Medical Drone – A Life Saver in Emergency Situations

A.Josephin Arockia Dhivya*, R.J. Hemalatha[2], T.R.Thamizhvani[3],Josline Elsa Joseph[4], Bincy Babu[5], R.Chandrasekaran[6]

*Department of Biomedical Engineering, Vels Institute of Science,Technology and Advanced Studies
,Pallavaram, Chennai-600117, India
Corresponding author E-mail: a.dhivya.se@velsuniv.ac.in

Abstract

Many thousands of humans are dying day to day due to the delay of ambulances reaching the accident spot at right time.So this prototype explains clearly about the emergent situation of a drone reaching the accident scenario with various sensors.The usage of this technology gradually decreases the fatal cases.It is used to save time and helps in patient's survival.The technology works such like different types of sensors are fitted to the health drone.When a phone call is given to a prescribed given number,the operator thereby tracks the location and the navigation of the place is tracked using global positioning system.The medical quadcopter or drone arrives at the critical situation and various modes of parameters from the body are measured.This prototype gives the information of the patient to both the hospital sources and the nurses present in the normal ambulance.This flying medical drone reach the spot before the normal ambulance arrives the scene.It also measures the real time actual situation of the patient and it helps in saving a life of a patient.The information regarding the patients health parameters will be sent to concerned hospital staffs and to the respective staffs coming in the ambulance. This helps the paramedics and the doctors to know about the patient's condition before arriving the spot.This medical drone acts as a tool kit which flies to various emergency Situation. ambulance and the hospital team so that they will be ready to serve to the needs of the patients.The proposed prototype model is used as a support the persons who need immediate attention.

Keywords: drones;emergency;lifesaver;patients;survival;variable sensors 3

1. Introduction

A medical drone is used as a life saver for many patients in critical situations.It is a drone which is not controlled by humans.To handle emergency situations medical drones are introduced[1].Medical drones are life saving equipment which consists of precise medical sensors to measure the real time body parameters.The measured parameters are then transmitted to the clinicians in the heathcare and to the staffs coming to the accident spot in ambulance[2].Using the motors fitted to the drone it is able to fly to different places to help the victims at critical situations.Here brushless type motors are used to drive the copter.Various types of medical sensors such as ECG sensor,stress sensor, The best way to use the drone is using it with the required number of brushless motors.Electrical energy source is used to drive the drone.This proposed medical drone is well equipped with various medical sensors[3].It is used to fly to emergency situations and it is used to measure the victims health parameters.The sensors we use are heartbeat sensor which is used to indicate the accurate heart beat value of the victim.Temperature sensor is used to determine the present body condition of the patient.Stress sensor is used to indicate the amout of respiration rate of the patient.Zigbee module is used to transmit the data.Zigbee module is preferred due to low cost when compared to wifi and Bluetooth. The drone is fixed with a mini health monitoring kit which is used to transmit the health datas to the clinic doctors and to the hosplital staffs coming in the ambulatory service[4].The parameters which is transmitted are real time parameters. It gradually reduces the number of death cases.This has a advantage of multi parameter monitoring.At a

estimated time limit,the parameters will be transmitted. It is a effective process implemented to save human lives. It is used in urgent situations.This technique is used to survive many patients.It is a easy method to implement.It is portable.It is used for caring patients[5].Health care is provided in developing countries. Implemented in disaster areas.Probably designed for caring public.

2.Existing methods

Josefin Lennartsson , stated that "A drone associated with hospital which is fitted with a defibrillator is used to fly to emergency situations for helping victims suffering from myocardial infarction[6].It is used in a emergency disaster areas to deliver drugs,vaccines and medical supplies.A medical quadcopter which is equipped with oxygen cylinder to relieve from respiration diseases.It is basically used to supply oxygen.The existing methods are only used to measure one parameter.Due to ability of measuring one parameter,it is not able to measure many parameters.The measured health parameters will be intimated to the clinicians immediately.

3.Proposed System

The proposed prototype is using GPS module to navigate the victim's location.GSM module is used to send the measured health parameters every minute and the values will be sent to the doctors.ZIGBEE module is used to transmit the measured health parameters.This information will help the doctors to take treat the

patients in time.The intimated health parameters will help to track the patients current condition.
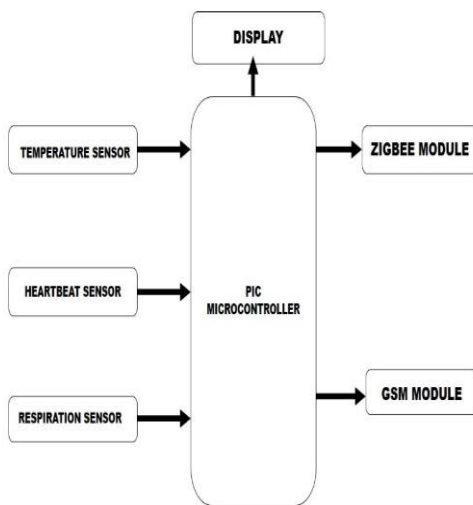
4.Materials and Methods

Fig.1.Block diagram of patient monitoring system

4.1 PIC microcontroller

PIC 16FB77A microcontroller is preferred in this project to enhance the working of the model.It has probably 40 pins.In our project,we use PIC 16FB77A which has 40 pins.Due to fast efficiency and power consumption it is preferable to use.

4.2Temperature sensor

LM-35 is used to estimate the health condition of the patient.It is practically possible to implement the method.The temperature sensor which we use is LM-35.Experimentally his type is widely used for experimental purpose.The basic temperature of a human body is 37 degree Celsius.Hyperthermia is a condition which results in increase in temperature. It causes loss of appetite and fever.

