DEVELOPMENT OF SMART HEALTHCARE MONITORING SYSTEM IN IOT ENVIRONMENT

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Abstract - *Healthcare monitoring* system in hospitals and many other health centers has experienced significant growth, and portable healthcare monitoring systems with emerging technologies are becoming of great concern to many countries worldwide nowadays. This paper proposes a smart healthcare system in IOT environment that can monitor a patient's basic health signs as well as the room condition where the patients are now in real-time. In this system, sensors are used to capture the data from hospital environment named heart beat sensor, body temperature sensor, room temperature sensor, CO sensor, and CO_2 sensor, blood pressure etc. In the traditional approach the healthcare professionals play the major role. They need to visit the patient's ward for necessary diagnosis and advising. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. In order to solve these two problems, the patients are given knowledge and information about disease diagnosis and prevention. Secondly, a reliable and readily available patient monitoring system (PMS) is required.*

The main objectives of this system is to transmitting the patient's health monitoring parameters through wireless communication This paper uses Arduino Board as an IOT device that interfaces five sensors and read the patient health parameters. These health parameters will be sent to cloud. Doctor and caretaker can access these values from cloud Proposed outcome of the project is to give proper and efficient medical services to patients by connecting, collecting, recording, analysing and sharing data information through health status monitors which we include patient's heart rate, blood pressure, body temperature, room temperature and send an emergency alert to patient's doctor with his current status and full medical information.

Key Words: IOT, Internet, Arduino , Sensors.

1. INTRODUCTION

In India, everyday many lives are affected because the patients are not timely and properly treated. Also for real time parameter values are not efficiently measured in clinic as well as in hospitals. Sometimes it becomes difficult for hospitals to frequently check patient's conditions. Also continuous monitoring of ICU patients is not possible. To deal with these types of situations, our system is beneficial. Our system is designed to be used in hospitals for measuring and monitoring various parameters like temperature, ECG, heart beat etc. The results can be recorded using Arduino as a microcontroller and displayed on a LCD display. Also the Doctors can login to a website and view those results. Health is one of the global challenges for humanity. In the last decade the healthcare has drawn considerable amount of attention. The prime goal was to develop a reliable patient monitoring system so that the healthcare professionals can monitor the patients, who are either hospitalized or executing their normal daily life activities. Recently, the patient monitoring systems is one of the major advancement because of its improved technology. Currently, there is need for a modernized approach. In the traditional approach the healthcare professionals play the major role. They need to visit the patient's ward for necessary diagnosis and advising. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. In order to solve these two problems, the patients are given knowledge and information about disease diagnosis and prevention. Secondly, a reliable and readily available patient monitoring system (PMS) is required. In order to improve the above condition, we can make use of technology in a smarter way. In recent years, health care sensors along with Arduino play a vital role. Wearable sensors are in contact with the human body and monitor his or her physiological parameters. We can buy variety of sensors in the market today such as ECG sensors, temperature sensors, pulse monitors etc. The cost of the sensors varies according to their size, flexibility and accuracy. The Arduino which is a cheap, flexible, fully customizable and programmable small computer board brings the advantages of a PC to the domain of sensor network.

The facilities in rural hospitals for health care are devices. No human interaction is required in this limited. Due to the lack of quality of health system as it contains autonomous feature through management enables issues in health care system which devices are controlled. .Everyone should be aware of their own health. Also, it should be beneficial for each. WHO defines the Health problems are increasing at a high rate now a doctor- patient ratio will be 1:1000 which has been failed in India. day. There is a lack of

resources to reach out the problems several sensors to collect information about human of individuals in developing countries. It becomes body parameters. It will be transmitted on an IoT very expensive for a common man to afford daily platform that can be easily retrieved by the health check-up of his health. The IOT various system unprofessional people through the internet. has been developed for this purpose to give assured History about patients health can be monitored and services. These system reduces time with safely handled equipment.

2. LITERATURE REVIEW

Here, in this section we are discussing about the Literature Review and some related work done for this project earlier.

[1] Alok Kulkarni, Sampada Sathe (2014), HealthCare is an emerging patient-centric model of health information exchange, which is often outsourced to be stored at a third party, such as cloud providers. However, there have been wide privacy concerns as personal health information could be exposed to those third party servers and to unauthorized parties. To assure the patients' control over access to their own HealthCare s, it is a promising method to encrypt the HealthCare s before outsourcing. Yet, issues such as risks of privacy exposure, scalability in key management, flexible access and efficient user revocation, have remained the most important challenges toward achieving fine-grained, cryptographically enforced data access control.

