MediSky for Drone Applications - A Conceptual View

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Abstract -In this paper, a conceptual view of a drone which could be used for medical applications in hazardous or hostile environments, where the humans are inaccessible is presented in a nut-shell, which can be extended for higher engineering applications.

Keywords –Drone, Application, Medicine.

I. Introduction

The principle objective or the reason for this paper is to build up a model of the automaton emergency vehicle to help the ambulances in sparing human lives by sending the prescriptions to the work environment where the influenced patients are available. A huge number of individuals bite the dust in view of rescue vehicle delays. The time taken by emergency vehicle to arrive at a patient relies a great deal upon the course and the traffic on the way.

At the point when a health related crisis happens, the reaction time can have a significant effect between an actual existence spared and a real existence lost. Lamentably, ambulances can stall out in rush hour gridlock and show up of late after the crisis call has been made, in which an unfortunate casualty may have endured a ton of wounds and can even lose his/her life. The utilization of Unmanned Aerial Vehicles (UAV) or "Automatons" has been utilized for quite a while for a wide range of uses.

System (UAS), as a sophisticated military technology or a hobbyist's tool for capturing images of foliage, sporting events, and cityscapes. But businesses across industries realize that drones have multiple commercial applications, some of which go beyond basic surveillance, photography, or videos, and they are already using them to transform daily work in some industries. Insurance companies are using drones to inspect damaged assets, for instance, and farmers are sending them to monitor crops and collect soil data. Even more dramatic changes could be in store as innovators explore new uses, including drone-delivery services for retail stores and air taxis for commuters.

The motivation behind this paper is to build up a model of automaton emergency vehicle to help the ambulances in sparing human lives. The emergency vehicle ramble enters the scene at the moment time and constant directions are given by the administrator. The automaton can gauge different continuous wellbeing parameters of the patient, for example, temperature, pulse and heartbeat. The estimations of these fundamental parameters are then transmitted to the specialists present in an emergency vehicle.

All things considered, the thought is to actualize the equivalent in the provincial zones where entrance of medicinal services is poor. The framework is being intended to take care of the newborn children and matured individuals in the quick moving urban lives. The work created right now with the outcomes demonstrated portrays the effectivity of the approach proposed.

Telecommunication drones are being used for diagnosis and treatment, perioperative evaluation, and tele-mentoring in remote areas. Drones have the potential to be reliable medical delivery platforms for microbiological and laboratory samples, pharmaceuticals, vaccines, emergency medical equipment, and patient transport. In this way, a large number of applications can be carried out like this way and used for various Bio-medical Engg. applications.

II. Highlights of the work

The main objective of building this model is to deliver the better and the faster medical facilities to all. Especially, quicker access to remote areas where healthcare penetration is severely poor. The system is capable of delivering the positive results in the critical circumstances where human penetration is impossible. Being an engineer and technology enthusiast, I desire of building such products where people are impacted directly. Other objective is to test my skills and work plan. Desire to help people for social well being is one of things I want to achieve.

I want to deliver my innovative ideas/products in the public domain to benefit them. The project delivers an idea of bringing up the medical/relief necessity in the case of emergency. This drone system powers the existing system to deliver the needs during natural calamities. Drone will be upgraded with some new components to make it more effective during night. The areas hit by natural calamities are often disconnected during the night and where humanreach out is nil. The penetration of the drone-crisis system would help in delivering the needs in the catastrophe situation. The main objective is to deliver the services to unreachable.

III. Background Review

The age of drones has arrived and now both autonomous driving AND autonomous flying are becoming more of a reality. Companies from new startups to established businesses like Google and Amazon are fighting for a piece of the sky, looking at best modes of incorporating drones into our lifestyle.

When a medical emergency takes place, the response time can make all the difference between a life saved and a life lost. With increase in population and the number of vehicles on the road, a lot of accidents occur, which leads to death of thousands of people every year. Now imagine an emergency requirement of an ambulance to a place where there is a slow-moving traffic or at times, traffic Jam. When there is a patient who is in an urgent need of the doctor's attention, there are chances that the patient might not survive the time that it takes for an ambulance to reach.

