REAL TIME PATIENT MONITERING SYSTEM BASED ON INTERNET OF THINGS

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Abstract: The Internet of Things is connected network between devices (wearable, portable and house hold devices, which was first proposed by Prof. Aston while performing the research related to Radio- frequency identification (RFID) in 1999.The service composition is fully supported by IoT with various application. An intelligent patient monitoring system for monitoring the patient's health condition automatically through sensors based connected networks. Several sensors are used for gathering the biological behaviors of a patient. The meaningful biological informations are then forwarded to the IoT cloud. The system is more intelligent that can be able to detect the critical condition of a patient by processing sensor data and instantly provides push notification to doctors/nurses as well as hospital in charge personal. The doctors and nurses get benefitted from this system by observing their corresponding patients remotely without visiting in person. Patient's relatives can also get benefitted from this system with limited access.

Index Terms – **Internet of Things, Intelligent patient monitoring system**.

I. INTRODUCTION

The popularity of Internet of Things (IoT) is increasing day by day in the area of remote monitoring system. The remote monitoring system includes vehicle or asset monitoring, kids/pets monitoring, fleet management, water and oil leakage, energy grid monitoring etc. The Healthcare monitoring system in hospitals and many other health centers has experienced significant growth. The advent of Internet of Things (IoT) technologies facilitates the progress of healthcare from face-to-face consulting to telemedicine. Internet of things makes medical equipments. more efficient by allowing real time monitoring of health. This project proposes a smart healthcare system in IoT environment that can monitor a patient's basic health signs where the patients are now in real-time.

This is a smart ICU which monitors patient heart beat along with his body temperature, body movement and glucose drip level. If any abnormality is noticed the ICU automatically alert with a beep sound and also message is sent to the duty nurse computer via blue-tooth. A heartbeat Pulse graph also be available in display of computer. Critical information will send to the Doctors phone number.

Fig 1 represents the block diagram representation of the product. Here Arduino 101 is used as the principal controller. The Arduino board collects various parameters from various sensors. Three sensors –heartbeat, temperature, and motion sensors are connected to microcontroller. In the heart beat sensor, the pulses are recorded based on optical power variation as light is scattered or absorbed during its path through the blood as the heart beat changes. Temperature sensor LM325 is used to measure temperature of patient with electrical output proportional to Celsius. Motion sensor senses the tilt or inclination or orientation in 2 or 3 dimensions. These sensors collect the data from the human body and are converted in to the digital form using the analog to digital converter and the outputs of these sensors are given to the Arduino. The output from the Arduino is fed to the Bluetooth which transmits data. And the receiver end collects this data and then displays the graph for the different parameters using the PC .With the help of Bluetooth,

the receiver is connected to mobile. The information received in the mobile can be displayed in the mobile through a net application. If any abnormality is noticed the ICU automatically alert with a beep sound and also message is sent to the duty nurse system via Bluetooth.
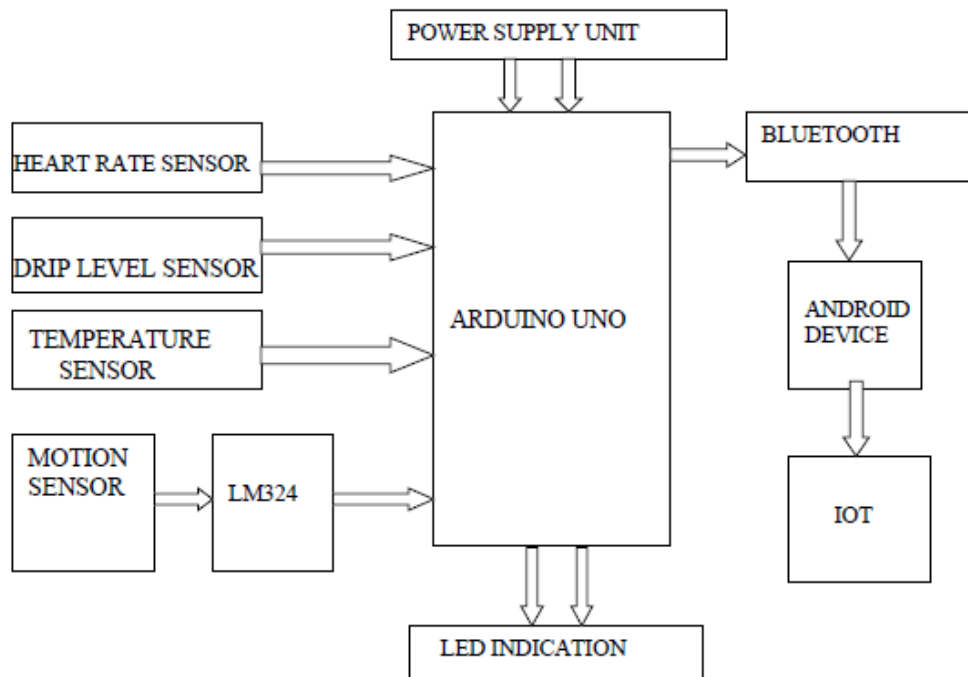

