PATIENT HEALTH MONITORING SYSTEM USING IOT

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ABSTRACT

Global health which denotes equitable access to healthcare, particularly in remote-rural- developing regions, is characterized by unique challenges of affordability, accessibility, and availability for which one of the most promising technological interventions that is emerging is the Internet of Things (IoT) based remote health monitoring. We present an IoT based smart edge system for remote health monitoring, in which wearable vital sensors transmit data into two novel software engines, namely Rapid Active Summarization for effective Prognosis (RASPRO) and Criticality Measure Index (CMI) alerts, both of which we have implemented in the IoT smart edge. RASPRO transforms voluminous sensor data into clinically meaningful summaries called Personalized Health Motifs (PHMs). The CMI alerts engine computes an aggregate criticality score. Our IoT smart edge employs a risk-stratified protocol consisting of rapid guaranteed push of alerts & PHMs directly to the physicians, and best effort pull of detailed data-on-demand (DD-on-D) through the cloud. We have carried out both clinical validation and performance evaluation of our smart edge system. The clinical validation of patients demonstrated that the IoT smart edge is highly effective in remote monitoring.

INTRODUCTION

Background of the study

A Remote health monitoring system is an extension of a hospital medical system where a patient's vital body state can be monitored remotely. Traditionally the detection systems were only found in hospitals and were characterized by huge and complex circuitry which required high power consumption. Continuous advances in the semiconductor technology industry have led to sensors and microcontrollers that are smaller in size, faster in operation, low in power consumption and affordable in cost.

Statement of the problem:

Remote health monitoring can provide useful physiological information in the home.This monitoring is useful for elderly or chronically ill patients who would like to avoid a long hospital stay. Wireless sensors are used to collect and transmit signals of interest and a processor is programmed to receive and automatically analyze the sensor signals. In this project, you are to choose appropriate sensors according to what you would like to detect and design algorithms to realize your detection. Examples are the detection of a fall, monitoring cardiac signals. Using a single parameter monitoring system an approach to a remote health monitoring system was designed that extends healthcare from the traditional clinic or hospital setting to the patient's home. The system was to collect a heartbeat detection system data, fall detection system data, temperature data and few other parameters. The data from the single parameter monitoring systems was then availed for remote detection.

Purpose of the study

Design a Remote Patient Health Monitoring System (RPHMS) which has heartbeat detection system, a fall detection system, temperature detection system, a humidity detection system, a toxic gas and air quality detection system and SPO2 detection system. A doctor or health specialist can use the system to monitor remotely of all vital health parameters of the patient or person of interest.

An attempt at designing a remote healthcare system made with locally available components.

i) The fall detector, temperature, humidity, pressure, toxic gas, air quality control, SPO2 modules comprise of an accelerometer, wireless transmitter and microcontroller. The data collected was transmitted wirelessly to a receiver module.

ii) ECG consists of a non-invasive infrared finger detector, Liquid Crystal Display (LCD)

iii) designed circuit for cardiac signal detection and microcontroller. The detected analog signal was then digitized to give a digital value that was read on the LCD.

iv) A simple cloud server where hosted with a database for all the vital data to be accessed remotely whenever required.

Objective of the study

Here the main objective is to design a Remote Patient Health Monitoring System to diagnose the health condition of the patients. Giving care and health assistance to the bedridden patients at critical stages with advanced medical facilities have become one of the major problems in the modern hectic world. In hospitals where many patients whose physical conditions must be monitored frequently as a part of a diagnostic procedure, the need for a cost-effective and fast responding alert mechanism is inevitable.

Properimplementation of such systems can provide timely warnings to the medical staffs and doctors and their service can be activated in case of medical emergencies. Present-day systems use sensors that are hardwired to a PC next to the bed.The use of sensors detects the conditions of the patient and the data is collected and transferred using a microcontroller.Doctors and nurses need to visit the patient frequently to examine his/her current condition. In addition to this, use of multiple microcontroller based intelligent system provides high-level applicability in hospitals where many patients must be frequently monitored.

Limitation of the study

The scope of the project was limited to ECG, fall, temperature, humidity, pressure, toxic gas, air quality and SPO2 detection and remote viewing of the collected data for a single patient.Here, the most important specification considered was that they should be safe to use and accurate.This is because the physiological information being detected determines life-threatening

LITERATURE SURVEY

with all the monitoring devices at hospital rooms and previously carried out the measurements of patients' health condition. Further, in this study, the health conditions were measured in 10 patients with cardiovascular disease or sleep disorder. From these results, the patients' health conditions such as the body and excretion weight in the toilet, the ECG during taking the bath and the pulse and respiration rate during sleeping were successfully monitored in the hospital room, demonstrating its usefulness for monitoring the health condition of the subjects with cardiovascular disease or sleep disorder.

