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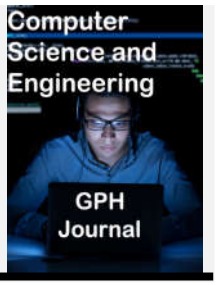

IOT BASED HEALTH MONITORING SYSTEM

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Research Article

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ABSTRACT

Health monitoring is a major issue in today's world. Due to the lack of health monitoring, patients suffer from serious health problems. Health experts are also taking advantage of these smart devices to keep an eye on their projects. Here in this project, we will make an IOT based health monitoring system which records the patient heartbeat rate, body temperature and skin pressure. Heartbeat rate, body temperature and skin pressure values are recorded over thingspeak and Google sheets so that patient health can be monitored from anywhere in the world over the internet. We will use Thinspeak to monitor patient heartbeat, temperature and skin pressure online using internet. We will also use IFTTT platform to connect thingspeak to SMS so that alert message can be sent whenever the patient is in critical state.

KEYWORDS: - Pulse rate sensor, Temperature sensor, Arduino, WIFI Module, Force sensitive sensor.

1. INTRODUCTION

The Internet of things is a very popular topic in today and is commonly viewed as all kinds of internet of things. Our system puts forward a smart patient health monitoring system that uses the sensors to track patient health and uses the internet to inform their beloved ones in case of any issues. Especially old age patients should be monitored regularly and the people who take care of them need to be informed about their health status. Heartbeat rate, Body temperature and skin pressure values are recorded and also sends an SMS to their beloved ones whenever the readings goes beyond critical values. A panic button will also be attached so that patient can press it on emergency to send Email to their relatives. Thingspeak provides very good tool for IOT based projects. By using thingspeak site, we can monitor our data and control our system over the internet, using the channels and WebPages provided by thingspeak, thingspeak collects the data from the sensors, analyse and visualize the data and acts by triggering a reaction.

OBJECTIVE OF THE PROJECT

The objective of developing health monitoring system is to reduce health care costs by reducing doctor visits, hospitalizations.

- The WIFI module helps the server to update the patient data on website.
- These smart devices are used to collect body temperature, heartbeat, skin pressure which is used to evaluate the health condition of the patient.
- The final results are displayed on the smart phones and also on web server.
- This project plays vital role in saving the patient life at emergency time since “Time is life”.
- Analyzing the collected data using the built in Matlab of the Thinkspeak sever to detect future hazards.

MOTIVATION

In rural hospitals, the facilities for health caring are limited. The poor quality of health management enables issues in health care system Everyone should get the knowledge of own health as easy and early as possible. Also, it should be worth for each. Latest report of The India Spend analysis of data says that the 500,000 doctor's shortage in India. WHO defines the doctor patient ratio will be 1:1000 which has been failed in India.

In developing countries there is lack of resources and management to reach out the problems of individuals. A common man cannot afford the expensive and daily check-up for his health. For this purpose, various systems which give easy and assured caring unit has been developed. Theses system reduces time with safely handled equipment.

BACKGROUND

In real life, we have to constantly monitor the patient. As of now there is no automatic alerting system has not been implemented which will notify a helper or relative a patient who is at a remote location. In case of emergency, message is sent to the patients relative.

we present a prototype of a basic health-care monitoring system, which alerts, in real time patients relative that an elderly people has experienced a problem that could need medical attention or hospitalization.

RELATED WORK

NO	JOURNAL	TITLE	AUTHOR	OBJECTIVE	REQUIREMENTS
1	International Journal of Engineering Trends and Technology October 2014	Patient Temperature Monitoring System Using Bluetooth Communication	1.K. Jagan Reddy 2.Santhosh Kumar	This paper demonstrates Portable Wireless Biomedical Temperature Monitoring System. In which we measure the temperature of the body of the patient and transmit temperature using wireless communication. It initiates immediate alarm in case of emergency. The system interfaces other two devises such as cell phone to enable remote monitoring.	Microcontroller Bluetooth Temperature sensor
2.	International Journal of Engineering Research & Technology	GSM Based Heart Rate and Temperature Monitoring	1.Aniket V. Kale 2.Supriya D. Gawade 3.Sayali Y.	The heart rate sensor and temperature sensor are used for patient	Arduino Uno GSM module Heart rate sensor Temperature

