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Smart Health Care Monitoring using Internet of Things and Android

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***Abstract*— In the recent development of, Internet of things(IOT) makes all objects interconnected and it has been recognized as the technical revolution. One of the application is in heath care to monitor the patient health status internet of things makes medical equipments more efficient by allowing real time monitoring of patient health, In which acquire data of patient's and reduce the human errors. In internet of things patient's parameters get transmitted through medical devices via a gateway, where it is stored and analyzed. The significant challenges in the implementation of internet of things for healthcare applications are monitoring all patients from various places. Thus internet of things in the medical field brings out the solutions for effective patient monitoring at reduced cost and also reduces the trade- off between patient outcome and disease management. In this paper discuss about, monitoring patient's body temperature and heart beat using arduino board.**

***Index Terms:-* IOT, Arduino Board, Sensors, Bluetooth, Patients, health care.**

I. INTRODUCTION

The objective of this project is to monitor and improve the quality of care of people in remote location and to provide continuous information about the patient for making better healthcare decisions in critical situation and to reduce the regular checkup of the aged patients. It helps the doctor to monitor their patients at any time apart from their consulting hours. Improved home care facilities and regular health updates to clinicians reduce the chances of redundant or inappropriate care. It improves patient care and safety by reduction in overall costs for care.

Internet of Things (IoT), gather and share information directly from patients and it also make possible to collect, record and analyze new Data Stream faster and more accurately. As the technology for collecting, analyzing and transmitting data in the IoT continues to mature, with the help of sensors, actuators, and computing devices. This provides data communication capabilities. These are linked to networks for data transportation. This connected healthcare environment promotes the quick flow of information and enables easy access to diseases such as hypertension, diabetics and cardiac diseases which needs continuous monitoring. This Internet of Things (IoT) is increasingly recognized by the researchers and analysts as one of the most sophisticated technologies for health monitoring and it is safety for people and it also tackled by all.

The ability of the devices to gather data on their own removes the limitations of human intervention and it reveals the data-automatically and send it to the doctor whenever they needed. The automation reduces the risk of error. This type of solution employs sensors to collect comprehensive physiological information and uses gateways and the cloud to analyze and store the information and then send the analyzed data wirelessly to caregivers for further analysis and review. It replaces the process of having a health professional come by at regular intervals to check the patient's vital signs, instead providing a continuous automated flow of information. In this way, it simultaneously improves the quality of care through constant attention and lowers the cost of care by eliminating the need for a caregiver to actively enhance in data collection and analysis. Powerful wireless solutions connected through the IoT are now making it possible for monitoring the patients. These solutions can be used to securely capture patient health data from a variety of sensors, apply complex algorithms to analyze the data and then share it through wireless network, for medical professionals who can give appropriate health recommendations for the patients.

II.METHODOLOGY

In this paper, the sensing devices from the patient are connected to the ARUDINO and programmed to convert the sensed data from the patient to readable signals and then transfer the signal wirelessly to IoT or the doctor's checking

