

IoT Based Wing Commander Pilot Emergency Live Tracking and ECG Monitoring Wrist Band

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ABSTRACT

In recent days the measuring of biological signal during trauma cases in remote areas for medical applications is difficult. In order to save this kind of peoples, this system needs to bring importance of Internet of Things (IOT) insight to save the human life during trauma (emergency) cases in remote areas where less availability of transportation. This IOT based monitoring system consists of microcontrollers integrated with Android (Webpage) applications to access the internet for acquiring and measurement of ECG signal parameters, body temperature, humidity and live tracking GPS system and this system process the acquired signals from various sensors. And, this system send the processed signals to cloud storage over the internet to make an alert for asking rescue. So, there is a need of low cost, portable, low power and time saving ECG monitoring system helps to finding of such person in abnormal condition by using live tracking system in emergency situation.

Keywords :— ECG, Arduino, ESP, Sensors and Internet Of Things.

I. INTRODUCTION

The cardiovascular abnormality is one of the reason for largest causes of death among the peoples all over the world especially for the old age peoples in remote areas. So, many researches are going for live and continuous monitoring of patient on Internet of Things (IoT) between healthcare professionals and patient or users to exchange their biological signals data over the internet. This type of IoT system decrease the sudden causes of death.

Hence, this paper makes a huge attempt for hospitals or rescue team in military based applications to implements the IoT based monitoring system which helpful for continuous monitoring of a person in remote areas where less availability of transportation or in high altitude areas.

Here, this system uses Arduino and ESP8226 as microcontroller to acquire the biological signals like ECG, body temperature, body humidity and GPS signals of a person by using different sensors. Then microcontroller process the acquired signals from sensors and send the data to webpage application and cloud storage over the internet for user's interface.

The advantage of this system is wearable and portable monitoring system which is low cost of device for acquiring the basic information of biological system and also live tracking of a person. However, the best of our knowledge, the existing system for patient monitoring system cannot interface with smartphones. Hence, this system of compactable size and low power can do complex tasks those are in existing devices.

II. EXPERIMENTAL DESCRIPTION

A. Hardware Setup

In this project used Arduino UNO and ESP8266 as microcontroller. Arduino UNO operating voltage of 5 volt and operating frequency is 16MHz. This controller has 20 I/O pins. The temperature and humidity sensor DHT11 is connected to digital I/O pin of 7 and the pulse sensor is connected to analog pin of A0.

ESP8226 controller operating voltage is 5 volt and operating frequency is 80 MHz. This controller has 17 GPIO. The Tiny GPS module is connected to D2, D3 pins. The AD8232 ECG module is connected to analog pin A0. The Arduino and ESP8266 is interconnected through transmitter (Tx) and Receiver (Rx) pins.

B. An Objective of the project

The main work of this project is acquiring of biological signal from various sensors and those sensors data are send to cloud storage. The sensors like DHT11, Pulse Sensor and AD8232 module are placed in appropriate surface of the body and Tiny GPS module is connected to controller with supply voltage. The sensor signals are acquired and processed in controller. Then, processed signals are send to webpage application by using URL of webpage and cloud storage by using internet in ESP8266 MCU.

Fig 3. Pulse Sensor

III. HARDWARE DESCRIPTION

A. A Block Diagram of circuit design

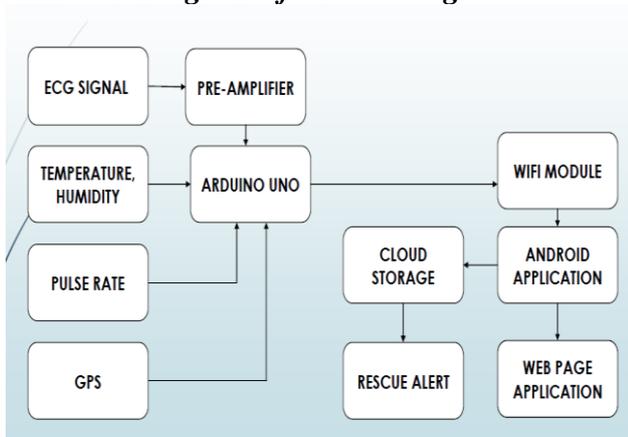


Fig 1. Block Diagram of monitoring system

B. Temperature Measurement Description

The principle of temperature measurement, it calculates the temperature by negative temperature coefficient which means that the temperature increases the resistive of the material decreases. The humidity sensing component of the DHT11 is a moisture holding substrate made up of ceramics electrode, due to this electrical resistance of material changes.

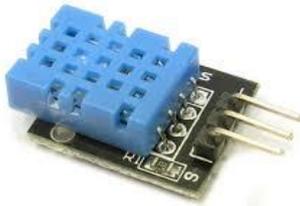


Fig 2. DHT11 Sensor

C. Pulse Detector

The pulse sensor consists of light emitting diode and a light detector which is like a light dependent resistor. The amount of light absorbed at detector is depend upon the heart beat pulses causes the variation of blood flow in that tissue region.