	April 2015	System	Jadhav 4.Samrat A. Patil	monitoring. Sensors gives accurate output therefore it rules out the use of traditional medical instruments such as thermometer. For continuously sending message from patient's location to medical advisory GSM modem used.	sensor.
3.	International journal of advanced technology in engineering and science Jan 2017	Automatic Wireless Health Monitoring System in Hospital for Patients	1.Spandana 2.P. Kalpana 3.Anjane 4.G. Bargavi	The purpose of this project is to measure the heartbeat of that particular person if high or low heart will come automatically it will send a message through GSM. By using heart sensor, we can calculate the heart beat rate.	Arduino Uno LDR GSM module
4.	International Journal of	Heartbeat and Temperature	1.Vikramsing R. Parihar	This paper describes the	Arduino Uno LCD display

	Advanced Engineering Research and Science **May 2017**	Monitoring System for Remote Patients using Arduino	2.Akesh Y. Tonge 3.Pooja D. Ganorkar	working of a wireless heartbeat and temperature monitoring system-based microcontroller ATmega328. The proposed approach consists of sensors which measures heartbeat and body temperature of a patient which is controlled by the microcontroller. Both the readings are displayed in LCD monitor.	Heartbeat sensor Temperature sensor
5.	International Journal on Recent and Innovation Trends in Computing and Communication **December 2017**	Smart Health Monitoring System using Sensors	1.Suhas Pindiproli 2. Harshal Marathe 3.Rakhi Mallesh	In this project, we monitor pulse rate, temperature with the help of sensor. Sensors sense the records the value and sends those to android phone.	Arduino Uno Heartbeat sensor Temperature sensor Android phone

				Moreover, we present a prototype of a basic healthcare monitoring system, which alerts, in real time patients relative that an elderly people has experienced a problem that could need medical hospitalization.	
6.	International Journal for Research in Applied Science & Engineering Technology **January 2018**	Patient Health Monitoring System based on IoT using Raspberry Pi	1.Vineela Thonduri 2.Venkata Sai Charan Sattu 3.Bhaskar Sure 4.Gopi Krishna Sabbineni 5.Sai Krishna Vanush Yemineni	IoT facilitates medical equipment to be more effective by allowing real time monitoring of patient's health where the sensors acquire patient's data and these parameters are transmitted through medical devices via a gateway, where they are stored and analysed.	Raspberry Pi, Pulse sensor, Temperature sensor, Thing speak

7.	International Journal of Innovations & Advancement in Computer Science **April 2018**	Heart Attack Detection and Heart Rate Monitoring Using IoT	1.Nikunj Patel 2.Prince Kumar Patel 3.Nehal patel	In this project the patient will carry hardware having sensors with android application. The user may set the high and low level of heartbeat limits as soon as the heart beat readings goes above or below the limit set by the user the system will send an alert about high or low heartbeat as well about chances of heart attack.	Heart rate sensor, Android smart phone
8.	2nd international conference on new frontiers of engineering science management and humanities **May 2018**	Patient health monitoring system using GSM	1.Ketan K. Lad 2.Dhaval K. Patel 3.Rohit B. Damor	The system calculates the heart rate, blood pressure and body temperature of patient. The system efficiently updates doctor about health status of patient and	Arduino Mega, DS18B20, GSM, LCD

				accurately measures the parameters of the patient and the data will be sent to registered number via GSM	

MODULE DESCRIPTION

SOFTWARE REQUIREMENTS

(1) THINGSPEAK

Figure 1: Thigspeak.

According to its developers, "ThingSpeak is an open-source Internet of Things application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network.

ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates". ThingSpeak was originally launched by ioBridge in 2010 as a service in support of IOT applications.