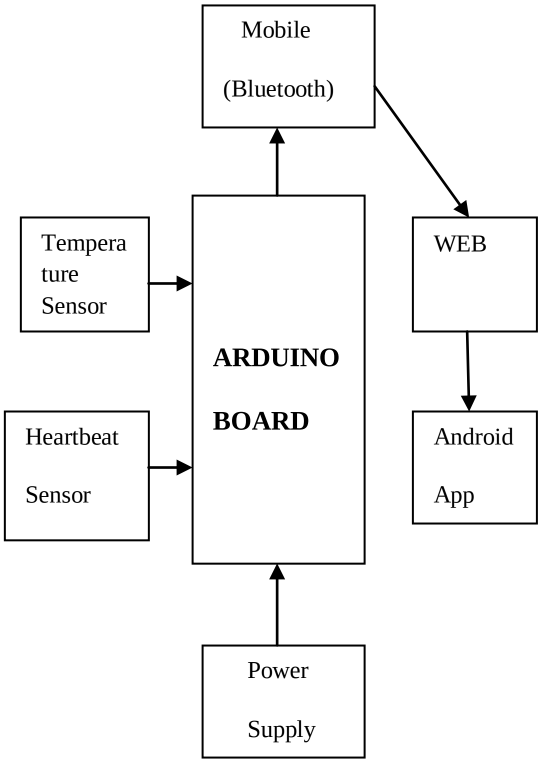

Fig1: Block Diagram

A. HEART RATE SENSOR

Heart rate is a very vital health parameter that us directly realted to the soundness o the human cardiovascular system. This project describes a technique o measuring the heart rate through a fingertip Using a Arduino Board. While the heart is beating, it is actually pumping blood throughout the body, and that makes the blood volume inside the finger artery to change too. This fluctuation of blood can be detected through an optical sensing mechanism placed around the fingertip. The signal can be amplified further for the Arduino Board to count the rate of fluctuation, which is actually the heart rate.

B. TEMPERATURE SENSOR (LM35)

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in Celsius). It can measure temperature more accurately than using thermistor. The sensor circuitry is sealed not subject to oxidation. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. The LM35 has an output voltage that is proportional to the Celsius temperature. The scale factor is 0.1V/^{o}C.

C. ARDUINO BOARD

Arduino is a computer hardware and software company, project, and user community that designs and manufactures microcontroller kits or the building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser Public License(LGPL) or GNU General Public License(GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. Arduino boards designs use a variety o microprocessors and controllers. The boards are equipped with sets of digital and analog input/output(I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus(USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an Integrated Development Environment (IDE), based on the processing language project.

The Arduino project started in 2005 as a program or students at the Interaction Design Institute Ivrea, in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

D. WIRELESS NETWORKING

The data transmission components o the system are responsible for conveying records of the patient from the patient's house (or any remote location) to the data centre of the hospital with assured security and privacy, ideally in real-time. The information hubs that collect sensor data and analyze it and then communicate it to the IP address, which is created to send the details about the patient condition to doctor. Gateways can be designed for the clinic to transfer the data. Medical device designers can also use this platform to create remote-access devices for remote monitoring.

III. RESULT ANALYSIS

A. PULSE RATE RANGE:

Table1: Tabular form of pulse rate range

STATUS	BPM
REST/NORMAL	60-100
SLEEPING	40-50
TACHYCARDIA	>100

Description: If the beats per minute is 40-50 then the condition of the patient is sleeping. If the beats per minute is 60-100 then the patient condition is rest/normal. In critical conditions the beats per minute is >100 then doctor gets alert and will alert patient to admit in hospital.

B.SAMPLE TEMPERATURE DATE OF SEVEN PATIENTS UNDER OBSERVATION:

Table2: Tabular form of temperature readings

PATIENT ID	DAY1 Current TEMP	STATUS
P1	96.5^{o} F	Normal
P2	94.3^{o}F	Normal
P3	99.3^{o}F	Abnormal
P4	102.6^{o}F	Abnormal
P5	101.2^{o}F	Abnormal
P6	112.8^{o}F	Abnormal
P7	92.6^{o}F	Normal

Description: For different patients temperature readings are noted and if the temperature readings are >98.3^{o} F then the condition of the patient is abnormal, he should be under the guidance of doctor.

IV. CONCLUSION

Health of the patients are monitored using internet o things (IoT) and enables the doctor to monitor their patients outside the clinic and also apart their consulting hours. Connected health care devices utilize resources to provide an improved quality of care, leading to better clinical outcomes. Measureable benefits of connected medical devices include reduces clinic visits, including reduction in bed days of care and length o stays in hospitals. Using Internet of Things (IoT), patient conditions are obtained and stored for further analysis. In this project the heart rate and blood pressure o patient are monitored.

From this work it is expected to monitor the whole body of the patient from remote location and improve the technology to world widely for patient monitoring by providing personalized and optimized services, it will promote a better standard of living. Nations across the world to improve patient care and IoT provides a timely and cost-effective response to those critical situations. Healthy and active people can also benefit from IoT-driven monitoring of their well-being, It also enables features for the aged persons who want only a monitoring device that can detect a fall or other interruption in every day activity and report it to emergency responders or family members.

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