Fig 1: Block diagram of Real Time patient monitoring using IoT

II CIRCUIT DIAGRAM

Circuit diagram describes the architecture of the proposed PATIENT MONITORING SYSTEM. The system consists of heartbeat sensor, temperature sensor, accelerometer, glucose level sensor, a ARDUINO UNO, LM324, Bluetooth module and andriod. The circuit consists of five inputs which are the power supply, temperature sensor, heartbeat sensor, glucose level detector and accelerometer. The outputs are the status area, Bluetooth. The LM35 is used as a temperature detector and it's connected to analog A2 pin, and is used to measure the body temperature. The heartbeat is measured by using lumisense heartbeat detector and is connected to pin A1. The accelerometer ADXL335 and is connected to the digital pin 2 and 3 via LM324. Glucose status detector is connected to the pin A0. Fig 2 shows circuit diagram of Patient monitoring system.
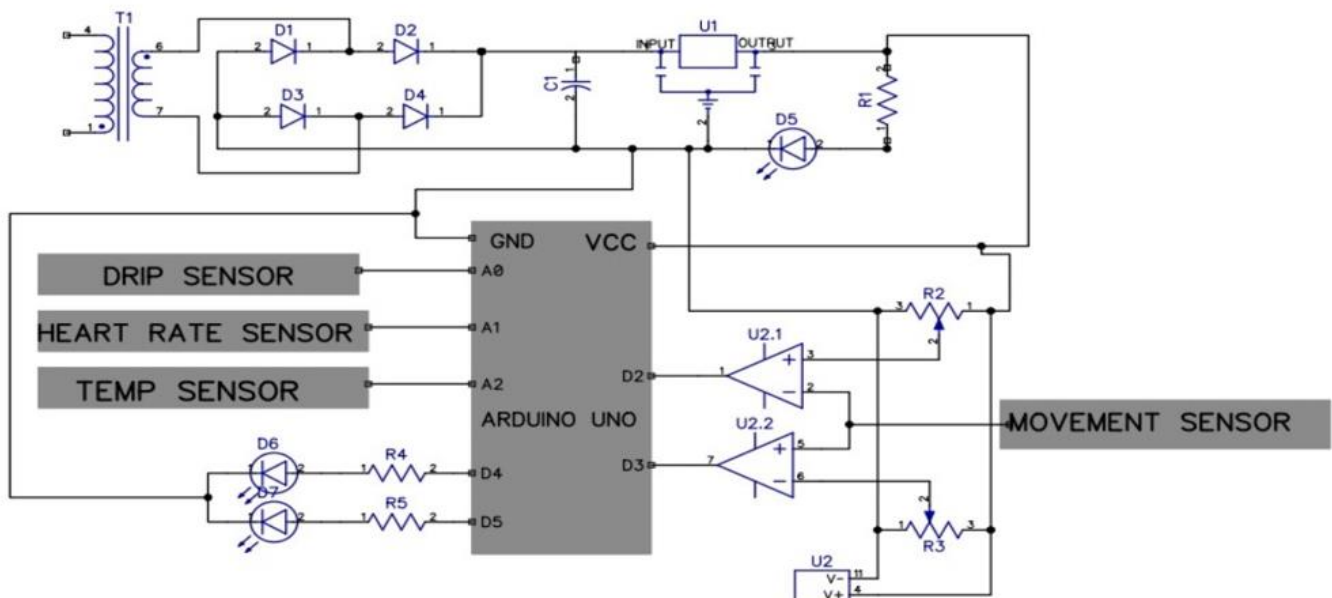

Fig 2: Circuit diagram of patient monitoring system

Power supply ac voltage normally 220 Vrms is connected to a transformer which steps down to desired dc output. A diode rectifier provides a full wave rectified voltage which was first filtered by a simple capacitor filter to produce a dc voltage. This dc voltage has some ripple or ac voltage variation.
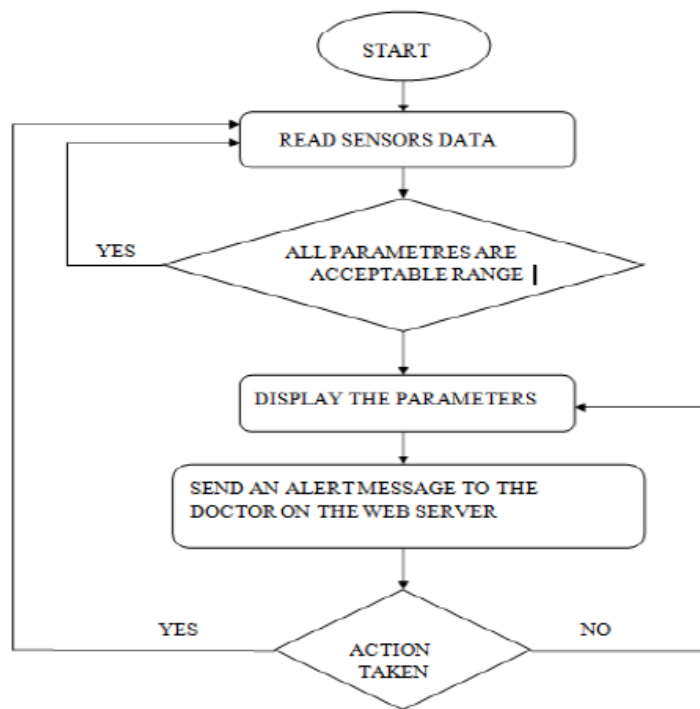
II.   FLOWCHART