(2) ARDUINO IDE

Figure 2: Arduino IDE

The Arduino integrated development environments a cross- platform application that is written in the programming language Java. It is used to write and upload programs to Arduino board.

The source code for the IDE is released under the GNU General Public License, version 2.The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures.

HARDWARE REQUIREMENTS

(1) ARDUINO UNO

Figure 3: Arduino Uno

The Arduino UNO is an open-source microcontroller board based on the MicrochipATmega328P microcontroller and developed by Arduino.cc The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE via a type B USB cable.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software 1.0. The Uno board and version 1.0 of Arduino Software were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards. You can find here your board warranty information. You can find in the Getting Started section all the information you need to configure your board, use the Arduino Software (IDE), and start tinker with coding and electronics.

Technical specifications:

Microcontroller - ATmega328P

Operating Voltage - 5V

Input Voltage (recommended) 7-12V

Input Voltage (limit) 6-20V

Digital I/O Pins – 14

PWM Digital I/O Pins – 6

Analog Input Pins – 6

DC Current per I/O Pin 20 Ma

DC Current for 3.3V Pin 50 Ma

Flash Memory - 32 KB

SRAM - 2 KB

EEPROM - 1 KB

Clock Speed - 16 MHz

(2) ESP8266 WI-FI MODULE

Figure 4: ESP8266 WIFI module

Most people call ESP8266 as a WIFI module, but it is actually a microcontroller. ESP8266 is the name of the microcontroller developed by Espressif Systems which is a company based out of shanghai. This microcontroller has the ability to perform WIFI related activities hence it is widely used as a WIFI module. There are two of ways to work with your ESP8266 module. This tutorial will help you to get started with ESP8266. One way is by using the AT commands. The other way is by using the Arduino IDE. Here we will use AT commands to send data from Arduino to ESP.

(3) LM35 TEMPERATURE SENSOR

Figure 5: LM35 Temperature Sensor

Temperature sensor is a thermocouple or a resistance temperature detector that gathers the temperature from a specific source and alters the collected information into understandable type for an apparatus or an observer. A temperature sensor is a device which is designed specifically to measure the hotness or coldness of an object.LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C).With LM35, the temperature can be measured more accurately than with a thermostat. It also possesses low self-heating and does not cause more than 0.1 °C temperature rise in still air.

(4) PULSE RATE SENSOR

Figure 6: Pulse rate Sensor

Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino. The sensor clips onto a fingertip or earlobe and plugs right into Arduino. It also includes an open-source monitoring app that graphs your pulse in real time.

The front of the sensor is the covered with the Heart shape logo. This is the side that makes contact with the skin. On the front you see a small round hole, which is where the LED shines through from the back, and there is also a little square just under the LED. The square is an ambient light sensor, exactly like the one used in cell phones, tablets, and laptops, to adjust the screen brightness in different light conditions. The LED shines light into the fingertip or earlobe, or other capillary tissue, and sensor reads the amount of light that bounces back. That's how it calculates the heart rate. The other side of the sensor is where the rest of the parts are mounted.

(5) PUSH BUTTON

Figure 7: Push button

A push-buttoner simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed.

Buttons are most often biased switches, although many un-biased buttons still require a spring to return to their un-pushed state. Terms for the "pushing" of a button include pressing, depressing, mashing, hitting, and punching.

(6) FORCE SENSITIVE RESISTOR

Figure 8: Force Sensitive Resistor

A force-sensing resistor is a material whose resistance changes when a force, pressure or mechanical stress is applied. They are also known as "force-sensitive resistor" and are sometimes referred to by the initialism "FSR".Force-sensing resistors consist of a conductive polymer, which changes resistance in a predictable manner following application of force to its surface. They are normally supplied as a polymer sheet or ink that can be applied by screen printing. The sensing film consists of both electrically conducting and non-conducting particles suspended in matrix. The particles are sub-micrometre sizes, and are formulated to reduce the temperature dependence, improve mechanical properties and increase surface durability. Applying a force to the surface of the sensing film causes particles to touch the conducting electrodes, changing the resistance of the film. As with all resistive based sensors, force-sensing resistors require a relatively simple interface and can operate satisfactorily in moderately hostile environments. Compared to other force sensors, the advantages of FSRs are their size, low cost and good shock resistance. A disadvantage is their low precision: measurement results may differ 10% and more. Force-sensing capacitors offer superior sensitivity and long-term stability, but require more complicated drive electronics. There are many types of FSR. They are, FSR400, FSR402, 406, FSR450.

