

Health Monitoring Services Using Wireless Body Area Network

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1. Abstract :Many of the healthcare facilities in today's life are not much reliable. Nowadays, internet became one of the most important factors in our life. Our project health monitoring services using WBAN will provide the online health monitoring to the patient. This system will provide more protective preventive healthcare that will not only improve the quality of life, but also reduce the healthcare cost. Doctors can check the complete details of patients from remote location and can recommend a suitable medication. The main purpose of this technology is to reduce the load at hospitals and provide efficient healthcare facility remotely using medical implant communication system and Wireless medical telemetry system. To monitor the patients in their natural environments is not practical when devices or sensors are connected through a wire that is why we use Wireless body area network (WBAN) to carrying out daily activities through unobtrusive and contented way. This technology can provide very cheaper, easier and quick respondent history of patient. This system will surely help to save the time of doctor and patient.

1. Introduction

Current Healthcare systems need updates for better and modified systems in it. Healthcare systems are facing new challenges due to the rate of growth of the elderly population due to increase in medicinal facilities. According to the Census, the number of old people is predicted to double from the millions by 2025. This trend shows that the world's population will increase from few million to many million in 2025. Furthermore, overall healthcare facilities in the trillion in 2000, and this number is projected to be double by 2020, or 20% of the Gross Domestic Product. The impending health crisis attracts economists, peoples toward optimal and quick health facilities or solutions.

The online health monitoring of patients data with real time updates of medical register via the internet provides economical and financial solutions to the problems that health care systems face. The health monitoring through internet

remotely of body status and the environment is therefore becoming more important for the activities, patients relatives, military and other health care services. The levels of fitness required for the every sporting event require athletes, sportsmen's to be at the very pinnacle of health with every body part used to its utmost. Consider a patient visiting a doctor for a blood pressure checkup. He may be anxious and thus have raised pressure resulting in an incorrect diagnosis. If, however, the patient can be fitted with a simple monitoring system that requires no intervention, then a picture can be built up of how the pressure changes throughout the day when he goes about their normal duties.

This system of health monitoring will help the peoples to easily access the medical facilities. The system will provide the better health caring and time consuming features for both doctor and patients.

2. Existing Systems

Many of the peoples in rural areas are not aware of the recent and updated medical facilities. They are still using traditional medical processes like Classical Thermometer and Sphygmomanometer, Haemocytometer. These methods are also time consuming and costly. Doctors are needed to go to the patient each and every time for their regular checkups. Due to all such reasons many people causes to high death rate. Illiteracy and unawareness about health facilities are two main reasons behind it. Many of the old age peoples in today's era are needs to checkup their body in particular span of time due to increasing tension and stress. Stress is the most important factor which is affecting our health systems. There is a need to do something about it and live a life freely and stress-free.

3. Disadvantages Of Existing Systems

To overcome the health related problems such as not getting proper healthcare and not getting services in time we are trying to make a online healthcare services which will surely help to all

peoples to get timely and better healthcare services. In big hospitals the doctor is not always available to the patient each and every time. He/she might be busy as they need to visit many hospitals within the same city. So we are trying to retrieve the patient's data on doctor's smartphone such that he/she can easily examine the patient's data remotely. We can implement this system in-house also so that the old age peoples having regular BP checkups can send the data to doctor by sitting in the home only.

4. Proposed Systems SYSTEM ARCHITECTURE

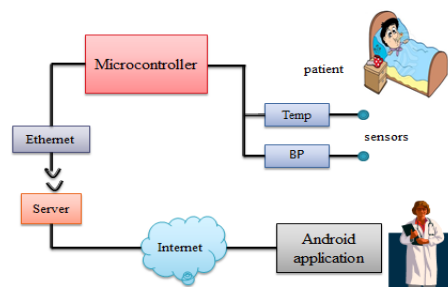


Fig. System Architecture Diagram

Many of the big hospitals and medical centers have their specialist doctors. But it is not possible they are available 24*7 to the patient's within the same hospital. They need to visit another hospital or they might be busy somewhere else. Hence we are implementing this project. Our main aim is to retrieve the patient's data on the doctor's Smartphone so that he/she can access the patient's data remotely. In our project first we will register the patient and doctor of the hospital i.e. we are providing the patient the unique identification number which will be then saved on the server, and then in our project health monitoring services using WBAN we are connecting two sensors to the patient's body to measure the temperature and blood pressure of the body i.e. LM35 sensor for measuring temperature and Pulse sensor for measuring the blood pressure. The temperature sensor gives the digital output and the Pulse sensor gives analog output, here we are using the A/D converter for the Pulse sensor. After collecting both sensors input we give it to the microcontroller. We are using AVR microcontroller here. Microcontroller will save the temporary data collected from the sensors. Then microcontrollers logical unit also determine the threshold values of the temperature and blood pressure. This is because we need not to send all the data coming from sensor to the doctor. This data can be normal and hence we are sorting the data into critical and non-critical. After sorting the data the critical data is then stored on the server. Apache tomcat is the

server we are using in our project we are using the Ethernet module to establish the connection into server and microcontroller. The data is stored on server in the table format each row is updated as the data is coming from the microcontroller. The server is also provided with the patient's historical data which will contain the patient's name and the illness and also their values of blood pressure and temperature. Then we are using the internet connection to send the server data to the doctor's Smartphone. Doctor will then get the notification on his/her Smartphone that the particular patient with their name and Id number has certain change in the temperature or blood pressure values. Doctor can easily access the data anytime anywhere just on his/her Smartphone.