Fig 3: Flow chart of patient monitoring system

III.   SOFTWARES USED

1. **ARDUINO IDE**

    The Arduino IDE is a cross-platform for the programming of Arduino UNO which is written in the functions from C and C++.

2. **DIPTRACE SOFTWARE**

    Diptrace Software was used to develop the schematic diagram of the circuit that was to be printed. It is a EDA/CAD software.

3. **ANDROID STUDIO**

    Android studio is development environment for Google's Android operating system and we used the same to develop a Doctor's App to get the real time statistics of patient in real time. The programming language used is Java.

4. **PROTEUS**

    Proteus IDE is used here to design the power supply circuit. It is mainly used for design automation.

5. **MICROSOFT VISUAL STUDIO**

    Visual studio is used for the visual representation of heartbeat in the form of a graph.

6. **PYCHARM**

    This IDE is used to create a local server to connect the devices and to obtain the real time data. The programming language here used is C#

IV. RESULT AND DISCUSSION

Various sensors such as temperature sensor, heartbeat sensor, drip level sensor and movement sensors are used to measure health parameters of the patients. Android application developed for this product which will send the health parameters of the patients to doctors or nurses, as well as hospital in-charge personal which allows them to monitor the patient in real time, which improves the efficiency and service quality. It is portable and is easy to use.
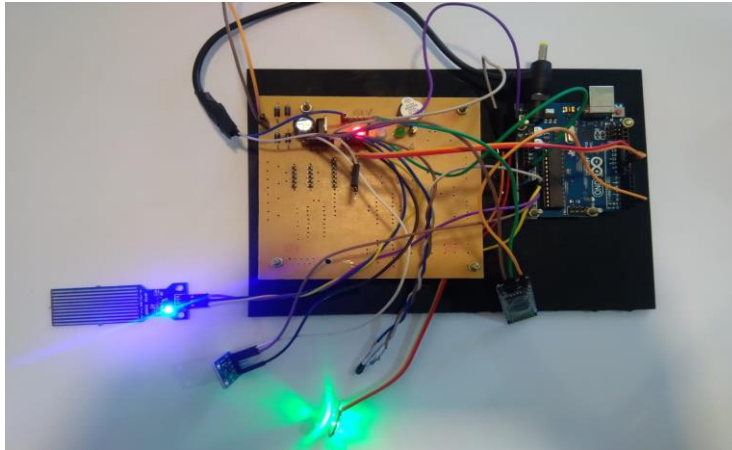

Fig 4 : Hardware set up of patient monitoring system

The system is implemented using the combination of hardware components. All the hardware components are assembled in the implementation phase. A supporting PCB board is designed using dip trace software. All the sensors are connected with Arduino using physical pins. Arduino is used as a processing device. HC05 Bluetooth is connected to a laptop in which an application in visual studio is created. Laptop is used as a local server, mobile and laptops can access only if it is in the local network. Bluetooth is configured with the application. The results were displayed in doctors mobile and a display placed near the patient as shown in Fig 5 and Fig 6 .

Fig 5: Patient health condition in Mobile Phone
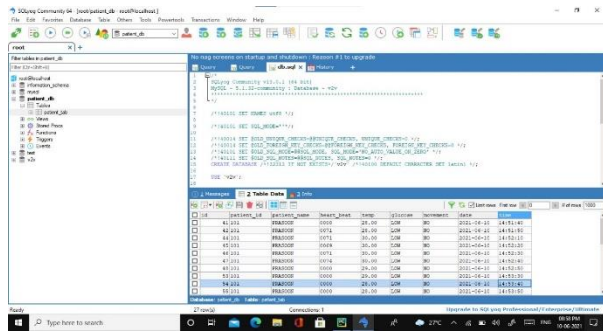
(a)   (b)

Fig 6: Patient health condition displayed in Laptop

V.   CONCLUSION

Real time patient monitoring system can able to monitor the patients heart beat, temperature and other critical parameters in the hospital.The system can benefit nurses and doctors in situations of epidemics or crises as raw medical data can be analyzed in a short time ,which improves the efficiency and service quality.The proposed system is simple, power efficient and easy to understand. It acts as a connection between patient and doctor.

VI.   REFERENCES

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