(7) ROTARY POTENTIOMETER

Figure 9: Rotary Potentiometer

A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat. The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential; the component is an implementation of the same principle, hence its name. Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power, since the power dissipated in the potentiometer would be comparable to the power in the controlled load. Potentiometers are rarely used to directly control significant amounts of power. Instead they are used to adjust the level of analog signals, and as control inputs for electronic circuits. For example, a light dimmer uses a potentiometer to control the switching of a TRIAC and so indirectly to control the brightness of lamps.

Preset potentiometers are widely used throughout electronics wherever adjustments must be made during manufacturing or servicing.

HARDWARE REQUIREMENTS

- Arduino UNO board
- ESP8266 WIFI – module
- SEN 11574 Pulse rate sensor
- LM35 Temperature sensor
- Push button
- Rotary potentiometer
- Force sensitive resistor
- LCD board
- Resistor
- Breadboard
- Jumper wires

SOFTWARE REQUIREMENTS

- Thingspeak
- Arduino IDE

EXISTING SYSTEM

Heart Beat and Body Temperature Monitoring using Arduino will detect the heartbeat using the Pulse

Sensor and body temperature using LM-35

• Sensor will show the readings in BPM (Beat per Minute) on the LCD connected to the Arduino. The

body Temperature will be displayed on the serial monitor along with BPM readings.

• Body temperature is a basic thing for monitoring and diagnosing human health. Heartbeat sensor was used for sensing heart rate.

PROPOSED SYSTEM

- We are going to use thingspeak application here. Thingspeak is an open source IOT application to store and retrieve data from things using the protocol over the internet.

• The values of heartbeat, body temperature and the skin pressure are displayed on LCD display.

• We are using this thingspeak to observe our heartbeat, body temperature and skin pressure values using the internet and are also used to store all our previous data also.

