Design of Intellgent Wearable Health Monitoring System using Iot

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Abstract: *Today's Nowadays Health-care Environment has developed science and knowledge based on Wireless-Sensing node Technology oriented. Patients are facing a problematic situation of unforese endemise due to the specific reason of heart problems and attack which is because of nonexistence of good medical maintenance to patients at the needed time. This is for specially monitoring the old age patients and informing doctors and loved ones. So we are proposing a innovative project to dodge such sudden death rates by using Patient Health Monitoring that uses sensor technology and uses internet to communicate to the loved ones in case of problems.*

Keywords—Heart pulse sensor,Temperature sensor, Node mcu, esp8266 Wi-Fi module, Thinkspeak,Jacket

I INTRODUCTION

Smart These days a number of people are losing their life due to heart attack. Heart attack can occur when the flow of blood to heart is blocked. Owing to late diagnosis of heart attack we are inadequate to save the lives of many humans. In this paper, we suggest a system that will detect heart attack by monitoring the heart rate based on IoT (Internet of Things). For a healthy adult, ordinary heartrate is 60 to 100 bpm (beats per minute).[1]

Athlete's heart beat generally range from 40 to 60 bpm depending upon their fitness. If a person's heart rate is constantly over 100 beats per minute then the person is said to be having higher heart rate which is also notorious as tachyarrhythmia. It can diminution the efficiency of heart by letdown the amount of blood pumped through the body can result in chest pain and lightheadedness. With the advancement in technology it is easy to monitor the patient's heart rate even at home. IoT is dexterity of network mechanism to intellect and gather information from world ubiquitously us then share the information athwart internet anywhere it can be managed for some tenacity.[2]

It is estimated that over 20 million deaths all over the world occur due to cardio vascular disorder.Several people are also disabled by cardio vascular disease. The severity increases due to deployment of resources for early detection and treatment. In this system, the analog sensors measure the heart rate. An analog to digital converter converts the sensed analog data into corresponding digital data. This digital data is transmitted over a ZigBee module. The heart of patients suffering from fatal heart failures is monitored continuously. The control system accepts and processes the monitored signal. The processed signal is then fed into alert system as an precaution or detection of heart failure to the patients.[4]

This paper aims at reduction in number of deaths due to heart attack and heart related diseases. The design uses low cost effective ZigBee heart rate monitoring and alert system. The system can be used in hospitals and for patients who are under continuous monitoring.[5]

The heart attack detection by monitoring the heart rate, helps to inform a person if he is about to have heart attack. The system uses transmitting and receiving parts of which the transmitter is with the patient and the receiver is with doctor or nurse. The system uses smart sensor which converts the heart beat into pulses. When the controller detects heart failure or heart attack, it sends signals to cell phone contained with the doctor.[6]

II FUNCTIONAL OVERVIEW

On s [1]Pantelopoulos and Bourbakis give information about the current existing research and development of wireless biosensors system for effective health-care monitoring. This system consists of wireless sensors using ZigBee wireless technology and ultra-low power technology. This system also supports wireless communication for wireless body area network (WBANs), in which it adapts the individual physiological conditions using artificial neural network. It also uses certain ranges in between 2360 and 2400 MHz band for medical BAN services to avoid interferences from wireless technologies, where these wearable systems must be reliable, multifunctional, and easy to use for the patients monitoring. It must be applicable for real-time usage. Milenkovi etc. [2]

spoke about the closely monitoring of health-care system, in providing feedback and alert medical person to maintain optimal health-care monitoring. This system makes the integration of physical sensors, embedded microcontrollers, and radio interfaces on a single chip called as wearable wireless body/personal area network. In addition, it is very cheaper in cost and portable to carry. It also provides an immediate feedback to the user about the health status and updates the medical records in the system. The system supports continuous health monitoring and provides benefits to patient. Where, there is an improvement needed on quality of service (QoS) for a wireless communication, reliability of sensors, security, and standardization of interfaces and interoperability. Kumar et al. [3]

spoke about the very wide usage of wireless sensor network for remote monitoring of patients, storage of data in cloud environment, and also the patient data are taken, where it is transferred through a wireless network without any interrupt. So that we can monitor the accumulated data from the patient using some smart applications with a comparison to the existing information in the system. Alert Short Message Service is sent to the doctor and to the patient caretaker. To provide the security and privacy to patient data and mobile computing, there is a need for health-care services with high quality and low cost that includes data analysis and cloud computing. Nithin et al.[4]

spoke about the sensors that will record not only the current day's data but also the previous days. Data provided by the sensors are longitudinally rich and helpful to the doctor to give precautions. WBAN consists of wearable sensors, which measures various physiological parameters. Sensor transmits the gathered data to a gateway server through Bluetooth connection. Gateway server stores data into remote server for later retrieval by clinic

through internet. Real time continues monitoring from anywhere in the world. It can be extended by adding database management and cloud storage. Doctors can access the data of the patient. Chou et al.

