

UAV FOR MEDICAL EMERGENCIES: ORGAN TRANSPORT

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Abstract: An UAV is an Aerial vehicle that operates either manually or autonomously depending upon the requirement of the motion and precision in operation. UAV (Unmanned Aerial Vehicle). The central idea of this paper is defining the use of UAV newly. The contemporary application consists of aerial photography, surveillance etc. A UAV is an aerial vehicle that uses rotors (electrical motors) for lifting, steering, and stabilization. Unlike other aerial vehicles, the UAV can achieve vertical flight in a more stable condition. The UAV is not affected by the torque issues that a helicopter experiences due to the main rotor. Furthermore, due to the UAV's cyclic design, it is easier to construct and maintain. As the technology becomes more advanced and more accessible to the public, many engineers and researchers have started designing and implementing UAVs for different uses.

Keywords: UAV (Unmanned Aerial Vehicle)

I. INTRODUCTION

UAV are basically characterized as, manually operated and autonomously operated. Manually operated UAV's are those whose control operation is performed by the client or operator and Autonomous UAV's are those whose control is independent of the operator. Both of the mentioned types have certain pros and cons depending upon the area of application, precision of operation etc. Autonomous systems are machines and systems that are capable of performing a series of operations where the sequence is determined by the outcome of the previous operation or by reference to external circumstances that are monitored and measured within the system itself or the host. Various groups such as military, engineers, researchers and hobbyists etc. have been developing UAV to understand different technical areas. For example, UAV's can be used for reconnaissance and collecting data. This could range from searching for survival victims in disaster area to checking the state of electrical powerline etc. The main focus of this paper is to elucidate the use of UAV for transportation of vital organs such as heart and kidney and blood. During a medical emergency such as a heart transplant the patient has to be handled as soon as possible in such situations contemporary modes of transportation of such organs such as roads can lead to serious problems in metropolitan cities where traffic is a major issue, sometimes the patient cannot survive the surgery due to delay in the transplant. Hence using UAV's as transportation medium during such situations can seriously reduce the transportation time which is considered as a key factor in the survival of the patient.

II. LITERATURE REVIEW

1] Etienne Oehmichen:

Etienne Oehmichen was the first scientist who experimented with Rota craft designs in 1920s. Among the six designs he tried, his second multi copter had four and eight propellers, all driven by a single engine. The Oehmichen used a steel-tube frame, with two-bladed rotors at the end of four arms. The angle of these blades could be varied by warping. Five of the propellers, spinning in the horizontal plane, stabilized the machine laterally. Another propeller was mounted at the nose for steering. The remaining pair of propellers were for forward propulsion.

2] Convertawings Model a Quadrotor (1956) :

This unique helicopter was intended to be the prototype for a line of much larger civil and military quadrotor helicopters. The design featured two engines driving four rotors through a system of v belts. No tail rotor was needed and control was obtained by varying the thrust between rotors. Flown successfully many times in the mid-1950s, this helicopter proved the quadrotor design and it was also the first four-rotor helicopter to demonstrate successful forward flight. Due to a lack of orders for commercial or military versions however,

the project was terminated. Convert a wings proposed a Model E that would have a maximum weight of 42,000 lb (19 t) with a payload of 10,900 lb (4.9 t) over 300 miles and at up to 173 mph (278 km/h).

III. CONSTRUCTION AND PRINCIPLE OF OPERATION

The UAV's are of various configurations depending on the application. Basically they are classified as on the basis of number of motors used viz. quadcopter, hexacopter, octacopter for four, six and eight motors resp. Also they are classified on the basis of arrangement of motors viz. plus and cross configuration. In this paper the focused description is on quadcopter.