SYSTEM ARCHITECTURE

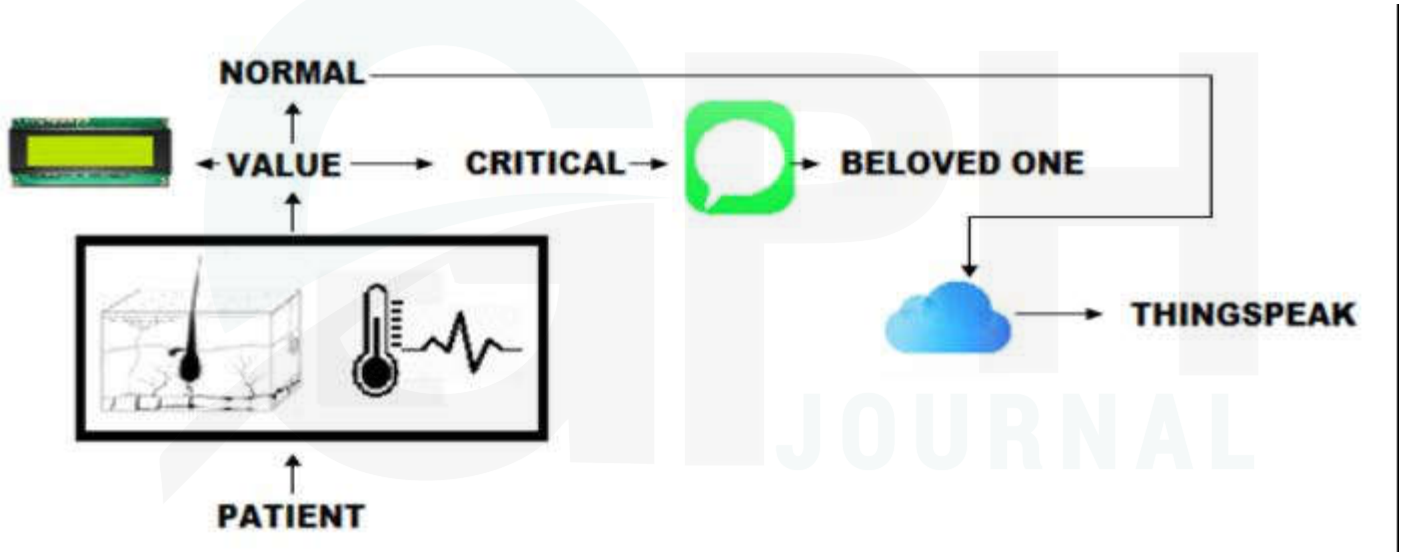

Figure 10: System Architecture

- We are going to use thingspeak application here. Thingspeak is an open source IOT application to store and retrieve data from things using the protocol over the internet.
- The values of heartbeat, body temperature and the skin pressure are displayed on LCD display.
- We are using this thingspeak to observe our heartbeat, body temperature and skin pressure values using the internet and are also used to store all our previous data also.

BLOCK CHART

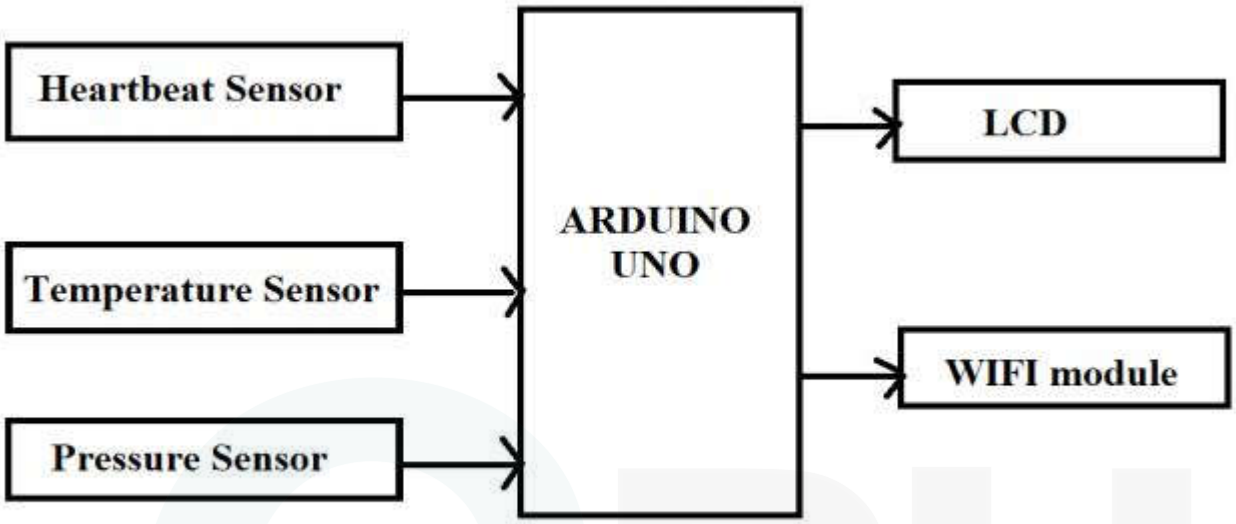

Figure 11: BLOCK CHART

CONCLUSION

As healthcare services are important part of our society, automating these services can help elderly people to reduce healthcare costs by reducing physician cost, hospitalization, etc. A Wi-Fi module is used to update the values on website. Many further improvements can be made in our system to make it better and easily adaptable.

It has been developed by certain hardware components. Presence of every module has been reasoned out. This will help the patients to easily carry this device with them wherever they go.

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