IOT Based Healthcare Monitoring System

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Abstract: Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. IOT devices are used in many application fields which make the users' day to day life more comfortable. These devices are used to collect temperature, Pulse rate, and sugar level etc., which are used to evaluate the health condition of the patient. Communicating the collected information to the doctor, making accurate decision on the data collected and notifying the patient is the challenging task in the IOT. In this project, An IoT based Patient Health Monitoring System (PHMS) using Arduino is proposed to collect the required parameters and evaluate the data obtained from the sensor devices. PHMS with arduino also gives the notifications to patient with possible precautionary measures to be practiced by them. This system suggests the patient with medical care and next step to be followed in case of critical situation. The combination of IoT with arduino is the new way of introducing Internet of Things in Health care Monitoring system of patients. Arduino Uno board collects data from the sensors and transfer wirelessly to IoT website. The Proposed PHMS system is evaluated for certain parameters like heartbeat, body temperature, blood pressure etc. and the decisions can be made based on the data obtained from IoT website.

Keywords: IOT; PHMS; Arduino; Healthcare; Sensor

I. INTRODUCTION

In the patient monitoring system based on Internet of things project, the real- time parameters of patient's health are sent to cloud using Internet connectivity. These parameters are sent to a remote Internet location so that user can view these details from anywhere in the world. There is a major difference between SMS based patient health monitoring [1] and IOT based patient monitoring system. In IOT [4] based system, details of the patient health can be seen by many users. The reason behind this is that the data needs to be monitored by visiting a website or URL. Whereas, in GSM based patient monitoring, the health parameters are sent using GSM via SMS. One more benefit of using IOT is that, this data can be seen using a desktop computer, laptop, using an Android smart phone, using a tab or Tablet. The user just needs a working Internet connection to view this data. There are various cloud service providers which can be used to view this data over Internet. Existing systems uses cables and wires to measure health related parameters like temperature [5], blood pressure, heart rate, etc. This makes the patient very uncomfortable and immovable. Existing systems uses cables and wires to measure health related parameters like temperature, blood pressure, heart rate, etc. This makes the patient very uncomfortable and immovable. Till date, existing system uses wired technology to interconnect between sensors and monitoring systems. This makes the patient feel uncomfortable and unable to move freely.

II. INTERNET OF THINGS

The Internet of things refers to a type of network to connect anything with the Internet based on stipulated protocols through information sensing equipment to conduct information exchange and communications order to achieve smart recognitions, positioning, tracing, monitoring, and administration. The IOT concept was coined by a member of the Radio Frequency Identification (RFID) development community in 1999, and it has recently become more relevant to the practical world largely because of the growth of mobile devices, embedded and ubiquitous communication, cloud computing and data analytics. Imagine a world where billions of objects can sense, communicate and share information, all interconnected over public or private Internet Protocol (IP) networks. These interconnected objects have data regularly collected, analyzed and used to initiate action, providing a wealth of intelligence for planning, management and decision making. The internet is not only a network of computers, but it has evolved into a network of device of all type and sizes, vehicles, smart phones, home appliances and industrial systems, animals, people, buildings,

all connected, all communicating & sharing information based on stipulated protocols.
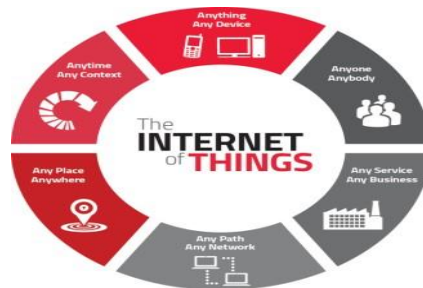