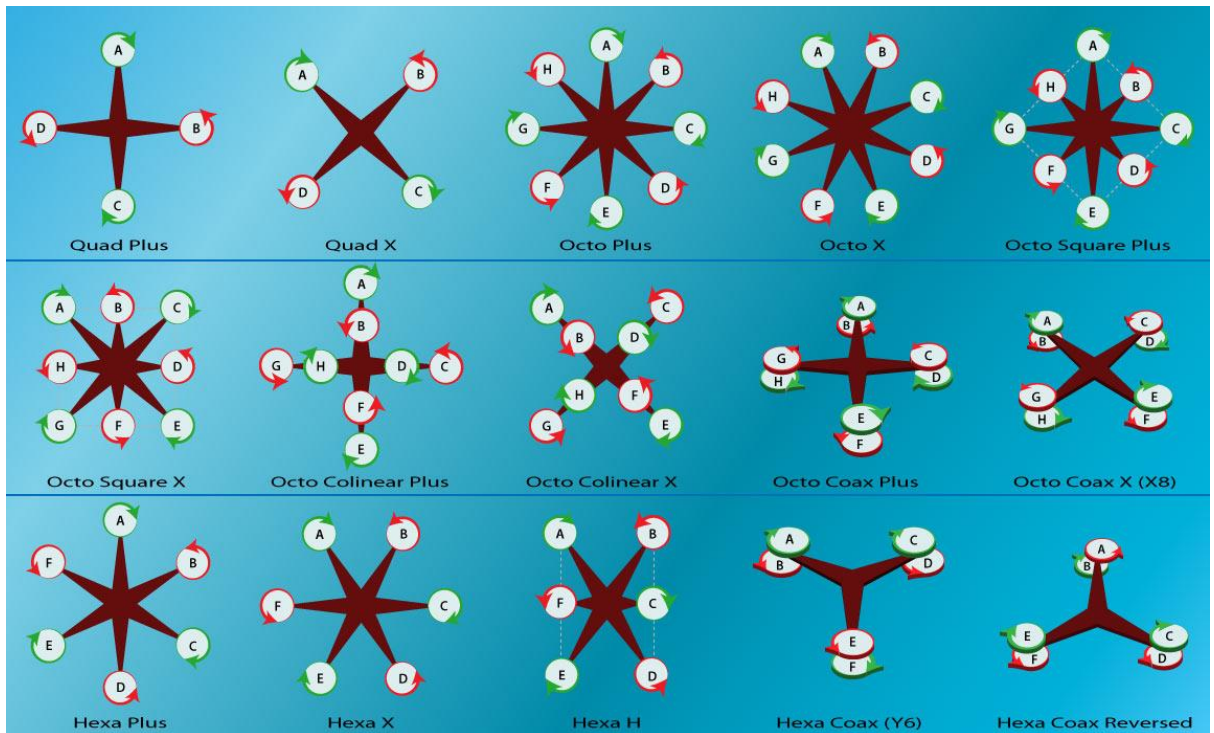


Figure1 : Various configuration of UAV's

Principle of working: The principle of working of any UAV's propeller is based on two principles those are Newton's Third law and Bernoulli's Principle.

- Bernoulli's principle states that, an increase in the speed of fluid occurs simultaneously with a decrease in pressure or decrease in the fluid's potential energy.
- Newton's third law states that, for any action there is an equal and opposite reaction.

An aerofoil of propeller is shaped so that air flows faster over the top than under the bottom. There is, therefore, a greater pressure below the aerofoil than above it. This difference in pressure produces the lift. Lift coefficient is a dimensionless number that relates lift generated by an aerodynamic body such as a wing or complete aircraft, the dynamic fluid flow pressure around the body, and a reference area associated with the body.

IV] TYPES OF UAV'S BASED ON MASS, RANGE, FLIGHT ALTITUDE, ENDURANCE.

Category name	Maas [kg]	Range [km]	Flight Altitude [m]	Endurance “e” [hours]
Micro	<5	<10	250	1
Mini	25/30/150	<10	150/250/300	<2
Close range	25-150	10-30	3000	2-4
Medium Range	50-250	30-70	3000	3-6
High alt. Long Endurance	>250	>70	>3000	>6

V] FOCUSED APPLICATIONS OF UAV

The present practices of UAV include Construction/surveying, Real estate photography, Video surveillance Photography, Toys etc. Access to healthy food and full medical support is a basic human right. The policies that affect our food and medical system should be enacted to ensure that everyone has access to these life support services. Mapping patterns of access to hospitals, medical centers using GPS is becoming more prevalent and increasingly effective. In India, major percentage of total population is living in rural areas and among them there are many villages that are inaccessible by road for at least part of the year. The only reasonably fast way of getting medicine and other essential supplies is to fly them in by military helicopters. Also many of the patient who are suggested to have a transplant die due delay in the delivery of the organ. The main motive of this paper is to elaborate the use of UAV for medical emergencies. Medical emergencies can come in many ways such as Organ transportation, blood transport, unconsciousness, stroke etc.



Figure 2: UAV Delivering Medical supplies and organ transport.

The main aim is to develop a low cost Drone which can be helpful for transportation of medical supplies. For example Consider a Quadcopter having 1.2-1.5 kg payload capacity can be used for transportation of Human Heart and Kidney. Weight of the cavity or box, weight of preservation fluids and cooling medium must be considered.

Category	Heart	Kidney
Weight [gms]	250-350	150-160
Dimensions	12*8*6 cm	13*7.5*2.5
Preservations time	6 hours	30 hours



Figure 3: Defibrillator

Some of the Future forecasters have also forecasted that in near future UAV's can be used as primary health care unit by the hospitals which can save many lives. These UAV's will carry a defibrillator – an apparatus used to control heart fibrillation by application of an electric current to the chest wall or heart. A Defibrillator arrangement can be made portable so that it can be arranged on a UAV which though will function similar to the actual defibrillator. There are three major components of a defibrillator that are a capacitor, an inductor, and a power supply. The interaction between these three components is what allows defibrillators to effectively restore proper cardiac rhythms.

VI CONCLUSION

Finally it can be predicted that UAV's are the future of medical services and has the ability to take it to a whole new level. With the help of GIS they can be transformed into data gathering tools. In India where most of the population lives in remote areas UAV can be considered as boon, by organ transportation no doubt UAV's will help to save many lives by reducing transportation time. This paper finally presents UAV's as more autonomous, reliable, economical and easier to use technology. And there is no doubt that UAV's has its applications to numerous problems and will surely contribute towards betterment of society.

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