AUTOMATIC HEALTH MONITORING SYSTEM USING RASPBERRY PI

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ABSTRACT:

In the advancement of Internet technologies all machineries are inter related. Using the technology improvement, we can make many things in high effective and simple for human life. There are several places of Internet of Things (IOT) is used. Such as smart environment, smart home, smart city, smart parking, agriculture fields and medical fields.. In this paper, monitor patient's heart rate, body temperature, Respiration rate and body movements using Raspberry Pi . After connecting Internet to the Raspberry Pi board it act as a server.. If these parameters are goes to abnormal, it will automatically sends alert message to the doctor. The data send by Raspberry pi is stored on a server. The detailed information of patients and doctor is registered through website on stored on server. The website can be accessible from anywhere only for patients, it also useful for normal people to check the health status by using wearable devices with sensors. Wireless Sensor Network (WSN) for monitoring patient's physiological conditions continuously using Raspberry Pi for acquiring the observed patient's physiological signal.

Keywords-Raspberry pi, EeG, Healthcare applications,Internet of things, , Heartbeat sensor, Temperature sensor, Respiration sensor, Accelerometer sensor, Internet of Things

I.INTRODUCTION

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 advancements 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 raspberry pi 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 Raspberry

Pi which is a cheap, 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 (ECG, temperature, heart rate, pulse, etc) different available sensors. This sensor collected data i.e. biometric information is given to raspberry pi and then it is transferred to server. Biometric information gathered can be wirelessly sent using different options available such as Wi-Fi, 3G, GSM, Bluetooth, 802.15.4 and ZigBee depending on the application . The data stored in a database and can be displayed in a website that can be accessed only by authorized personnel . The doctors, RMOs, patient or his family members can be given authorization. The system even facilitates the doctor to view the patient's previous history from the data in memory. The system utilizes an optical mechanism to measure the modulations generated by electrical or physical variations in the heart movements.

- Wired communication is eradicated.
- Real time monitoring of the patient is possible.
- The doctor does not need to visit the patient to monitor him/her.
- Time is saved for both patients and doctor.
- Helpful in emergency period.
- Routine checking of the patient can be done easily.
- Useful for remote areas.
- Once installed, the maintenance cost is very low.
- Easy to use (Even illiterate people can operate it).
- Increases access to health care while decreasing the healthcare delivery costs.

- The device utilizes a GSM module to send the data in the form of SMS to a mobile device for better portability of the system.
- The device has a functionality of showing both the time and date of the measured data

A.Sensors

The part is the sensors part that consists of different health sensors like heartbeat sensor, temperature sensor.

1. Heartbeat sensor

2. Temperature sensor

Sensors are the wearable sensors are placed at the patient's body. Sensors sense the patient body parameters like heartbeat, temperature. The sensed data from the sensors send to the sensor node
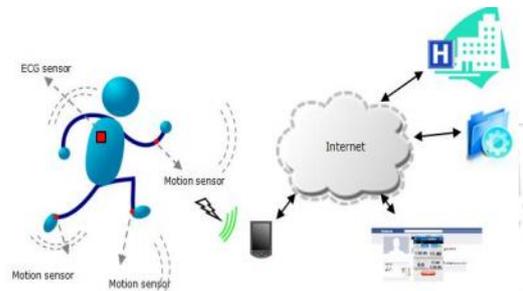

Fig 1.sensor

II.LITERATURE SURVEY

A. Real Time Wireless Health Monitoring Application using Mobile Devices

Patient monitoring system and control using feedback and GSM technology is used to monitor the different parameters of an ICU patient remotely and also control over medicine dosage is provided. This system enables expert doctors to monitor vital parameters viz body temperature, blood pressure and heart rate of patients in remote

areas of hospital as well as he can monitor the patient when he is out of the premises [8].

B. GSM based tele alert system

A module that provides mobility to the doctor and the patient, by adopting a simple and popular technique, detecting the abnormalities in the bio signal of the patient in advance and sending an alert SMS to the doctor through Global system for Mobile(GSM) thereby taking suitable precautionary measures thus reducing the critical level of the patient [9].

C. A Multi-Alert Patient Health Monitoring using Zigbee

Wireless sensor network is a growing field showing tremendous applications in the areas of medical assistance in hospitals. According to the Medical Statistics, everyday many patients' lives are affected due to negligence in the part of providing immediate care to the patients. Sometimes it is difficult for the staff in the hospitals to race against the time to reach the patient. Solution to this is a need of system that can measure patient health constantly. The main goal of this paper is to alert the staff in the hospitals in case of emergency. This system is designed using sensors and wireless technology with the help of Microcontroller. Sensors will continuously monitor the vital signs until an abnormal condition is detected. After detecting the abnormal condition, alert system comes into action which acts as a multi-alert system.

