



Drone Ambulance

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ABSTRACT

The purpose of this paper is to develop a prototype of drone ambulance to assist the ambulances in saving human lives. According to a study conducted by the Centre for Science and Environment (CSE), traffic in its 'peak hours' on an average does not exceed 30-40 km/h 92% of the times. In existing systems, a drone carries only the defibrillator to the emergency spot. Thus, it takes into account only a single parameter. This paper aims at developing a system that would be able to fly to the emergency spot earlier than ambulance and take into account multiple real time health parameters of the patient such as temperature, heart rate and heartbeat. The values of these essential parameters are then transmitted to the ambulance. For this purpose, IEEE 802.15.4 Zigbee is used. The range of the drone ambulance is approximately 500m and the range of Zigbee which is 2.4GHz is 10-20m. This helps the doctor to evaluate the situation better. The experimental results of the measured parameters are observed and presented.

INTRODUCTION

In today's world, there is a lot of traffic on roads which leads to congestion in the whole city. So in the time of emergency crisis situation, an ambulance which travels via road may not be able to reach the destination in time and the patient might lose his or her life. Thus, it is necessary to introduce a distinct means that would take the objective of „saving human life“ one step closer. A drone or a quadcopter takes aerial route and is not driven by human. Using more number of motors and propellers will produce more thrust. The quadcopter which consists of four BLDC motors and propellers attached to it makes it the optimal design and provides the necessary thrust. Four 2200mAh batteries provide power supply to the drone. The drone comprises of a medbox which is capable of reaching emergency situations faster than the ambulance and can measure patient's real time health parameters. The various sensors in this prototype comprises of heartbeat sensor, temperature sensor, and ECG sensor. An ECG Sensor with disposable electrodes is attached directly to the chest to detect every heart beat. The electrodes convert heartbeat to electrical signal and thus ECG Sensors are able to measure continuous heart beat and gives data of heart rate. The temperature of the patient 's body is detected by the temperature sensor. The heartbeat or the pulse rate sensor is used to detect the number of heart beats per minute of the patient. The ZIGBEE technology is used to transmit the real time data from the emergency situation spot to the ambulance which is enroute to the destination. The Zigbee mechanism is simpler and less costly than Wi-Fi system.

Literature review

Pulsiri and Vatananan-Thesenvitz (2018a) On the other hand, the world also faces many challenges in healthcare including aging societies, persons with disabilities, natural disasters, new diseases, urbanization, and global warming

Pulsiri et al. (2019b) Medical drone can be flown to deliver medical supplies such as automated external defibrillators (AED), red-blood cells, medicine, or vaccines, to save emergency patients in remote areas

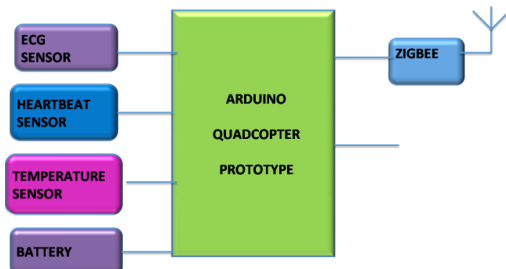
Chuang et al. (2018) Thus, the implementation of medical drone for EMS can assist EMS personnel by rapidly delivering medical supplies directly to patients or taking on-sight images prior to the arrival of ground ambulance, which could increase the survival rate

Bitar et al. (2017) Thus, only a handful of policy makers understand the state of the art let alone passing legislation to incorporate the technology into current EMS. Henceforth, this paper aims to review the current scientific research on drones in EMS through a systematic literature review with bibliometric analysis. A Software, VOSviewer, is employed for analyzing publications from SCOPUS databases over the past five years span.

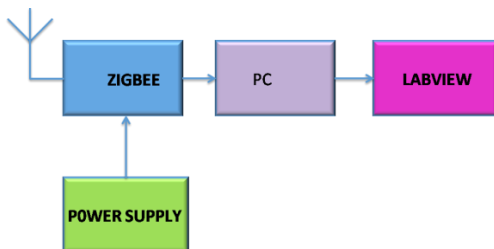
Existing System

In a situation of myocardial crisis, a hospital drone can be used for supplying defibrillator. At remote locations, an emergency air ambulance can serve as a drug delivery system in emergency situations. People suffering from respiratory syndrome can be provided with the drone which carries oxygen supply to them. The existing systems take into account only a single parameter.

System Block Diagram



Block diagram of Transmitter



Block diagram of Receiver

Hardware Module Description

The transmitter consists of an Arduino based Quadcopter prototype to which various sensors would be attached in order to measure or collect the specific data. The receiver would be able to receive the data collected through Zigbee technology and then the data collected would be shown on the computer screen in the ambulance using the LabVIEW software.



Quadcopter model

Advantages

- Drones can help us with delivery

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- Drones can help us with dangerous tasks
 - Can help to explore areas without having to be present in person
 - Can be used to solve conflicts
 - Drones can be used in agriculture
 - May be helpful for cloud seeding

Disadvantages

- Drones may pose a danger to aircraft
- Drones may be a risk to the general public
- Flying drones needs some practice
- Drones may not be allowed in certain areas
- Opponents of drones often claim that they are not safe
- Drones for private persons can be costly
- Use of drones is hard to control in an international context

Applications

Some of the most common commercial applications Drones are:

- Aerial Photography & Videography.
- Real estate photography.
- Mapping & Surveying.
- Asset Inspection.
- Payload carrying.
- Agriculture.
- Bird Control.
- Crop spraying.

RESULTS

The development of the quadcopter was done and a med box was installed at the base of the quadcopter. The drone was able to fly within the specified range. The real time health parameters of the patient which are transmitted by zigbee are observed in the Labview Software and those results and graphs are presented below.

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