4.3Respiration Sensor

A healthy adult have 11-20 breaths per minute.It has a belt like structure and it will be worn around the victims chest.It comprises of a rubber cord where the amount of breaths can be calculated by the resistance change.

4.4Heartbeat Sensor

By the rate of expansion and contraction we can determine the rate of heart beat.A heart beat sensor comprises of a probe where the finger is placed.
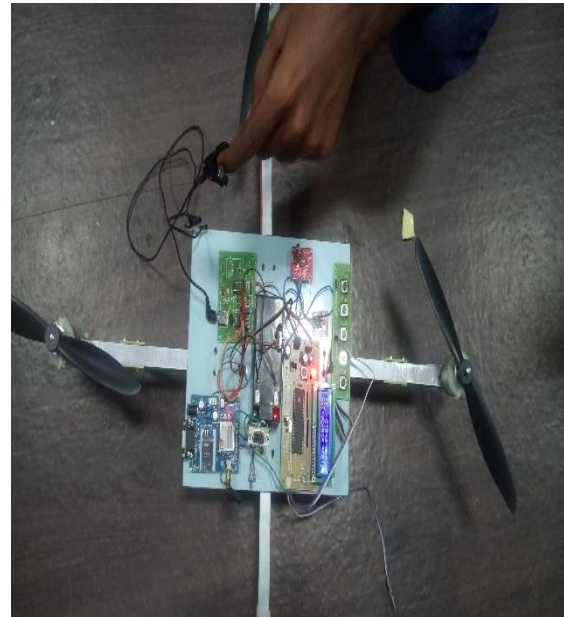

Fig.2.Schematic Diagram Of A Heartbeat Sensor

A LED light is glown when the heart beat is measured.A average individual has a heart beat ranging from 65-100 beats per minuteThe output will be indicated in the LCD display.

5.Medical Drone

Nowadays healthcare is trending a lot with the innovation of drones[4].The multi monitoring kit is embedded into the drone .The victim's location is tracked by GPS module.GSM module is used to send messages regarding the real ime parameters measured.Zigbee block is used for transferringthe data.The tracking happens when the phone calls comes to the hospital from the accident spot.The medical copter acts as a assistant ambulance to the hospital ambulance[7].The patients real time parameters are measured and then they are sent to the concerned clinicians accordingly.Therefore medical drones are specially designed to help the public people.Regular ambulance which will be on the way reaching the scenario.These information will be sent to the concerned workers in hospitals using GSM module.

6.Results

The mentioned results are the parameters which was taken from the health care volunteers.The parameters measured from the health volunteers are their body temperature,respiration rate and heart beat sensor.In heart beat sensor, a clip will be present and the subject 's finger is placed[8].Then the heart rate of the individual is measured.For measuring the accurate body temperature of the subject the subject finger should be placed in LM -35 sensor.Respiration sensor has a belt which is embedded in a circular form and it represents the amount of breaths per minute[9].The measured values will be indicated in the LCD kit which is attached with the drone.

Table I. Tabular column of measured parameters

Subject	Heart (bpm)	Body Temperature (^{0}C)	Breath (breath Per min)	Status Of the subject
1	71	39	12	Normal
2	68	38	13	Normal
3	66	35	10	Partially normal
4	60	39	10	Abnormal
5	68	37	12	Normal

The values extracted from the patients seems to be the patient is in a normal condition. A healthy adult have a heart beat ranging from 66-72 beats per minute.Temperature of a healthy adult ranges from 33^0C to 39^0C.

References

[1] Albulbul.A and A. Chan, "Electrode-skin impedance changes due to an externally applied force" , IEEE , pp. 1–4, May 2012.

[2] Darshana Varma, Virendra Shete, Sunil Somani,"Real Time Self Health Monitoring System", International Journal of Innovative Research in Computer and Communication Engineering(IJIRCCE), Vol. 3, Issue 6, June 2015.

[3] Farin, N. , Sharif, S. and Mobin, I, "An Intelligent Sensor Based System for Real Time Heart Rate Monitoring"(HRM), Intelligent Control and Automation, 7, 55-62,May 2016.

[4] Dr.Firat Güder,Dr. Alar Ainla,Julia Redston,Prof. Bobak Mosadegh,Dr. Ana Glavan,T. J. Martin,Prof. George M. Whitesides ,"Paper-Based Electrical Respiration Sensor" Issue 19 , Pages 5727–5732, May 4, 2016.

[5] Josefin Lennartsson,"Strategic Placement of Ambulance Drones for Delivering Defibrillators to out of Hospital Cardiac Arrest Victims",2015.

[6] Mr. Kalpesh N. Shah, Mr. Bala J. Dutt, Hardik Modh, "Quadrotor – An Unmanned Aerial Vehicle", International Journal Of Engineering Development And Research (IJEDR),   Volume 2, Issue 1, 2014.

[7] Mohamed Fezari, Mounir Bousbia Salah, and Mouldi Bedda, "Microcontroller Based Heart Rate Monitor", The International Arab Journal of Information Technology, Vol. 5, No. 4, October 2008.

[8] Nemati.A and M. Kumar 2014, "Modelling and control of a Single Axis Tilting Quadcopter", American Control Conference (ACC) , June 4-6, 2014.

[9] Shanmugasundaram.M,G Muthuselvi,S Sundar, "Implementation of PIC16F877A Based Intelligent Smart Home System" , International Journal Of Engineering And technology(IJET),Vol5,Issue 2,Apr-May 2013