WIRELESS PATIENT HEALTH MONITORING USING IOT

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Abstract - Remote patient monitoring devices had greatly decreased the burden of patients and delivered high quality of care with lower risk by monitoring various medical parameters such as BP, ECG, Heart Rate, temp. The implemented technology is being enhanced in every district and answers all medical related problem of the patient at any remote locations using IoT. The usage of IoT technologies brings convenience of physicians and patients, since they are applied to various medical areas such as healthcare monitoring. Body sensor network used to monitor the patient regularly, the sensed values is continuously compared with threshold limits. Whenever the sensed values exceed the threshold limits, the message about patient health condition is communicated through IoT.

I. INTRODUCTION

Health is the fundamental capability humans require to perceive, feel, and act effectively, as it represents a primary element in the development of the individual. That is why it is necessary to provide adequate ways to manage healthcare by monitoring and medical assistance. Increased life expectancy of the elderly and technological evolution led to innovative and effective solutions for in-home monitoring and treatment of patients. This introduces the use of telemedicine and home monitoring using Internet of Things (IoT). A solution for a sustainable and adaptable patient oriented infrastructure development is presented with the help of Arduino UNO R3. Thus this hopes to achieve a solution that is cheap and economically stable. This proposes architecture for the system, which is developed using the above mentioned devices. The main applications of IoT can be in healthcare, which increase the availability, quality of care and reduces costs. This system will help in real time monitoring of the patient but will be cost efficient. Thus we can make use of arduino for developing cheap systems in healthcare using IoT.

Advancement in information and communication technologies has led to the emergence of Internet of Things. In the contempory health care environment, the usage of IoT technologies brings convenience of physicians and patients, since they are applied to various medical areas (such as real- time monitoring, patient information management, and health care management). The body sensor network (BSN)

technology is one of the core technologies of IoT elaborating in health care system, where a patient can be monitored using a collection of tiny-powered and lightweight wireless sensor nodes. The arduino which is a charging low price, flexible, fully customizable and programmable small computer board brings the advantages of a PC to the domain of sensor network.

In our system we are measuring patient's parameters like Blood Pressure, temperature, ECG and heart rate sensors. The sensors values are collected and the data information is given to arduino and then it is transferred to server. The data stored in a database and can be displayed in a website that can be accessed only by authorized persons. The doctors, patient or his caretakers are given authorization to view the status of the patient.

II. SYSTEM ARCHITECTURE

Architecture of the system implemented to achieve various applications of a patient. Sensors such as temperature, ECG, Blood Pressure, Heart rate been implemented here. The main purpose of this project is to monitoring patients health parameters, the information about the patient are transfer to healthcare provider through IoT.
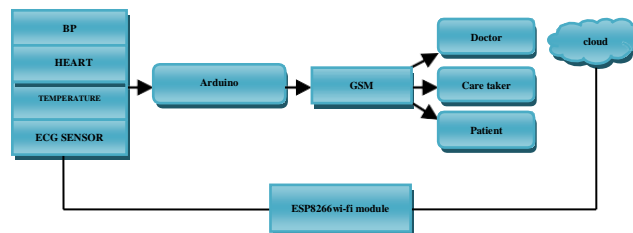
SENSORS

Fig. 1System Architecture

A. **Temperature Sensor**

The LM35 are precision integrated circuit temperature sensor, thus has a advantage over linear temperature calibration. The LM35 does not require any external calibration or trimming to provide typical accuracies. The LM35 has low output impedances, precision inheritance, linear output makes the control of circuit easy. The LM35 is rated to operate over -55 to +150 C temperature range, while it rated for -40 to 110 C(-10 with improved accuracy).

The LM35 is used to measure the hotness and coldness of an object. It operates over low voltage from 4 to 30 volts, less than 0.0006A current drain, low self heating up tos 0.08 C in air. The LM35 consist of mainly 3 pins input voltage, analog input A0 and ground.
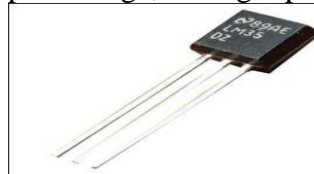

Fig. 2Temperature Sensor

B. Blood Pressure Sensor

Blood Pressure (BP) is the pressure that circulating blood on the walls of blood vessels. The BP sensor is normally used in hospitals to determine blood pressure. Blood pressure varies depending on situation, disease and activity of a person. It is control by the nervous and endocrine system. Blood pressure due to low state is hypotension, and high level is hypertension. Long period of hypertension is a risk strand for many diseases, including heart disease, stroke and kidney failure. Long period of hypertension often goes undiscovered due to infrequent absence of symptoms. Normal systolic and diastolic pressure in a human being is 120/80 mmHg.