[5] spoke that there is a need for sufficient energy required for the data collection by a wireless sensor network. The existing adaptive compressive sensing algorithms obtain a very good data, but these cannot be added to the WSN. So, that the methods like information collection framework and adaptive projection vectors are used for iteratively compute projections that also maximize the ratio of the information that gains to the energy required to get the information to realize the energy efficiency in absolutely collecting the information in WSN. Couderc

[6] speaks about the ECG current signals and the resources available to the scientific community, in which the Telemetric and Holter ECG Warehouse (THEW) is an initiative that developed to the scientific community to the advance in which it assures about the field of ECG and cardiac safety. Furthermore, in this, an initiative has grown rapidly, and the organization using data warehouse concepts is growing continuously. So that the improvement is needed in ECG technology for cardiac safety. Bazzani et al.

[7] gave information about the IoT technology in which it continuously monitors the patient's activity independently in remote monitoring. In addition, a patient activates from home and can be handled using an IoT paradigm. Here, the concept is of IoT, which is linked with the architecture layer that is a middleware. VIRTUS is an event-driven middleware, which tells about the IoT paradigms in e-health. Kocabas et al.

[8] said that the digital health is the next big revolution when the internet was invented. Here, remote data are widely spread in the system, where system consists of two super layers named

III THE PROPOSED SYSTEM

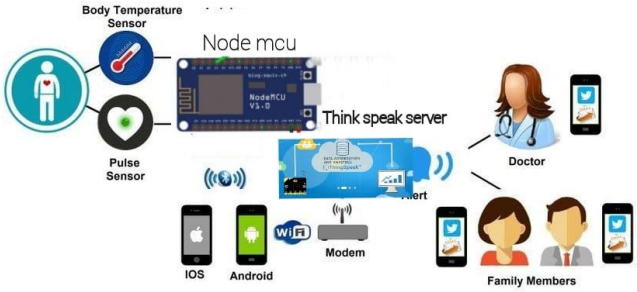

Figure1.Working Model

1. Pulse Sensor

Pulse Sensor is a sensor used to find the heart rate using nodemcu. Students & mobile developers can easily use this sensor to find out the pulse rate of a person and give its informationto anodemcu and it sendsit toa cloud server so the doctors in real time can easily assess it. The pulse rate sensor cost less and it is easy to buy from any local shops.it is very useful for students who want to develop any medical applications.

1) A Color Coded Cable is used to differentiate the ground, positive and analog output

2) An Ear Clip is made where the sensor is placed. And it can be easilyplacedon figure tip.

3) The sensor amplifies the taken pulse sensor form figure tipsinanalogform and give itto theanaloginput of the nodemcu

4) The ground is connected to the ground pin of the nodemcu.And the analog output is given to the analog input of the nodemcu

5) The stickers on the pulse sensor protect the the sensor form sweat and oil that is produced by finger

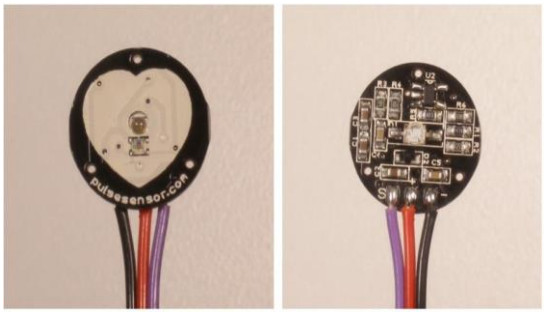

Figure2.Pulse Rate Sensor

2. NodeMCU

NodeMCU is similar microcontroller and it can be configured to connect to the Internet for the Internet ofthings (IoT). The NodeMCU development board is an open source board on Esp8266 microcontroller with integratedWi Fi transceiver. NodeMCU is a complete environment of hardware and software for IoT.

Figure 3 NodeMcu

Node mcu is a source Internet of Things as a platform, to transmit the data to the cloud server.it uses xtos operating system

3. Thinkspeak

The thinkspeak is cloud platform where the data can be stored in real time and can be assessed any time formmobile phones. And it is a free website for students who want to get cloud assess. It uses a single router. The nodemcu is connected to internet and then it has direct connection to the thinkspeak cloud server.it can be assessed anywhere and anytime.

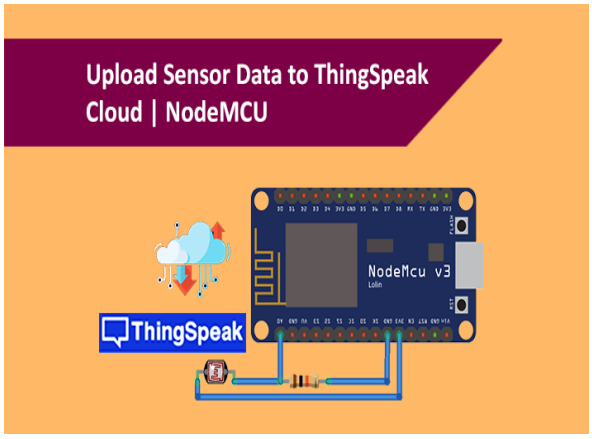

Figure 4 Thinkspeak

It allows the user to get the data from the cloud.And it gives it to the user to read the data

ThinkSpeak is an Internet of Things (IoT) platform developed by MathWorks. It allows you to collect, analyze, and visualize data from various IoT devices or sensors. Users can create channels to collect data, analyze and visualize it using MATLAB, and perform actions based on the data received.