The biggest problem is that even if the ambulance goes to a location as close as a couple of miles, it might still take about 10-15 minutes for it to reach the patient or even more. These 10-15 minutes can be vital to decide whether or not, a victim will survive. Thus, it is necessary to introduce a distinct means that would take the objective of saving human life, one step closer.

A drone will take off from its base location, i.e. the ambulance and can be driven by human as well as with autopilot feature. The setup consists of 4-rotating motors each of 1000kv which are enough to produce a decent amount of thrust which help drones to reach at a good amount of altitude. Battery of 5400 maH, 11.1v provides a flight time of approximately 25-30 minutes.

The drone also consists of a GPS and a camera to increase accuracy in finding the patient's correct location. Whereas, the person in need will switch to its live location through a Smartphone featured application. Also, with the use of GPS and telemetry, the controller (service provider) can set the path to the destination.

The drone also comprises of various sensors which can measure patient's real time health parameters. These sensors include an ECG sensor and a heartbeat sensor. Once the drone is reached, the sensor will collect data and will convert them into electrical signals. These signals are then transmitted with the help of Wi-Fi enabled Arduino board, directly to the ambulance in the real time. The more in-depth detail will be provided in the coming sections. Furthermore, the project model aims to implement for organ transportation during organ transplantation.

IV. Medical Specialization

The use of drones to speed up emergency response time is ingenious because of their ability to bypass traffic and reach victims anywhere in a 4.6 square mile radius in 1 minute, thus cutting response time significantly. Moment claims that this drone could increase heart attack survival rates from 8 percent to 80 percent. A drone ambulance which is equipped with a medical box comprising of sensors such as temperature sensor, ECG sensor and heartbeat sensor which reaches the emergency spot earlier than the ambulance and not only measures the real time health parameters, but also transmits them to the ambulance.

The doctor present in the ambulance can analyze the real-time health parameters such as the condition of the heart, provided by the ECG sensor data. This enables them to prepare for the pre-medication to be given to the patient. If the condition is more critical, then the doctor can inform to the hospital well in advance to be ready for the next step in saving the patient's life. It also helps the doctor in the ambulance to come prepared by examining the patient's health parameters. This amongst other factors exemplifies how drones are a positive solution to existing problems in emergency medicine.

V. Designed Methodology

The development will require a lot mechanical, electronics and electricalengineering. Beginning with the structure of the drone, drone must be capable

oflifting heavy loads.The formula to carry out the calculations for payload weight,

$$\frac{2\,(wt.of\ drone + wt.to\ be\ lifted) + 0.2\,\{2(wt.of\ drone + wt.\ to\ be\ lifted)\}}{No.of\ electric\ motors}$$

Example:

Frame: 290g

Controller Board: 30g

Motor + Propeller: 215g

ESC: 32g

MPU 6050: 15g

9 DoF Board: 50 g (GxAxM)

Range Sensor: 8 g

GPS: 32g

Radio: 30g

Power Distribution Board: 28g

Battery: 425g

Total Wt: 1155g

Total Wt to be lifted: 445g

No. of Motors: 4 (1000 kv)

Note: Item weights used are taken from the different internet sources

Calculation:Implies that,

= 2(445+1155) + 0.2(2(445+1155))/4

= 2(1600) + 0.2(3200)/4

= 3840/4

= 960 gf/motor (Thrust created per motor) (9.4 N)

Well, a hexa-copter (6 arms) could be a better choice over a quadcopter for liftinga heavy payload. Although, a lot depends on motors.

VI. Proposed block diagram

The connection of drone module is carried out as follows in the following block-diagrammatic representation shown in the Fig. 1. The software module (flow-chart/algorithm) used for the control of the medical drone is depicted in the Fig. 2. The developmental stages consists of the following, viz., Well, ECG Sensors and other medical components will be embedded along the drone which will be further controlled by any of the MCUs.