[2]Mir Sajjad, Hussain Talpur (2015), Now a days there is need of a novel patient-centric framework and a suite of mechanisms for data access control to HealthCare s stored in semi-trusted servers. To achieve fine-grained and scalable data access control for HealthCare, leverage attribute based encryption (ABE) techniques to encrypt each patient's HealthCare file. Different from previous works in secure data outsourcing, it focuses on the multiple data owner scenario, and divide the users in the HealthCare system into multiple security domains that greatly reduces the key management complexity for owners and users. A high degree of patient privacy is guaranteed simultaneously by exploiting multi-authority ABE.

[3] K. Natarajan, B. Prasath, P. Kokila (2016), This scheme also enables dynamic modification of access policies or file attributes, supports efficient on-demand user/attribute revocation and break-glass access under emergency scenarios. Extensive analytical and experimental results are presented which show the security, scalability and efficiency of our proposed scheme.

[4] Gaurav Sharma, Mehmet Aktas, Gonzalo Mateos, Burak Kantarci, Silvana Andreescu (2015), A project is initiated to address a wide spectrum of security issues within Healthcare by the European AIM/SEISMED (Advanced Informatics in Medicine/Secure Environment for Information Systems in Medicine). It also provides practical guidelines for secure healthcare establishment.

[5]In Cosmin Gabriel Toa der, have The vital signs or physiological parameters are the critical

factors to determine the individual's health status. These signs measurement are very important assessment, which includes counting the number of pulses in one minute and checking forehead palpation for body temperature manually. Monitoring them become critical procedure to gain information about the health status of patients in any given scenario. That is why there have been continuous improvement and enhancement of the vital signs collection equipment, transmission protocols and graphical presentation for the doctors in an informative and easy to understand approach.

[6]The values of all the bio-signals taken from different sensors of e Health platforms influence the medical professional's interpretation of a patient's overall condition and affect the course of treatment for each patient individually. Pulse is defined as the palpable rhythmic expansion of an artery produced by the increased volume of blood pushed into the vessel by the beating of the heart. In most clinical circumstances pulse rate is very similar to heart rate. Some other factors such as irregular pulse or if the person is cold, play a significant role in the inaccuracy of reading.

[7] Author has presented "An Overview on Heart rate Monitoring and Pulse Oximeter System". In this paper a low-cost device is described that measures the heart rate of the patient by placing sensors on the fingers, later the result will be displayed on LCD. The designed system can be used by unprofessional people. The change in heart rate can be displayed by graph using graphical LCD. Over a period of time, maximum and minimum heart rate can be displayed using the designed system. Abnormalities are displayed on LCD indicated by buzzer. In order to send heart rate to PC output should be attached.

[8] Author has presented "Heart rate Measurement from the Finger Using a Low Cost Microcontroller". IOT has a wide range of application. IoT has been developed for Wireless sensor network (WSN). Using IOT, health monitoring designs are presented. There are some problems that are related to health monitoring and IOT. New technologies help to minimize better quality as well as security concept. New technologies and methodologies are used. Aurdino board, Wi-Fi modules, temperature, pulse oximeter, blood pressure, heartbeat rate sensors are used in IoT.

[9] Author has presented, "Heart Attack Detection and Heart Rate Monitoring Using IOT". In this paper with the help of observed heart rate through IOT device, heart attack can be detected. Here the methods used by author includes Arduino board, Wi-Fi module and pulse sensor. Pulse sensor will start sensing the heart rate readings once the system is set and heart rate of the patient will be displayed on LCD screen. Data can be transmitted over internet with the use of Wi-Fi

module. By checking a patient's heart rate it can be determined if the patient is healthy or not based on heart rate displayed on the LCD screen. Limits are set to the system, heart rate of the patient is monitored and immediately alert message will be sent by the system if the heart rate goes below or above threshold value. They have implemented an application that will track and monitor heart rate of patient

[10] author has presented, "Heart Attack Detection and Heart Rate Monitoring Using IOT". In this paper with the help of observed heart rate through IOT device, heart attack can be detected. Here the methods used by author includes Arduino board, Wi-Fi module and pulse sensor. Pulse sensor will start sensing the heart rate readings once the system is set and heart rate of the patient will be displayed on LCD screen. Data can be transmitted over internet with the use of Wi-Fi module. By checking a patient's heart rate it can be determined if the patient is healthy or not based on heart rate displayed on the LCD screen. Limits are set to the system, heart rate of the patient is monitored and immediately alert message will be sent by the system if the heart rate goes below or above threshold value. They have implemented an application that will track and monitor heart rate of patient.

[11] author has proposed "Survey Paper for Health Recommender System". Here various parameters of the human body are detected by the designed health monitoring system. Later this data is made available to doctors via internet. In case of emergency when the person is not in a state of conscious, the alerts will be generated automatically and sent to the doctor. Here records of health parameters can be instantly used. People pay attention towards prevention and early identification of disease, Author has examined arduino based health monitoring system. Disability can be detected in the health through sensors through internet and informed to the particular person. The proposed architecture is efficientient and easy to understand. It plays as a connection between doctor and patient.