D. Low Cost and Portable Patient Monitoring System for E-Health Services in Bangladesh

This Paper Propose An Efficient Low Cost & Portable Patients Health Monitoring System. A Raspberry Pi Based System Is Developed for Collecting Sensed Data from Sensor (Sensors like Temperature, Blood Pressure, Oximeter Etc. Are Used) This Signals From Patients Will Be Send To Doctor For Remotely Analyzing The Patients Health Report. A Web Based Application Has Been Developed For Both Patients and Doctors through Which They Can Even Communicate With Each Other. This System Can Be More Useful For The Peoples From Rural Areas

E. Health Gear: A Real-Time Wearable System for Monitoring and Analysing Physiological Signals

A Health Gear Presents A Real Time Wearable System For Monitoring, Visualising And Analysing Physiological Signals. Set Of Non-Invasive Physiological Sensors Are Wirelessly Connected To A Cell Phone, Which Stores, Transmits And Analyses The Physiological Data And Then It Presents It To The User In An Appropriate Way. Set Of NonPervasive Sensors Are Part Of Health Gear. To Monitor The Users Blood Oxygen Level And Pule While Sleeping, We Focus On Implementation Of Health Gear Using A Blood Oximeter. Also The Two Different Algorithms We Use For Automatically Determining Sleep Apnea Events And For Illustrating The Performance Of The Overall System In Sleep Study With 20 Volunteers

II.IMPLEMENTATION
A.Raspberry Pi:
The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. The Raspberry

Pi Model B+ has dual core ARM11 processor with 512MB SDRAM and powers through Micro USB socket of 5V. Sensors are connected to the Raspberry Pi Model B+.Raspberry Pi sends the information to servers through GSM module.

The interconnection between different components is explained using the architecture of system. Architecture diagram is shown in figure 1. The patients connect the sensors to their body and the other end of the sensors is connected to Raspberry Pi. The data acquired by sensors is stored in the Raspberry pi B+. The data values (i.e. Biometric data) are shown on LCD display and at the same time if the values exceed the normal range, the alarm triggers. The values stored are sent to server with the help of GSM. All the values are stored on the server and the most recent value is displayed on webpage. The doctor along with their login credentials can login and see the patient data. Doctors can see all previous records of a patient and suggest medicines and changes in prescription. Also patients are given unique user id and password to view their records
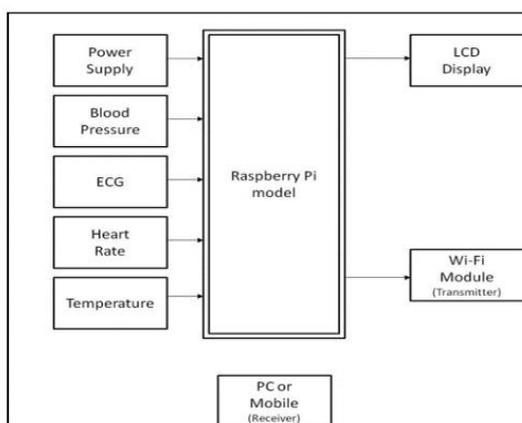

Fig 2. Raspberry

- Raspberry pi is used for this application because of its multi-tasking capability and low power consumption

- Also this system can be installed easily in all the hospitals and huge data obtained can be stored in the database. Moreover this data is much valuable
- Raspberry Pi, with its broad variety of features can be used for several purposes and have much scope in future

Problem definition of our underlying system which is basically useful for doctor's for monitoring patient's
- Health parameter and gets the accurate result.
- The doctors are continuously monitor the health parameter of icu patients from any location and virtually connected to the patient through website.
- Also through this system real time parameter values can be measured so this system is beneficial for
- Hospitals as well as in clinic also.
- Through this system, the doctor can able to calculate temperature, ecg, heart rate values efficiently and store data on raspberry pi temporarily.
- The values are in form of - temperature we are getting celsius, heart rate in pulses, ecg in percentage shown on display as well as on website.
- The any threshold value will be fluctuating from specified value then the alarm will be triggered which is connected through raspberry pi and rmo's get the alert.

B.STEPS
Import all the modules required for Serial Communication, MySQLdb.
- Communicate with the ECG's connected to Raspberry Pi.
- Find the heart beat from the input data.

- Update the website database with new health parameters.
- Check if the heart beat is in the normal range.
- If heart beat is not in normal range alert the authorized
- person by sending SMS through GSM module and alert
- in the hospital through buzzer sound.
- Delete the message in SIM card to make space.
- If heart beat is in normal range monitoring continue

IV.CONCLUSION

As health care services are important part of our society, automating these services lessen the burden on humans and eases the measuring process. Also the transparency of this system helps patients to trust it. When threshold value is reached, the alarm system that consists of buzzer and LED alerts the doctors and he can act more quickly. The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure.

GSM

The GSM technology helps the server to update the patient data on website. Many further improvements can be made in our system to make it better and easily adaptable such as adding more advanced sensors. The biometric information of the patient which is stored and published online can be given to scientists and researchers of medical fields to analyze the value and find patterns or for other research work. To simplify the hardware and reduce wiring we can have used wireless sensors.

Future Work

Instead of medical application we can use our system in industrial and agricultural application by using sensors like humidity sensors, fertility check sensors, etc.

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