Development and Clinical Evaluation of a Home Healthcare System Measuring in Toilet, Bathtub and Bed without Attachment of Any Biological Sensors

Daily monitoring of health condition at home is important for an effective scheme for early diagnosis, treatment, and prevention of lifestyle-related diseases such as adiposis, diabetes and cardiovascular diseases. While many commercially available devices for home health care monitoring are widely used, those are cumbersome in terms of self- attachment of biological sensors and self-operation of them. From this viewpoint, we have been developing a non-conscious physiological monitoring system without attachment of any sensors to the human body as well as any operations for the measurement. We developed some devices installed in a toilet, a bath, and a bed and showed their high measurement precision by comparison with simultaneous recordings of ordinary biological sensors directly attached to the body. To investigate that applicability to the health condition monitoring, we developed a monitoring system in combination

Intelligent wireless mobile patient monitoring system

Nowadays, Heart-related diseases are on the rise. Cardiac arrest is quoted as the major contributor to the sudden and unexpected death rate in the modern stress filled lifestyle around the globe. A system that warns the person about the onset of the disease earlier automatically will be a boon to the society. This is achievable by deploying advances in wireless

technology to the existing patient monitoring system. This paper proposes the development of 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 SMS alert to the doctor through Global System for Mobile(GSM) thereby taking suitable precautionary measures thus reducing the critical level of the patient. Worldwide surveys conducted by World Health Organization (WHO) have confirmed that the heart-related diseases are on the rise. Many of the cardiac-related problems are attributed to the modern lifestyles, food habits, obesity, smoking, tobacco chewing and lack of physical exercises etc. The post- operative patients can develop complications once they are discharged from the hospital. In some patients, the cardiac problems may reoccur, when they start doing their routine work. Hence the of such patients needs to be monitored for some time after their treatment. This helps in diagnosing the improper functioning of the heart and take precautions. Some of these lives can often be saved if acute care and cardiac surgery is provided within the so-called golden hour. So, the need for advice on first- hand medical attention and promotion of good health by patient monitoring and follow- up becomes inevitable. Hence, patients who are at risk require that their cardiac health to be monitored frequently whether they are indoors or outdoors so that emergency treatment is possible. Telemedicine is widely considered to be part of the inevitable future of the modern practice of medicine.

The real-time monitoring system for in-patient based on ZigBee

The system is made up of two sub-systems: patient physical states data acquisition and communication system based on ZigBee technology, and hospital monitoring and control center. The patient physical states data acquisition and communication system monitors the main physical parameters and movement status continuously. The information from data acquisition system is sent to hospital monitoring center by ZigBee wireless communication module. The monitoring center receives the information from each patient and save them to the database, and then judges the states of the patient by fuzzy reasoning. The data from the patient can be displayed as a graph or numeric on the monitor if it is necessary, and then the doctor can diagnose the patient according to the recorded continuous data. Wireless sensor network is made up of a lot of wireless sensors based on ZigBee technology. The ZigBee technology provides a resolution for transmitting sensors' data by wireless communication. ZigBee technology can transmit data with a rate of 250kbps, and then it is enough for the physical parameters of the patient. The communication distance of ZigBee node can be over 200 meters and can be spread by add route node, and then ZigBee technology is suited to a short distance wireless sensors network. ZigBee technology owns many virtues, such as low power consumption, low cost, small size, free frequency, etc. To know the physical states of in-patient, the physical parameters need to be monitored real-time. The traditional medical test instrument is a large size and connected

by wire often, and the patient is required to be quiet during the test. In most of the hospital, the medical instruments need to be read by doctor or nurse, and the physical parameters are tested and recorded one or two times each day, the real-time monitoring is expensive for most of the patients, and can be only acquirable for ICU by a nurse. For this reason, the worsening of patient can't be found in time, and then the patient can't be helped in time. For most of the patients can be monitored real-time in hospital, we should 10 find a new method. Consider that the movement of the patient is limited in hospital.