Fig.4: Internet of Things

Fig.5: Internet of Things Functions

III. PROPOSED SYSTEM

The hardware architecture of the proposed model It is mainly built on the Atmega328 microcontroller. LM35 is the temperature sensor used to sense temperature. Light dependent resistor and LED are used to sense the pulses and determine the heartbeat. The proposed system consists of three devices namely heartbeat, temperature and wireless transceiver. In this research, an IoT based Patient Health Monitoring System (PHMS) using arduino device is proposed to collect the required parameters like temperature, heart beat and blood pressure and evaluate the data obtained from the IoT devices. Over the last few years, the usage of arduino increases exponentially due to its reliability, easiness, open source programming, and low cost. In this paper, we introduce a new way of implementing PHMS with Arduino Uno named as an IoT based Patient Health Monitoring System using Arduino. Data generated by the sensors are processed by arduino microcontroller ATMEGA 328. ESP8266 provides unsurpassed ability to embed Wi- Fi capabilities within other systems. It offers a complete and self- contained Wi- Fi networking solution; it can be used to host the application or to offload Wi- Fi networking functions from another application processor.
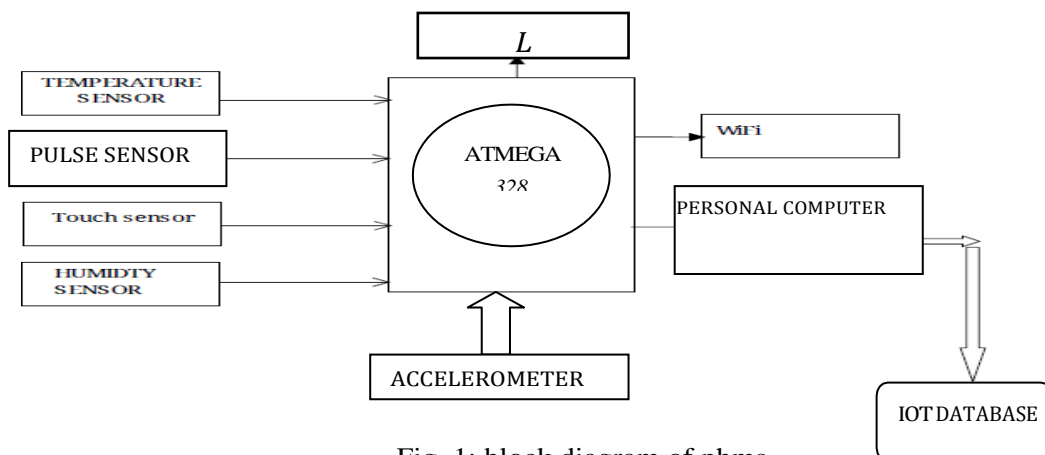
IV. BLOCK DIAGRAM

Fig. 1: block diagram of phms

V. FUNCTIONS

✓ **IOT based patient monitoring system has 3 sensors.**

First one is a temperature sensor, second is heartbeat sensor and the third one is humidity sensor. This project is very useful since the doctor can monitor patient health parameters just by visiting website or URL. Nowadays many IOT apps are also being developed. So now the doctor or family members can monitor or track the patient health through the android apps. To operate IOT based health monitoring system project, you need a Wi- Fi connection. The microcontroller or the Arduino board connects to the Wi- Fi network using a Wi- Fi module. You can create a Wi- Fi zone using a Wi- Fi module or you can even create a Wi- Fi zone using hotspot on your smartphone. The Arduino Uno board continuously reads input from these 3 senses. Then it sends this data to a particular URL/ IP address. Then this action of sending data to IP is repeated after a particular interval of time
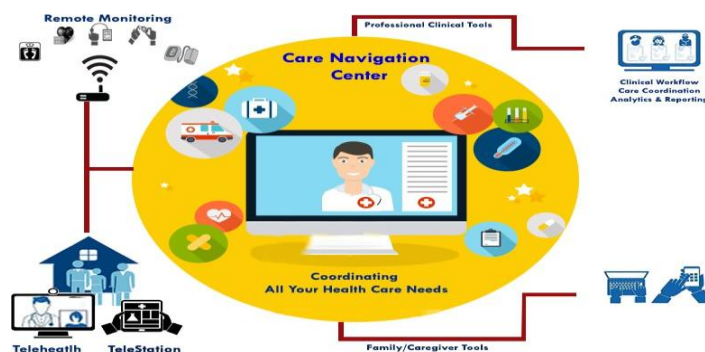

Fig.2: Patient Monitoring

✓ **Controlling and enabling of devices using touch sensor**

Fig.3: Touch sensor

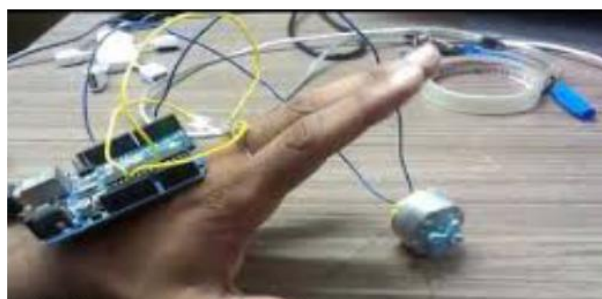✓ **Motion controlled message conveyer for disabled persons**

Fig 4: Motion Control

These people are not capable of full body movement as compared to a normal person. In such a situation we propose a system that helps disabled person display a message by just simple motion of any part of his body. Our proposed system works by reading the tilt direction of the user part. This device needs to be mounted on user finger of hand. The user now just needs to tilt the device in a particular angle to convey a message. Tilting the device in different directions conveys a different message. Here we use accelerometer in order to measure the statistics of motion. It then passes on

this data to the microcontroller. The microcontroller processes the data and displays the particular message as per input obtained. The microcontroller now displays the associated message on the LCD screen. It also sounds a buzzer along with message as soon as it receives motion signal from the accelerometer. The patient motion recorder device consists of an RF transmitter in order to transfer the data signal. An RF receiver on the other side receives the data and then decodes it before passing it to the microcontroller for processing the input and responding to it.