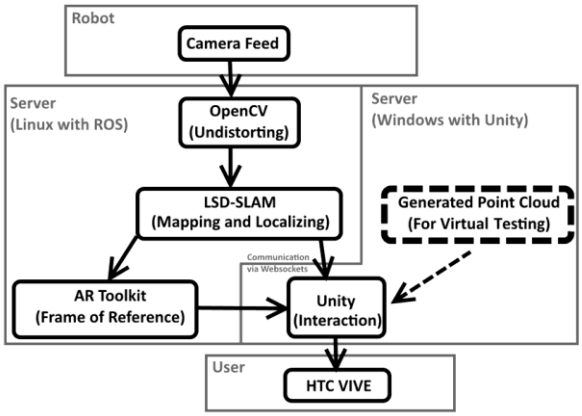


Fig. 1 : Block-diagrammatic representation of the medical drone

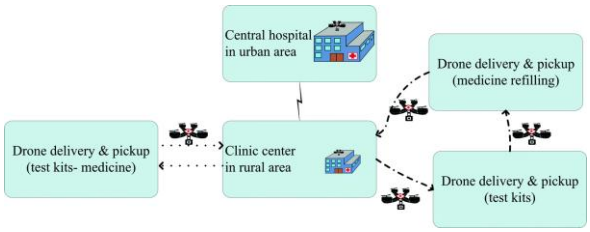
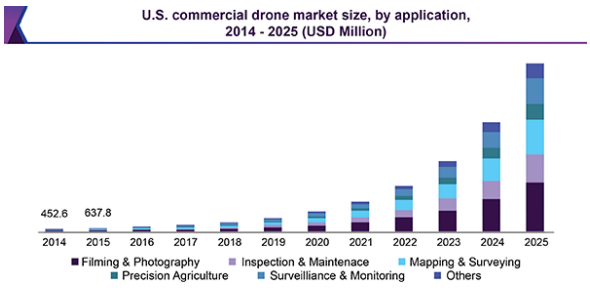


Fig. 2 : Software module (flow-chart/algorithm) used for the control of the medical drone

Fig. 3: Pictorial view of a drone doing a medical application



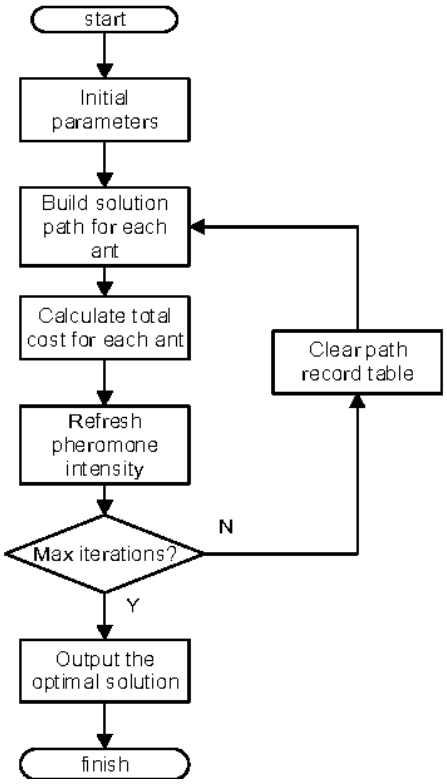


Fig. 4:Flow-chart of the drone applciation

VII. Conclusion

The framework will convey an exceptionally constructive outcome to the individuals out of luck. The framework is intended to assist the destitute with better clinical offices. All things considered, this framework covers all looked for old enough gathering. Medi-Sky covers country just as urban area. Cataclysmic circumstance don't cover a particular age gathering, pay levels or geology. The framework is being worked on and will bring the confirmed outcomes and help many individuals. The point is to structure an automaton conveying the clinical applications. These clinical applications will assist with profiting the penniless.

In this day and age, there is a great deal of traffic on streets which prompts blockage in the entire city. Along these lines, in the hour of crisis emergency circumstance, a rescue vehicle which voyages through street will most likely be unable to arrive at the goal in time and the patient may lose their life. Subsequently, it is important to present an unmistakable implies that would take the goal of sparing human life one bit nearer. An automaton or a quad copter takes airborne course and isn't driven by human. Utilizing increasingly number of engines and propellers will deliver more push, this is the fundamental feature of the work.

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