 5: 45).

Asheesh Kumar et al. [3] stated that jute epoxy composite exhibited better tensile and compressive strength. Conclusion drawn is, bending strength is directly proportional to percentage of jute fiber in jute fiber epoxy composites.

Ramchandran M. et al. [4] stated significant result i.e. mechanical behavior of natural fiber polymeric composite (NFPC) having banana, bamboo, linen as reinforcement material in different proportion by performing impact, FTIR, hardness tests. The conclusion drawn from paper is

bamboo-banana natural composite with the distribution (epoxy: bamboo: banana) (90:5:5) showed good result as compared to others composites.

Jacob O. A. et al. [5] examined natural coconut shell fiber on the basis of hardness, tensile strength, impact strength. It has been stated that the effect of fiber/epoxy ratio and amine/epoxy ratio leads to increase tensile strength of coconut shell fiber reinforced polymer composites.

Alok Singh et al. [6] stated that the properties like tensile strength, flexural strength and density of coconut shell powder (CSP) epoxy composites was greatly influenced by CSP filled volume fraction. The conclusion drawn is final composite prepared with 20 percent to 30 percent of CSP fill volume fraction are suitable for optimum performance application.

M. Jawed et al. [7] stated the effect of woven jute fabrics on tensile and flexural properties of oil palm empty fruit bunches (EFB)/woven jute fabrics reinforced with epoxy composites resulted with good tensile strength. Conclusion drawn is the change in tensile strength of the epoxy composite varies with the change in stacking sequence of reinforcement material.

Punyapriya Mishra et al. [8] examined the properties of bagasse fiber reinforced polymer composites (BFRP) by conducting different tests. The conclusion drawn from paper is, abrasive wear rate of BFRP is strongly dependent on the size and orientation of fibers in polymer composites.

S. Harish et al. [9] carried out an experimental study on fiber of coconut coir obtained from outer shell or husk of coconut as reinforcement and epoxy resin as matrix. Conclusion drawn from this study is coir / epoxy composites exhibits average value of tensile strength, impact strength, and flexural strength.

M. A. Maleque et al. [10] proved that the tensile strength of pseudo-stem banana woven fabric reinforced epoxy composite is increased up to 90 percent compared to virgin epoxy. Conclusion drawn is the impact strength is increased by approximately 40 percent, which states that higher the impact strength leads to increase the toughness property of material.

## 3. METHODOLOGY:

In this paper an algorithm is evaluated to adjust the UAV route under changes in wind intensity and direction .It also able to deliver first aid kits during rescue operation. Dr. DG. Srinivasan developed quad copter UAV & package drop mechanism. Prof. Mainak Bhaumik helped us to calculate all the weight lifting and thrust calculations for (UAV)

Table No. 1

| Sr. No. | Part Name | Qty. |
|---|---|---|
| 1 | Motor | 4 |
| 2 | Electronic speed controller | 4 |
| 3 | Flight controller | 1 |
| 4 | Propeller | 4 |
| 5 | Frame | 1 |
| 6 | Servo motor | 1 |
| 7 | Soldering tools | 1 |
| 8 | Cable ties | 10 |
| 9 | Battery | 1 |
| 10 | Remote controller | 1 |

The methodology consists of mathematical calculation to analyze weight carrying capacity of one moderate weight brushless D.C. Motor to provide sufficient power to the system to fly. After analyzing of weight and load carrying calculations the next focus is to select no of motors required for the purpose of driving the drone and to deliver power to the servo motor and for the proper balancing of the system to fly in air without dropping down. Based on the material availability, the economy of the material, prototype model preparation, and actual set up construction with more durable and cost effective of. Unique drawing and design carried manually and finalized the model set up outer look and appearance. Remote control with the sensors selected and installed to serve the automatic operation for a wide range of operation. The fabrication of the structure set up, motor and servo motor mounting on the structure, fertilizer carrying mechanism has been made.

## 4. COMPONENT SELECTION AND CALCULATION:

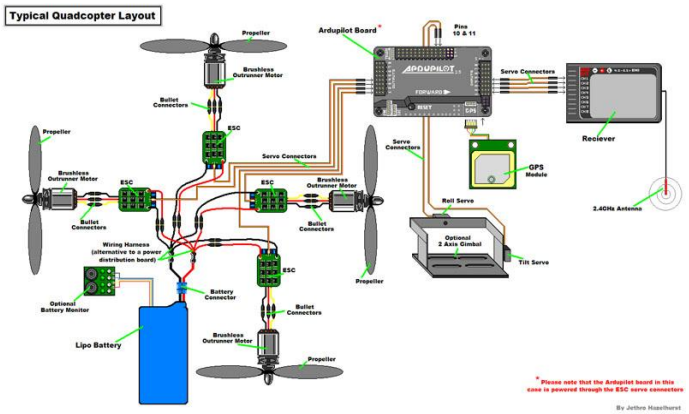


Fig. (a) Block diagram of connection

The above figure (a) shows the complete connection of brushless DC motor with lithium polymer (Lipo) battery , receiver through electrical speed controller (ESC).