This system is reliable for big hospitals and medical centers and it can also be used in the rural areas so that the many of the peoples get the medical facilities in their town only they are not needed to go to the doctor each and every time. And also many of the old age peoples who have the regular blood pressure checkups can use the system in-house only.

HARDWARE REQUIREMENT

Sensors:

a. LM 35 Temperature sensor

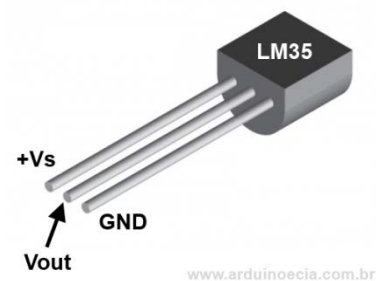


Fig. LM35 SENSOR

Temperature sensors are devices used to measure the temperature of a medium. There are 2 kinds on temperature sensors: 1) contact sensors and 2) noncontact sensors. However, the 3 main types are thermometers, resistance temperature detectors, and thermocouples. All three of these sensors measure a physical property (i.e. volume of a liquid, current through a wire), which changes as a function of temperature. In addition to the 3 main types of temperature sensors, there are numerous other temperature sensors available for use.

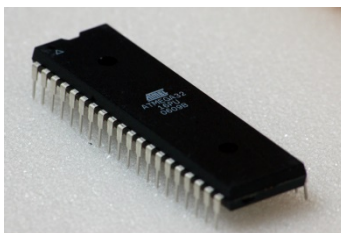
b. Pulse Blood Pressure sensor



Fig. PULSE SENSOR

It is usually measured at a person's upper arm. Blood pressure is usually expressed in terms of the systolic (maximum) pressure over diastolic (minimum) pressure and is measured in millimeters of mercury (mm Hg). It is one of the vital signs along with respiratory rate, heart rate, oxygen saturation, and body temperature. Normal resting blood pressure in an adult is approximately 120/80 mm Hg.

C. Micro-controller



Microcontroller is a small computer on single integrated circuit containing a processor core, memory and programmable input/output peripherals. Their programming memory is in the form of RAM or flash. These are used in automatically controlled products and devices such as automobile engine, implantable medical devices.

In our project we are using the AVR microcontroller which will collect the sensors information and set the threshold values for it. This will also save the temporary values.

SOFTWARE REQUIREMENT

Web server

Apache Tomcat server is used in our project. Tomcat is a web server and a web container. it is not really meant to function as a high performance web server, nor does it include some features typical of a web server. Tomcat is useful if you

don't have an high performance server requirements and/or want to embed a relatively simple web server with container functionality. Apache tomcat with version 8.0.33 is available.

Android application

World is growing with mobile phone technology. Android apps are written in the Java programming language. The Android SDK tools compile your code—along with any data and resource files—into an APK: an *Android package*, which is an archive file with an .apk suffix. The Android operating system is a multi-user Linux system in which each app is a different user. There are different components are used for Android Development. They are activities, services, content provider and Broadcast receivers

SQLite

SQLite is the database engine used in android for data storage purposes. It gives higher performance. In SQLite queries and data retrieval is robust. It helps in relating data with each other. It uses create, delete commands to manage the database.

JSON

JSON is Java Script Object Notation. JSON is an open standard format. It uses human-readable text to transmit data objects consist of attribute–value pairs. JSON provides data in form of object that is to be parsed while reading form source and a JSON object is created, whenever data is to be transmitted over network or any source to destination. JSON is very light weight, structured, easy to parse and much human readable. JSON is best alternative to XML when your android app needs to interchange data with your server.

ADVANTAGES OF SYSTEM

It is useful in big hospitals to monitor patient remotely. It saves the time of doctor as well as patient. Our system is Cost efficient. This technology can provide very cheaper, easier and quick respondent history of patient. The main purpose of this technology is to reduce the load at hospitals.

5. Future Scope

We can use the cloud instead of server to store the patient's data and retrieve it easily .It is easily available for authenticated people to retrieve data at anytime and anywhere. We can provide required medicines information on android application.

6. Conclusion

This work proposed architecture of Wireless Body Area Network (WBAN) in which we retrieve's the patient's data on Smartphone using sensors. Patient's all data stored on server only critical data that is temperature and blood pressure value is send on android application.

7. Acknowledgement

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