VI. RESULTS ANDANALYSIS

The output from sensors is connected to the arduino. The observed output signal was periodic ac signal with amplitude varying from peak to peak according to person. A model sinusoidal signal and the output from sensor were fed to arduino and the counted pulse rate was successfully sent via Wi- Fi module. The signal then sent to the microcontroller for further processing. The microcontroller then sent the received data of both heartbeat and temperature of a patient to a remote end via Wi- Fi module. The output is received on the website and is displayed as shown in the Figure 6. The output consists of the data from sensors. It provides the data of heartbeat and body temperature. Also, the measured heartbeat and temperature for different individuals vary depending upon their age- group. The data of heartbeat and body temperature of an individual was posted to the web.
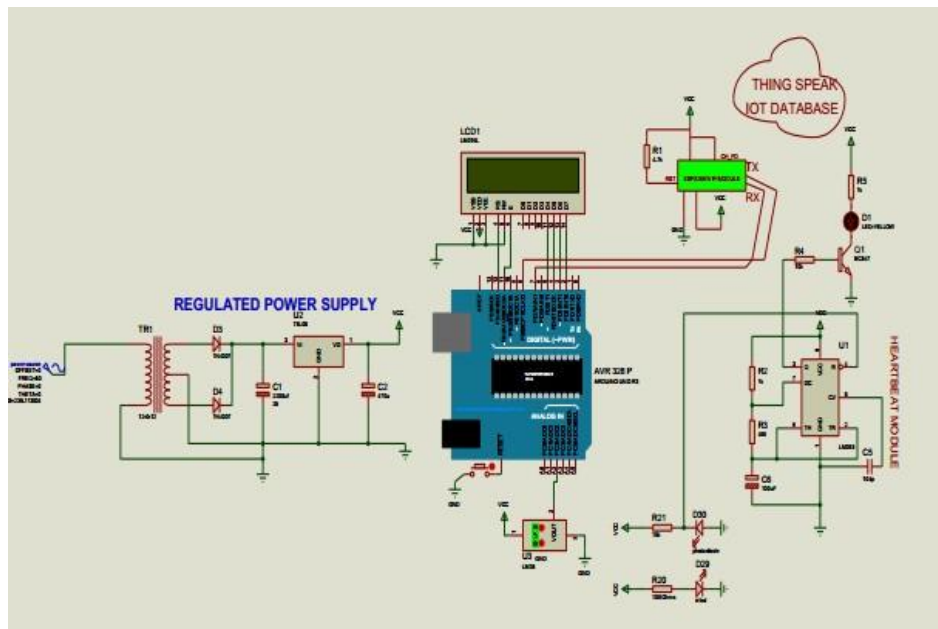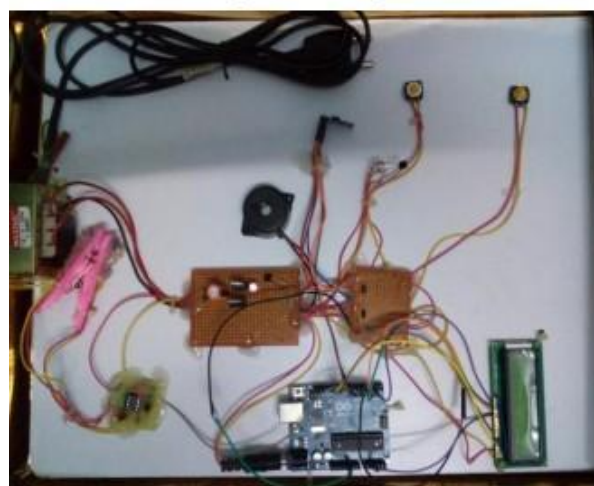

Fig.5: Circuit Design

Fig.6: IOT Based PHMS Hardware Kit

Table 1: Health parameters of a Patient Monitored for a Period of Time

DAYS	TEMPERATURE (in degree Celsius)	PULSE RATE(in bpm)
DAY 1	35	72
DAY 2	37	68
DAY3	36	70

CONCLUSION

This research led to the development of a system which measured heartbeat and temperature of a patient and sent it to a remote end by the use of an Arduino and Atmega328 microcontroller at a reasonable cost with great effect. It utilized remote patient monitoring system technology which enabled the monitoring of patients outside of clinical settings and leads to increasing access to health care as well as decreasing the health care delivery costs. Nowadays most of the systems work in offline mode. The research utilized two sensors for measuring heartbeat and temperature of a body. These sensors are controlled by the Atmega328 microcontroller. For measurement of heartbeat, we used fingertip to measure it accurately. The device uses the optical technology to detect the flow of blood through the finger. The heart beat monitor in our research counts the heart beat rate in beats per minute (bpm) for specific interval and transfers the calculated rate via Wi- Fi module and sends it to a remote end where it displays the observed data in the website. Thus, calculated heart beat rate is displayed in liquid crystal display (LCD). The data is also displayed on the screen of a mobile device or PC by using Wi- Fi module

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