Development of IoT based Emergency Rescue Life Hacking Band for Human Safety

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Abstract

This paper presents an IOT based health band which can be used as an emergency rescue measure for human safety. The main objectives are to ensure better health monitoring of human and timely reach of patients to the hospitals. IOT is the emerging trend in the network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices. Whenever any unhealthy condition is recognized then this proposed system will send the information to concerned hospitals and relatives. Thus the system will help in saving human lives by ensuring proper health monitoring and data transmission.

Keyword- IOT, Pulse Sensor Cloud Storage, Arduino, GPS and GSM Module, Zigbee

I. INTRODUCTION

Health is a state of complete mental, physical and social well-being and not merely the absence of any disease. But at present due to modern lifestyle, such a condition is hard to have. As a result even at younger ages people are facing different unhealthy conditions.

Nowadays it is seen that many deaths are caused due to the inability to reach nearby hospitals on time. At emergency situations such as accidents, heart dis-function or sudden pressure variations etc., the patient has to be taken to hospital as soon as possible. If they are not treated on time, there is more chance to cause their lives. So our proposed project helps to get rid of this situation. The proposed band will act immediately at these situations by informing about the condition of the patient to nearby ambulance and hospital.

In the existing health monitoring system only the data monitoring part is active. Such systems consists of different sensors which monitor the health parameter. But for a proper health monitoring system the data has to be monitored, analyzed and further it has to be transferred to ensure safety of the individual.

Our proposed system focuses on the application of IOT in health care. The system consists of a smart health band mounted with pulse sensor. This band is used for live monitoring and analysis of the mentioned health parameters. The patient's health status and location will be made send to the intended hospitals and person such as doctors or family members, using GPS navigation. After getting exact location of the patient, necessary action can be performed for proper treatment.

II. LITERATURE SURVEY

The need for such an electronic gadget to sense and monitor human pulse rate sparked from the news and articles relating to death caused due to heart diseases. The major reason for major deaths caused today is due to heart attack followed by accidents. If a person is suffering a heart attack but it is not noticed by someone, or if noticed after a delay, can lead to fatal incidents and even can cause his life. The only solution to get rid of such situation option is to monitor human body constantly. The heart rate or the pulse rate is one of the major parameter enhancing the health condition of a human body.

At present the pulse rate or is monitored using ECG machines in hospitals. The machine consists of several sensing nodes that are to be pasted on chest and are usable only once. Then there are wires that connect the sensing nodes with dedicated computing machines. The whole setup is large in size, more complex and costly. Also, one must always be in a room in order to be monitored by these dedicated machines constantly.

Muhammad Zubair, Changwoo Yoon Dept. of information and communication networks, Korea University of Science & Technology have published a paper titled "Smart Wearable Band For Stress Detection"[1]. This paper draws attention towards the need of an electronic gadget to detect mental stress of human being using skin conduction. Variation in skin conductance is in relation with sweat secretion. When a person is under stress, this stress puts the sympathetic nervous system into actions. Since sweat glands are controlled by sympathetic nervous system so it activates the activity of the sweat glands. Sweat secretion from sweat glands reduce the skin resistance and increase the skin conductance level. Thus skin conductance acts as indicator for sympathetic activation due to stress reaction and can be used for stress measurement.

Similar study was done by T. Elakkiya and published a paper titled "Wearable safety wristband device for elderly health monitoring with fall detect and heart attack alarm," 2017 Third International Conference on Science Technology Engineering & Management. In this paper they presented the importance of heart rate monitoring especially for the elderly people. And also they have introduced the concept of NFC technology. [2]

III. METHODOLOGY

A. System Architecture

This health band consists of Arduino Uno, pulse sensor and Wi-Fi module which is altogether mounted on a Velcro Tape. This system is a four level architecture, which consists of pulse sensor module, cloud module and communication module (GSM) and android application module. Fig.1 gives a diagrammatic overview of the system.

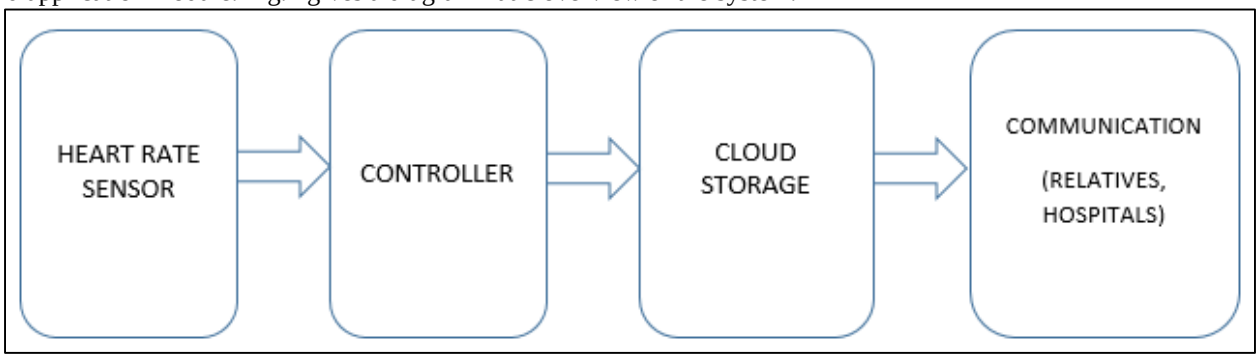

Fig. 1: Four level Architecture of the system

Each level performs the exact necessary task whereas the first level sensing module consists of pulse sensor which continuously sense the heart rate. The second level is the controller level using Arduino UNO where the sensed values from the pulse sensor are taken. In this level the sensed data is used for analysis and other calculations.

