IJESC

Patient Health Monitoring System using Internet of Things

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Abstract:

Among the panoply of applications enabled by the Internet of Things (IoT), smart and wireless health care is a particularly important one. This paper deals with design and developed for remote patient monitoring in healthcare field. The primary function of this system is to constantly monitor inpatients and outpatients physiological parameters such as pulse rate, temperature using wireless communication. Chronic diseases and cardiovascular diseases are the biggest challenge for India and these diseases are the main cause of hospitalization for elder people. In hospitals, where patient's physiological parameters are needed to be constantly monitored, is usually done by a doctor or other paramedical staff for maintaining a record of it. It is a tedious method. In this proposed system real time monitoring continuously reads patient's pulse rate or heart beat rate and body temperature through Fingertip Measuring Heart rate sensor and Thermistor Temperature Sensor. These values will be send to mobile application or and webpage using wireless communication for further analysis. By using data mining approaches, the system is trained for vital sign data. Patients give their measures to the system and know their health status without any nurse help. This system enables high risk patients to be timely checked and enhance the quality of a life of patients.

Keywords: Sensor; GSM module; MQTT

I. INTRODUCTION

Chronic diseases and cardiovascular diseases are the biggest challenge for India and these diseases are the main cause of hospitalization for elder people. In hospitals, where patient's physiological parameters ar needed to be constantly monitored, is usually done by a doctor or other paramedical staff for maintaining a record of it. It is a tedious method. In this proposed system real time monitoring continuously reads patient's pulse rate or heart beat rate and body temperature through Fingertip Measuring Heart rate sensor and Hermiston Temperature Sensor. These values will be send to mobile application or webpage using wireless communication for further analysis. Data can be transmitted and viewed by anywhere around the world. Formatter will need to create these components, incorporating the applicable criteria that follow.

II. LITERATURE SURVEY

A. Zigbee and GSM Based Patient Health Monitoring System

Care of critically ill patient, requires spontaneous &accurate decisions so that life-protecting & lifesaving therapy can be properly applied. Statistics reveal that every minute a human is losing his/her life across the globe. More close in India, everyday many lives are affected by heart attacks and more importantly because the patients did not get timely and proper help .This paper is based on monitoring of patients. We have designed and developed a reliable, energy efficient patient monitoring system. It is able to send parameters of patient in real time. It enables the doctors to monitor patient's health parameters (temp, heartbeat, ECG, position) in real time. Here the parameters of patient are measured continuously (temp, heartbeat, ECG) and wirelessly transmitted using Zigbee. This project provides a solution for enhancing the reliability and flexibility by improving the performance and power management of the patient monitoring system. In the current

proposed system the patient health is continuously monitored and the acquired data is analyzed at a centralized ARM microcontroller. If a particular patient's health parameter falls below the threshold value, an automated SMS is sent to the pre-configured Doctor' mobile number using a standard GSM module interfaced to the ARM microcontroller. Here, we are using Zigbee for wireless transmission. The Doctor can get a record of a particular patient's information by just accessing the database of the patient on his PC which is continuously updated through Zig bee receiver module

III.PROPOSED METHODOLOGY

This paper proposed a methodology based on health monitoring that overcomes the above mention disadvantages. This project is designed to reduce the work of visiting the hospital for usual check up for the patients. To protect the ill patients & aged persons by embedded system based real time patient distance monitoring system using GSM/GPS technologies. Sensors such as temperature, gas, fall detection, heart rate and blood pressure rate adopted in this work to effectively maintain the proposed health monitoring system. A monitoring system, specifically designed for cardiac care with electrocardiogram (ECG) signal analysis as the core diagnostic technique, could play a vital role in early detection of a wide range of relating to the heart, from a simple arrhythmia to life threatening conditions such as myocardial infarction. The system that have developed consists of three major components, namely,

(a) mobile gateway, deployed doctor-patient's relationship mobile device, that receives 12-lead ECG signals from any ECG sensor,

(b) remote server component that hosts algorithms for accurate annotation and analysis of the ECG signal and (c) point of care device of the doctor to receive a medical

diagnosis report from the server hardware on the analysis of ECG signals. The focus has been toward developing a system capable of detecting critical heart disorder events well in advance using an advanced remote monitoring system. A system of this kind is expected to have applications ranging from tracking wellness/fitness to detection of symptoms leading to fatal related to critical events Vital signs are measurements of the body's most basic functions. The main vital signs routinely measured by health care unit and doctors are:

- Body temperature
- Pulse rate
- Respiration rate (rate of breathing)
- Blood pressure

(The Blood pressure is not considered a vital sign, but is often measured along with the vital signs.)Vital signs are used to detect and monitor medical problems. In this system temperature, pulserate, ECG is considered. The body temperature of a person normally varies depending on gender, recent activity, food and fluid consumption, time of day, and, in women, the stage of the menses cycle. For a healthy adult the normal body temperature can range from 97.8 degrees Fahrenheit (36.5 degrees Celsius) to 99 degrees Fahrenheit (37.2 degrees Celsius).The pulse rate is a measure of number of times the heart beats per minute and the heart rate. The arteries expand and contract when heart pushes blood through arteries. The pulse measured only measures the heart rate, but also can represent the Heart rhythm and Pulse strength. The normal pulse value for the healthy adults ranges from 60 to 100 beats per minute. During exercise, illness, injury, and emotions the pulse rate may fluctuate and increase. Than males, 12 age and older females tend to have faster heart rates. Athletes, such as runners, may have heart rates near 40 beats per minute due to cardiovascular conditioning and experience no problems. According to the National Heart, Lung, and Blood Institute (NHLBI) the high blood pressure for adults is given as