**SELECTION OF BATTERY:**

One 1000 mAh lipo battery to provide power supply for motors


Fig. (b) Battery used

**SELECTION OF BRUSHLESS DC MOTOR:**

**TABLE 2**

| Model | Volts | KV | Max Pull | Weight | Motor size | Max Power | Esc(A) |
|---|---|---|---|---|---|---|---|
| D2826-6 | 7.4-11.1 V | 1000 | 960g | 50g | D27.7* 26 mm | 342 W | 40 A |
| D2826-10 | 7.4-11.1 V | 1000 | 780g | 50g | D27.7* 26 mm | 205 W | 40 A |
| D2826-13 | 7.4-11.1 V | 1000 | 660g | 50g | D27.7* 26 mm | 150 w | 40 A |

The above table 1 shows specification of brushless motors with respect to above parameters based on which the suitable motor is selected.

- Weight of complete drone setup(assumed) = 2 kg
- Thus thrust required by each motor to lift the drone = 500 grams
- Hence the most suitable motor for this model is 1000 Kv motor.

**SELECTION OF FRAME MATERIAL:**

Aluminum material is selected as frame material because of its lighter weight with density of 2800 kg/cm2.

**SELECTION OF CENTRE PLATE & BASE PLATE MATERIAL:**

Plywood of 5 mm thickness is selected

**SELECTION OF SPRAYER PUMP:**

Servo motor which is used for package release mechanism in unmanned aerial vehicle.

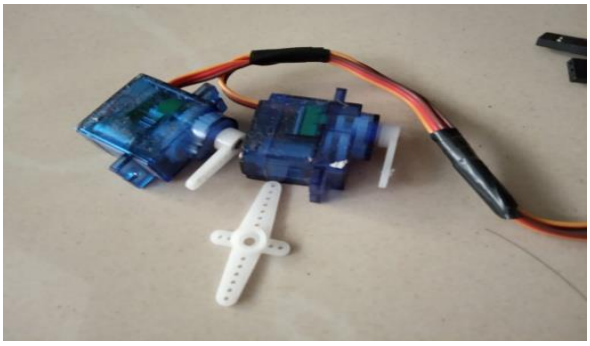

Fig (c): servo motor

**SELECTION OF PROPELLERS :**

For whichever multi-rotor frame chosen, note that there are specific propellers to install. Propellers have an influence on the speed of the drone.

Fig (d): Propeller Model

Logically, smaller propellers are said to be faster than the long propellers. But with regard to efficiency, the longer propellers emerge victorious.

**SELECTION OF FLIGHT CONTROLLERS :**

No drone is complete without flight controllers. They come integrated in a small circuit board that you should install on your frame.

Fig (e): Flying Control Circuit

You therefore have to check if your frame is fully

supportive of specific flight controllers. With these controllers, you will be able to issue commands of your drone after completion

**SELECTION OF MOTORS:**

The best motors are needed for the drone to start flying.


Fig (e): Motor used for flight.

They are controlled by the ESCs, and they, in turn, responsible for the rotation of propellers, thus enabling the drone to take off.

**SELECTION OF ELECTRONIC SPEED CONTROLLERS (ESCS) :**

As highlighted above, they are responsible for the functioning of the motors as they are directly connected to the flight controller. There's no way that your flight can function well without these electronic components.

**5. RESULTS AND DISCUSSION:**

In this project design, fabrication, calculation& experimentation of UAV for disaster management. We have practically completed by overcoming various difficulties. There are various parameters on which this project has completed. Total knowledge of project fabrication, design, mechanism development. Its applications drawback though we have knowledge of this practically .perfect decision of design and control of cost by moving all this difficulty we successfully completed it by now we can say that there is nothing difficult in this world if you are hardworking then you will definitely achieve success.

**6. CONCLUSIONS:**

This technology will help society to "If there is a distinctive path that modern technological change has followed, it is that technology goes where it has never been. The victims who are physically disabled to move from one place to another by using these technology packages can be delivered to them for first aid . Also this drone will be helpful in a place where there is hard to find workers. This method is in its initial stages, advancement of this technology will lead to improve the disaster management sector. Scope of this technology is to provide effective and efficient way to enhance the growth in uav for disaster management.

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