D. Global Positioning System

The working and operation of Global Positioning System is based on the mathematical principle of 'Trilateration'. The GPS system uses three or four satellites from above the earth to get the exact location. The GPS receiver gets a signal from each satellite from the network of satellites.

E. ECG Module working

The AD8232 ECG sensor is a small IC unit and it is used to measure the electrical signal of the heart. These electrical activity is generated by depolarization of heart muscles. ECG electrodes needs conductive gel between the skin and the electrode to increase the electrical conductivity.

Normally, the ECG signal is in range of few milliseconds. Hence, AD8232 internally consists of pre-amplifier circuit to amplifies ECG signal and remove the noise by using the low pass filter.



Fig 4. AD8232 ECG Sensor

IV. SOFTWARE DESCRIPTION

A. Arduino IDE

The program developed in Arduino IDE V.1.8.5 software by using set of C/C++ languages. Arduino is an open source tool software for the development of embedded application and it is an integrated development toolset for programming the Arduino. Its construction of software is easy to use to program for developing embedded application.

Arduino microcontroller and ESP8266 microcontroller is a 16 bit processor chipset and it can be widely used for numerous development of embedded applications. Arduino IDE consists of many third part libraries for interfacing numerous embedded system. This software consists of Serial monitor and Serial plotter to see and plot the values which are available in serial transmitter of microcontroller.

B. Webpage Application

A webpage application is a computer program that utilizes web technology and web browser to perform the numerous application over the internet connection. In this project, the

webpage application is created by using IP address of ESP8266 MCU. This webpage application can open in any browser.

This webpage/single page application has lot of improve performance features like loading time, easy to interface any external system, easy to navigate pages etc.

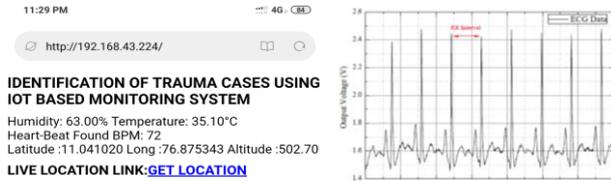


Fig 5. Webpage application.

C. CLOUD STORAGE USAGE

Instead of storing the information in your system storage device of hard disk or any other local available storage device. Then, the information is stored in remote database. The internet is made connection between the computer and the remote database storage. There are many advantages using the cloud storage over using the traditional storage.

In this project Ubidots is used as remote database for storing the various sensors data. Ubidots stack of memory provides the secure communication and storage of data between the user system and remote database. By using these remote storage, store the sensor values like temperature, humidity, pulse rate, GPS and ECG signals. And these type of storage can be access any time to read the data values and these IoT visualize company provides additional wizards to plot the data values to get a chart format of sensor values at different time period. These can helpful to get the past values of sensors and can compare with new values to get the performance of a system.

V. RESULT AND DISCUSSION

We acquired the various biological values like temperature, humidity, pulse rate, ECG signal of a person and the GPS signals to find the live location of a person. Then, these data are processed and send the values to webpage and remote database storage. The values are taken at different time period and store the values at remote database in Ubidots IoT. These, data storage shows the health monitoring of a person which helps to analyses the health condition of a person.

The result of this project is at accepted. By using these system, depend upon the value of ECG signal shows the person health condition of a person. If a person ECG signal is not at expected value and then, these system makes an alert to

other user like healthcare professional or military based rescue application to ask for providing the rescue team. This type of IoT based monitoring system is helpful for a person like old age person, person at remote areas where less availability of transportation or a person high altitude regions by continuous health monitoring of a person.



Fig 5. Humidity data display in remote database.

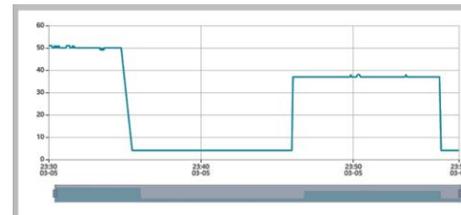


Fig 6. Temperature data display in remote database.

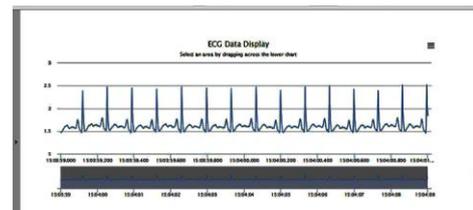


Fig 7. ECG data display in remote database.

VI. CONCLUSION

The effective cardiac abnormality of heart detection system is proposed in these project. This system helps to reduce the sudden death of a person during cardiac arrest. This type of sudden death of a person can be avoided since the system will notify the healthcare professional with ECG report. In this project

The effective cardiac abnormality of heart detection system is proposed in these project. This system helps to reduce the sudden death of a person during cardiac arrest. In this project, microcontroller was integrated to acquire the various signals from various sensors and plot the real time sensor values on webpage application. And, it can send the data to concerned physician or healthcare professional via internet for health decision for treatment analysis. These proposed system is very helpful and it can be used comfortably by user during daily activities and also at emergency situation.

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