3. PROPOSED SYSTEM

The proposed system consists using Arduino microcontroller with Wireless Body Area Sensor Network. The sensors are used here Temperature sensor, Blood pressure sensor, Heart beat sensor. These sensors are placed on human body which are helps to monitor the health condition without disturbing the daily routine of the patients and these health related parameters are then communicated to physicians server using long range wireless technology.

The brief working of the above can be explained with the help of some important points as follows:

[1] Start the Hardware, then sensor senses the physical parameter. This physical parameter or Non-electrical get Converted into Electrical form.
[2] After that, That Electrical data send Towards the Micro-controller then that will analyze.
[3] And transmitted towards server or PC/ mobile and saved as files.
[4] Check the condition, if everything all Right the message will not send otherwise data will transmit towards Doctor and/or family member.
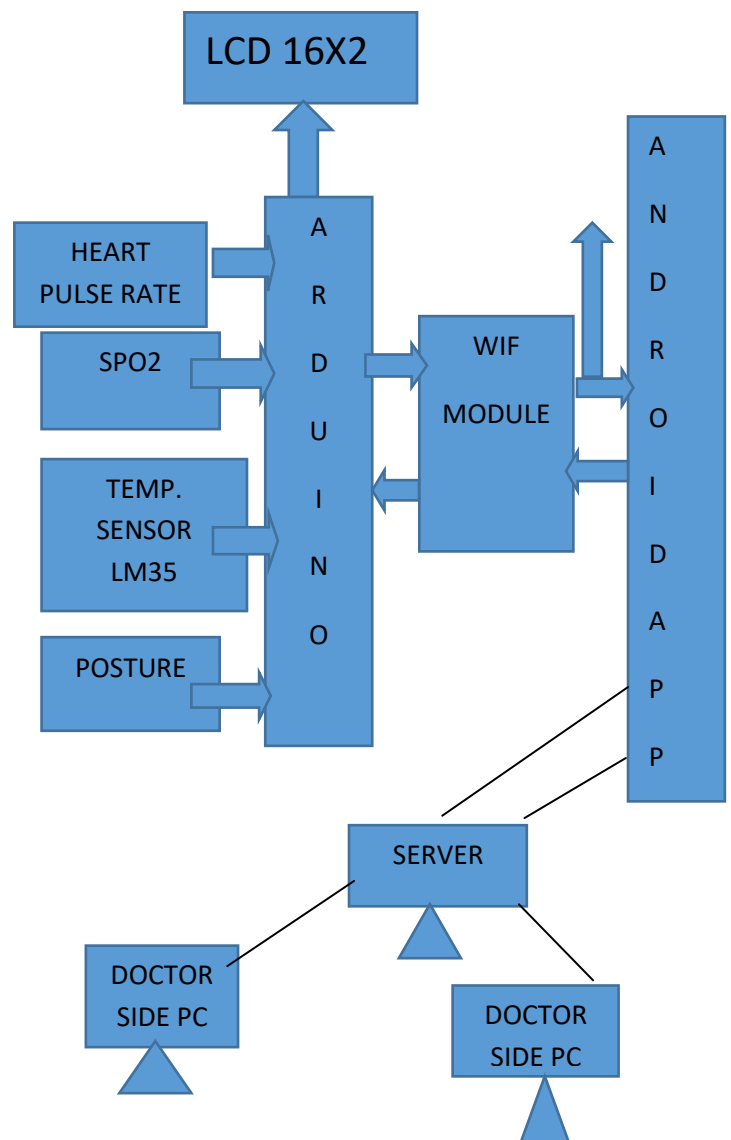

Fig 1: Architecture of Proposed work

4. SENSORS-

1. Temperature Sensor: Temperature sensors enable accurate non-contact temperature measurement in medical applications. The most common applications for this type of temperature sensor is measuring human body temperature.

2. SPO2 Sensor: This sensor can be used for to estimate the oxygen saturation level in the blood.

3. Heart Pulse Rate Sensor: The heart sensor measure the pulse wave, which are changes in the volume of a blood vessel that occur when the heart pumps blood.

4. Posture Sensor : Posture sensor is used to sense the human body posture , means whether it is horizontal position or vertical position.

5. Hardware used:

Arduino: The Arduino Nano, as the name suggests is a compact, complete and bread-board friendly microcontroller board. The Nano board weighs around 7 grams with dimensions of 4.5 cms to 1.8 cms (L to B). This article discusses about the technical specs most importantly the pinout and functions of each and every pin in the Arduino Nano board.

6. CONCLUSION

The main idea of the proposed system is to provide better and efficient health services to the patients by implementing a networked information cloud so that the experts and doctors could make use of this data and provide a fast and an efficient solution. The final model will be well equipped with the features where doctor can examine his patient from anywhere and anytime. Emergency scenario to send an emergency mail or message to the doctor with patient's current status and full medical information can also be worked on.

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