ThinkSpeak provides APIs that allow devices to send data to the platform, making it versatile for a wide range of IoT applications. It's commonly used in fields such as agriculture, weather monitoring, home automation, and industrial IoT. With its easy-to-use interface and integration with MATLAB, it's popular among both hobbyists and professionals for building IoT solutions.

4.DS18B20 Temperature Sensor

The sensor works with the method of 1-Wire communication. It requires only the data pin connected to the microcontroller with a pull up resistor and the other two pins are used for power

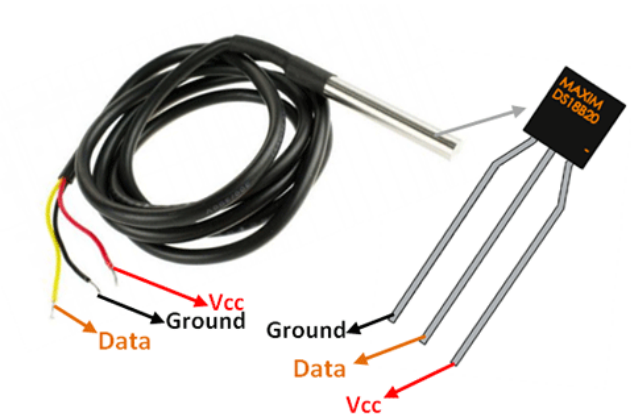

Fig 5. DS18B20 Temperature Sensor

The DS18B20 is a digital temperature sensor manufactured by Maxim Integrated. It is commonly used in various applications where accurate temperature measurements are required. Here's a brief description of the DS18B20 Temperature Sensor:

1. Digital Output: The DS18B20 provides digital output, making it easy to interface with microcontrollers and digital systems.

2. One-Wire Interface: One of the key features of the DS18B20 is its one-wire interface, which allows multiple sensors to be connected to a single microcontroller pin. This simplifies the wiring and reduces the number of pins required for sensor communication.

3. High Accuracy: The DS18B20 offers high accuracy temperature measurements with a resolution of up to 12 bits, allowing for precise monitoring of temperature variations.

4.Wide Temperature Range: It can measure temperatures ranging from -55°C to +125°C (-67°F to +257°F), making it suitable for a wide range of applications, including both indoor and outdoor environments.

Overall, the DS18B20 is a reliable and versatile temperature sensor widely used in the electronics industry for temperature monitoring and control purposes.

IV METHODLOGY

EXISTING SYSTEM

In today's busy and expensive world everyone is so tied up with their daily works that most of the times no family members can be with the elder people of the family 24/7. The Elder person should be continuously monitered by other external.Also, external help is not affordable for everyone. Again, there are cases where elder people are living in their home all alone independently. In all of the above cases, the common problem is lack of continuous health monitoring of elderly people living alone.

PROPOSED SYSTEM

This system uses Temperature and heartbeat sensor for tracking patients health. Both the sensors are connected to the microcontroller . To track the patient health micro-controller is in turn interfaced to a LcD display and GSM connection to send the data to the web-server(wireless sensing node). In case of any abrupt changes in patient heart-rate or body temperature alert is sent about the patient using GSM via SMS.

Thus the proposed system effectively monitor patient health and helps the user monitoring their loved ones

drom work and saves lives

BLOCK DAIGRAM

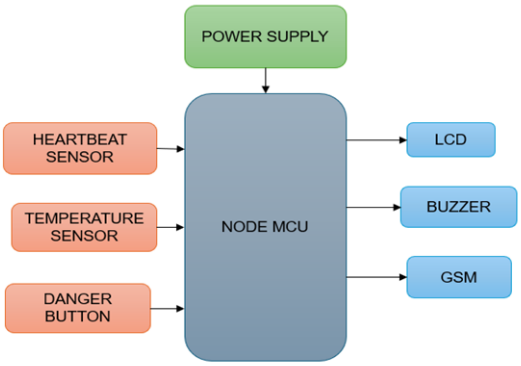

Fig 6 Block Diagram

V CONCLUSION

The smart healthcare monitoring system (i.e., SW-SHMS) has been proposed in this paper to handle the challenges of providing home based healthcare monitoring and avoiding hospitalisation. The literature show that there is a great demand of producing an effective healthcare solution that monitor elderly people in their home and in real-time. SW-SHMS can highly contribute to provide comfortable, and safe environment for elder and disable people, thus, enable them to live independently without the fear of any emergency or critical healthcare situation through continuous monitoring of their health by SW-SHMS. Briefly, SW-SHMS accumulate patient's physiological data via wearable sensors and transmit it to Cloud for data analysing and processing. Thus, any detection of disorder in patient's data will be reported to patient's doctors via hospital platform. SW-SHMS has a fixable architecture that can scale and expand easily, thus, providing a reliable and cost effective systems to monitor patients remotely. In addition, the results shows that the system could efficiently contribute to improve healthcare services by using the prosed impeccable SW-SHMS system which able to monitor patients symptoms remotely and in real-time.

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