The use of accelerometer sensor will help to identify whether the body was in motion or stationary. Along with the pulse data the output of the accelerometer is also fed into the control device (PIC IC). In order to identify whether the body is in motion, a series of accelerometer output data is considered during the analysis.

ADXL335 three axis accelerometer is used which is having three analog read pin,so that the data from the sensor can be analysed and the motion of the body can be manipulated. The heart beat may vary from the normal range to a higher value or to a lower value. This increase in rate could happen in both usual and unusual cases, like climbing staircase, running, during exercise, during mental stress etc. For example while running, the drastic change in heart rate is identified and then the data from the accelerometer is also checked. If the x ,y,z axis output from accelerometer is varied continuously for a certain period of time then it is interpreted as safe condition.

The third level is the cloud module consisting of cloud where the complete data from the sensor is stored. It uses Wi-Fi module to connect to the internet and to create a communication with the intended cloud platform. This data can be accessed by the doctors and intended parties to analyse the body condition of the patient without any further check-up.

The fourth level is the communication section. Whenever the data interpreted in the controller is identified wrong then the communication level gets activated. This module focuses on sending the collected values to the intended hospitals, machine, relatives and other emergency numbers.

IV. EXPERIMENTAL SETUP

The proposed health band consists of pulse sensor, accelerometer, display unit, controller, zigbee module and battery which are assembled to a single unit by using a velcro strap.

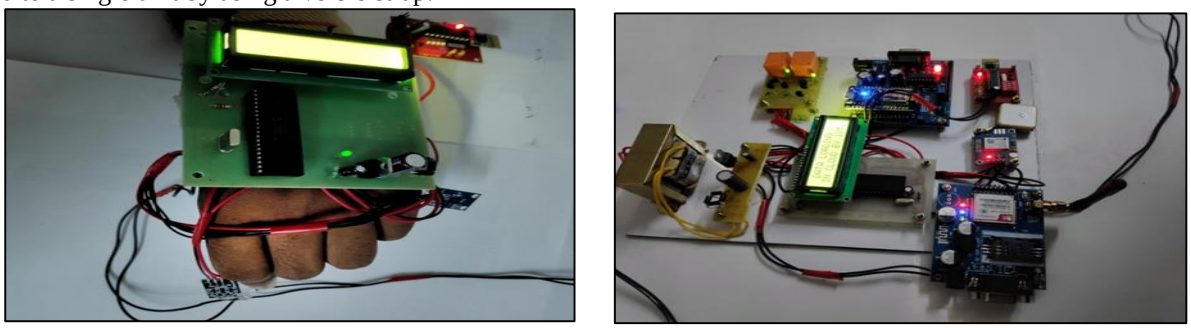

Fig. 2: Wrist band and the control unit

The sensor output is connected to the arduino uno where the analysis and processing of monitored data occurs. Zigbee module is used in both parts of the system. From the band the data is transferred to the control unit with two zigbee units in both ends. The received data is then fetched by the PIC controller IC where the ideal conditions are programmed. Along with this the data is send to the cloud storage using the Wi-Fi module. This system is now sewn to the Velcro Tape.

V. RESULT

The sensed values of the heart rate sensor are displayed on the 'iot cloud data' channel. The values are stored as numerical data with a merely five seconds gap. The same values are fetched by the controller part which could analysis it with the predefined data.