Fig.3 Blood Pressure Sensor

C. *ECG Sensor*

ECG or EKG is commonly known as electrocardiograph comes from Greek word – Electro, because it is related to electrical activity, cardiac, meaning heart and graph means "to write". Thus electrocardiograph is used to record the activity of the heart through electrical signals generated naturally by a human body. The electrical signals are detected by using electrodes attached to the surface of the body.

The PQRST wave plays the major role in monitor, the activity of heart continuously. PQRST wave can be measured by connecting the electrodes in body nodes such as right arm, left arm and right leg (or) left leg.

Fig .4 ECG Sensor

D. Heart Rate Sensor

Heart Rate is a common health parameter that related to the soundness of human cardiovascular system. The number of times the heart beats per minutes, change due to different physiological conditions such as stress, increase and decrease in temperature, workload , concentration on task, state of automatic never system these things play a major role in heart rate changes. The normal heart rate various between 70 to 110 minutes per sec.

E. Arduino UNO R3

Arduino UNO R3 is an open source with the combination of hardware and software, the project uses design and manufactured microcontroller based kit for both analog and digital devices. Arduino provides an (IDE) integrated development environment based on the processing project, it supports C, C++, and java programming languages. Hardware portion consist of digital, analog and voltage provided by arduino is 5V.

Fig.5 Arduino UNO R3

F.GSM Module

Global System for Mobile communication (GSM) is the most frequently used in mobile phones, all over the world. Around 3 billion people from more than 212 countries use GSM for mobile phone operation. Both signalling and speech channels are digitalized. It consist of (2G) Second Generation mobile phone system. Similarly GSM EDGE is the 3version protocol. Moreover GSM is designed using second generation cellular technology by using TDMA / FDMA system.

Fig .6 GSM Module

G. Wi-Fi Module (ESP8266)

ESP8266 acts similar to a station (or) access point to connect with the Wi-Fi network. This helps in building mesh network. It acts like a hub for one or more station. The access point of other end is connected by a wired medium / network, for connecting with external devices it uses SSID (Service Set Identifier).

Fig .7 Wi-Fi Module

H.Cloud

Cloud IP address is routed as IPv4/IPv6. Cloud account is created to make a continuous report of the patient, similar to documentation. IP addresses available to Google Cloud Platform (GCP). The IP address is private and secure.

III.CONCLUSION

This project develops a Wireless Patient Health Monitoring System that is capable of measuring patient's health parameters and to communicate up to an end device using chosen wireless connectivity option. The results are expected to be acceptable measurements of different sensors data's.

The research work is a base for healthcare monitoring environments, with the prototype system different medical sensors can further attached to provide immediate remedy for the patient and to improve patients health condition. This project help in enormous application for human health care field.

V.REFERENCES

[1]   Shreyaasha Chaudhury, Debasmita Paul ,Ruptirtha Mukherjee"Internet of things based healthcare monitoring system"[IEEE], 2017.

[2]   Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou- ElNour, Mohammed Tarique "Real time wireless health monitoring application using mobile devices" published in International Journal of Computer Networks & Communications (IJCNC),2015.

[3] Shamika Jog, Prajakta Ghodake, Darshana Jagtap "Patient Health Monitoring and Controlling System using Internet-of- Things (IoT)" International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE),2017.

[4] Bandana Mallick, Ajit Kumar Patro "Heart rate monitoring system using fingertip through arduino and processing software"international Journal of Science, Engineering and Technology Research (IJSETR) ,2016.

[5] Shivam Gupta, Shivam Kashaudhan, Devesh Chandra Pandey, Prakhar Pratap Singh Gaur "IoT based Patient Health Monitoring System" International Research Journal of

Engineering and Technology (IRJET), 2017.

[6] Nagaravali Turlapati, Chandana Srinivas "Heart Rate and Activity Monitoring" International Journal of Computer Science & Communication Networks.

[7] Kunal Patil, Shraddha Zingade describes "Profile Based E- Healthcare Systems Using Internet of Things (IoT)" Volume 6 Issue No.9.

[8] J. W. P. Ng et al., "Ubiquitous monitoring environment for wearable and implementable sensors (UbiMon)", implementable sensors (UbiMon)", (UbiComp), Nottingham, Sep.2004,pp. 1-2

[9] Pandesswaran C , Surender S, Karthik KV (2016) "Remote Patient Monitoring System Base Coap in Wireless Sensor Networks".Int J SensNetwData commun 5:145V.

[10] D.Higgins, "Measuring body temperature", Nursing Times, Vol.108, June 22 2014.

[11] Benny P L Lo and Guang-ZhongYang, "Key technical challenges and implementation of body sensor networks".