- 140 mm Hg or greater systolic pressure
- 90 mm Hg or greater diastolic pressure

In an update of NHLBI guidelines in 2003 for hypertension, a category of new blood pressure called pre hypertension

- 120 mm Hg – 139 mm Hg systolic pressure
- 80 mm Hg – 89 mm Hg diastolic pressure

The NHLBI guidelines specify normal blood pressure as follows

- Below 120 mm Hg systolic pressure
- Below 80 mm Hg diastolic pressure

A.Block Diagram
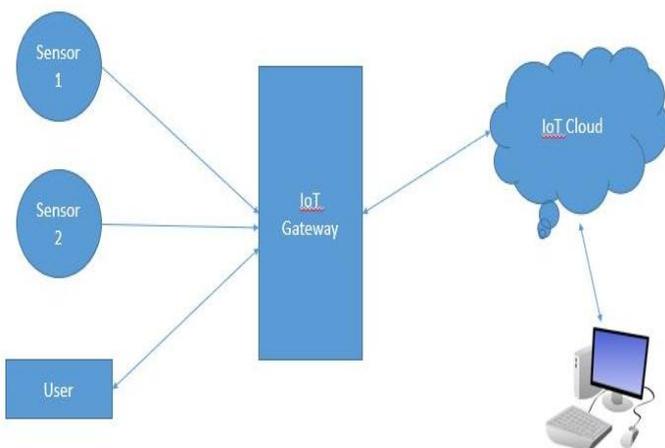

III.TECHNOLOGIES USED

A..*Node Js*
Node.js is an open-source, cross-platform JavaScript run-time environment for executing JavaScript code server-side. Historically, JavaScript was used primarily for client-side scripting, in which scripts written in JavaScript are embedded in a webpage's HTML, to be run client-side by a JavaScript engine in the user's web browser. Node.js enables JavaScript to be used for server-side scripting, and runs scripts server-side to produce dynamic web page content before the page is sent to the user's web browser. Consequently, Node.js has become one of the foundational elements of the "JavaScript everywhere" paradigm, allowing web application development to unify around a single programming language, rather than rely on a different language for writing server side scripts.

B. *Codeversion AVR*
AVR is a family of microcontrollers developed by Atmel beginning in 1996. These are modified Harvard architecture 8-bit RISC single-chip microcontrollers. AVR was one of the first microcontroller families to use on-chip flash memory for program storage, as opposed to one-time programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time. AVR microcontrollers find many applications as embedded systems; they are also used in the Arduino line of open source board designs. Atmel says that the name AVR is not an acronym and does not stand for anything in particular. The creators of the AVR give no definitive answer as to what the term "AVR" stands for. However, it is commonly accepted that AVR stands for Alf and Vegard's RISC processor. Note that the use of "AVR" in this article generally refers to the 8-bit RISC line of Atmel AVR Microcontrollers.

C. *Architecture Diagram:*

Architecture Design
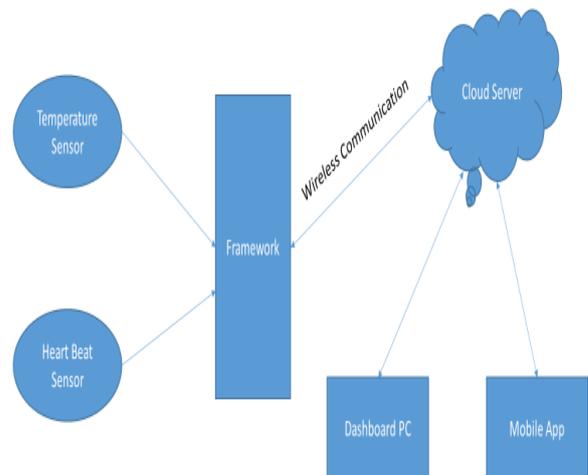
D. *SCOPE:*
• With the above mentioned system, keeping this as the basic foundation in Tele-medical fields we can build a more robust system that helps in integration of inpatient and out-patient services.
• We can integrate various services such as messages, e-mails, voice messages from physicians /nurses / patients, to Patient's family.

• With further technology we can build Wireless Long Distance [WiLD] Clinical Applications to deliver expertise to anywhere in the world.

E. Advantages

•In Existing system, patient health can be monitored and will be show to user using Bluetooth or Zigbee technology. But Bluetooth and zigbee has lot of limitations. In our proposed system we have used Internet of things technology.

•So that patient health status will be published to the cloud. So anyone can able to check the patient status anytime and anywhere around the world.

•In Existing system, there is no effective dashboard and configured mobile application for checking the patient health status.

•In our proposed system we have created an effective dashboard and configuration in available MQTT mobile application.

IV. CONCLUSION AND FUTURE WORKS

In this paper, we have monitored the Patient health status simultaneously using Healthcare sensor and wireless technologies. We have developed a hardware for monitoring the patient health condition. Our mobile application will be given and installed to all faculty in a hospital. So whenever patient health changes immediately information will be updated to user mobile irrespective of user location. In future, data processing through cloud computing and remote access to store the data will improves the computing performance. Also the Healthcare sensors will produce enormous amount of data. So we move onto Big Data techniques. Map reduce algorithm can be used to find the health status.

V. ACKNOWLEDGMENT

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