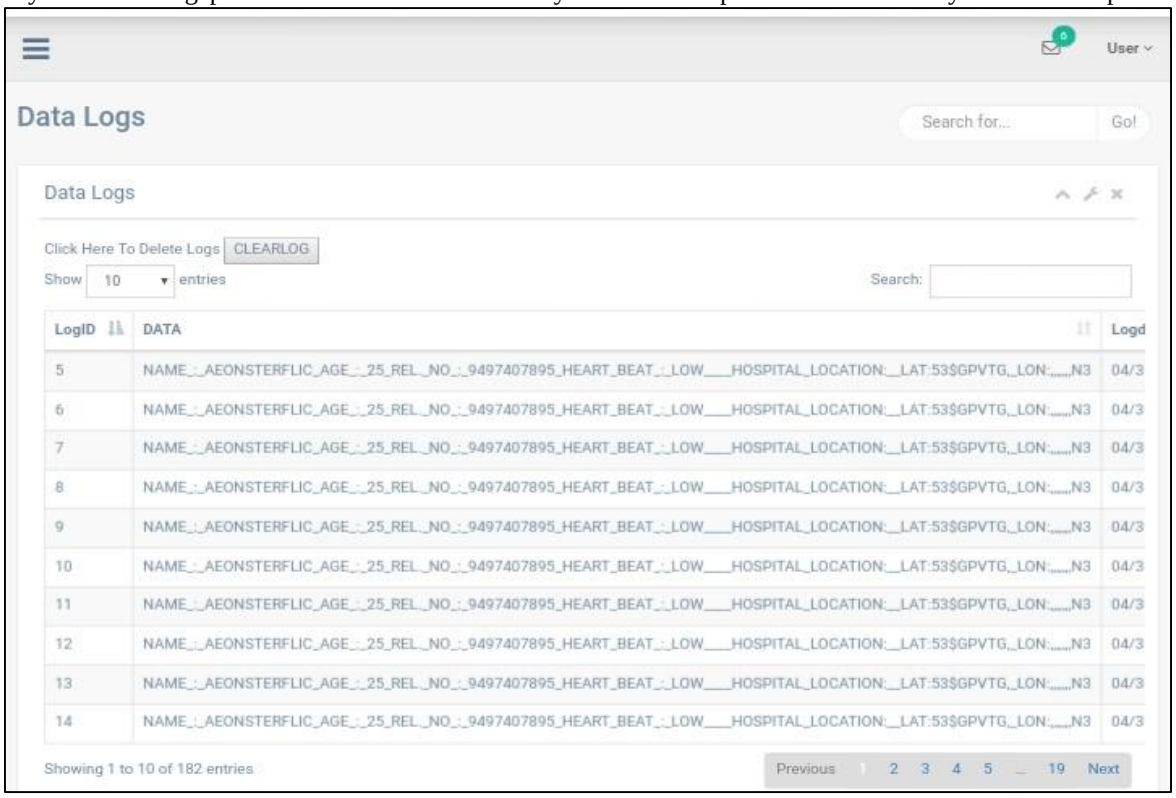

Fig. 3: Data stored on 'Iotclouddata' channel

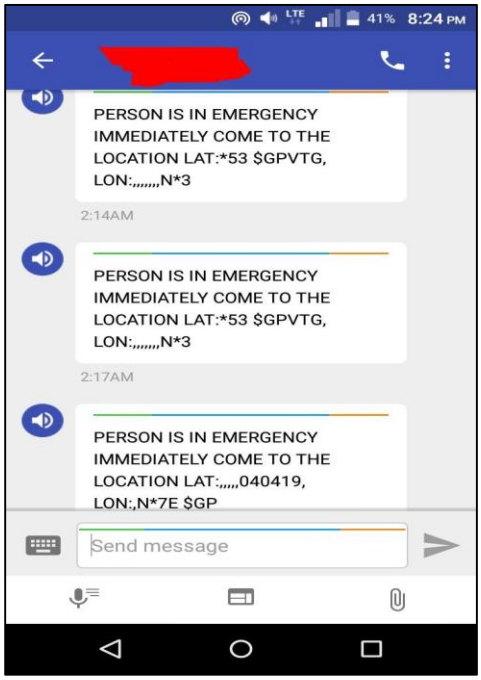

Fig. 4: SMS received regarding the emergency situation

In case of an emergency such as drastic increase or decrease in the pulse rate, the situation will be identified and further action will be initiated. The message will be send to the concerned hospitals and relatives by using the GSM and GPS module. The SMS will include the emergency message and the location of the patient. By this, precautions or early treatment can be taken so as to save life. Fig.3 shows the message and location link.

VI. CONCLUSION AND FUTURE SCOPE

This paper is based on our project for the final year of engineering. Since the project is having an application of Internet of Things (IoT), this project proves to be an autonomous health monitoring system. The proposed project is able to continuously sense, monitor and analysis pulse rate of the person wearing the band. The project can be further extended to create a whole new system of connected smart health bands so that everyone will be monitored and given proper treatment at right time. With more advanced and reliable sensors, the health band can be more efficient. This project can be a life saying band for people who do not have sufficient time to take care of their health or people who live alone and do not have someone to look after.

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REFERENCES

[1] "Smart Wearable Band for Stress Detection," 2015 5th International Conference on IT Convergence and Security (ICITCS), Kuala Lumpur, 2015, M. Zubair, C. Yoon, H. Kim, J. Kim and J. Kim
[2] "Wearable safety wristband device for elderly health monitoring with fall detect and heart attack alarm," 2017 Third International Conference on Science Technology Engineering & Management
[3] "Smart health band using IoT," 2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI), Chennai, 2017, pp. 1683-1687. S. A. Kokalki, A. R. Mali, P. A. Mundada and R. H. Sontakke