EXISTING SYSTEM

In the existing system, we use active network technology to network various sensors to a single PMS. Patients' various critical parameters are continuously monitored via single PMS and reported to the Doctors or Nurses in attendance for timely response in case of critical situations. The sensors are attached to the body of the patients without causing any discomfort to them. In this PMS we monitor the important physical parameters like body temperature, ECG, heart beat rate and blood pressure using the sensors which are readily available. Thus, the analog values that are sensed by the different sensors are then given to a microcontroller attached to it. The microcontroller processes these analog signal values of health parameters separately and converts it to digital values using ADC converter. Now, the digitalized values from more than one microcontroller are sent to the Central PMS. Each of the sensors attached microcontroller with a transceiver will act as a module which has its own unique ID. Each module transmits the data wirelessly to the gateway attached

to the PC of the Central PMS. The gateway is attached to the PC i.e. Central PMS which is situated in the medical center, is capable for selecting different patient IDs and allowing the gateway to receive different physical parameter values the patient specified by the ID. The software designed using Graphical User Interface (GUI) can operate on different physical parameters of each patient, consecutively with a specified time interval for each patient. At any time, any of the doctors or nurses for some years in the study though most of the time these markets have not been interlinked. The study has used. It should be borne in mind that the tests carried out only tests for presence or absence of linear relationships. can log on the Central PMS and check the history of the observed critical parameters of any of the patient attached to the network. In case of a critical situation which requires the immediate attention of the doctors or nurses for any of the patients, the custom software will instruct the Central PMS to enable the GSM modem to send an SMS with the patient ID. A voice call is also made to the doctors and the staffs of the hospital. The SMS also consists of a status of the patient's physical condition. With the help of the patient ID, the doctor can easily identify and attend to the patient situation.

PROPOSED SYSTEM

The main objective is to design a Patient Monitoring System with two-way communication i.e. not only the patient's data will be sent to the doctor through SMS and email on emergencies, but also the doctor can send required suggestions to the patient or guardians through SMS or Call .Our project is comprised of both hardware and software. In hardware part, heartbeat sensor is used. Therefore,

Arduino uno integrates with the WIFI Module. When the heartbeat and temperature is measured, WIFI module helps to upload it in cloud as message, Web and APP server. Moreover GSM modem sends

In general IoT based health care platform which connects with smart sensors attach with human body for health monitoring for daily checkup. In this paper we discussed about IoT based patient monitoring system. The system technologies being used by smart phones or gadgets in present time where we also mentioned about advantages, challenges and opportunities. Due to the importance of observing medical patient, continuous remote monitoring is necessary. Our project work is giving the

FUTURE ENHANCEMENT

In our proposed system we monitor the patient condition especially for the ICU or cardiac patients but in the future we will upgrade both hardware and software part. In hardware part, we will measure temperature of the patient so for this we will need temperature sensor. Also we will monitor the whole ward room or patient room from far places by Wi-Fi module.Therefore, person fall detection feature will be added which would be beneficial to older people Moreover, blood pressure sensor will be given.

In software segment we will upgrade the Website as well as the Apps. We will build a user friendly feature in the website which will show the patient name, date and time description in the ECG

the heartbeat condition if abnormal too.

CONCLUSION

opportunity to monitor patient heart beat and temperature continuously by using the web andapps service along with live monitor and if abnormal it sends as message or calls through gsm service. This paper also compared the early aged medical system between present time health monitoring. The present time represents the time reducing, reduce health care cost especially for rural area people.

segment automatically. Similarly, Apps will be upgraded and uploaded in the Play store. Therefore, people will get the opportunity to download the Apps from Google Play Store and install it in their Page as phone.Due to the importance of observing medical state of patients who are suffering from acute diseases, especially cardiovascular diseases, a continuous remote patient monitoring is essential. Internet of Things is able to provide tools to build comprehensive services.
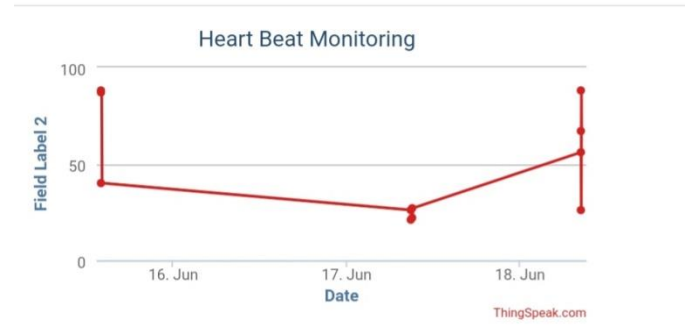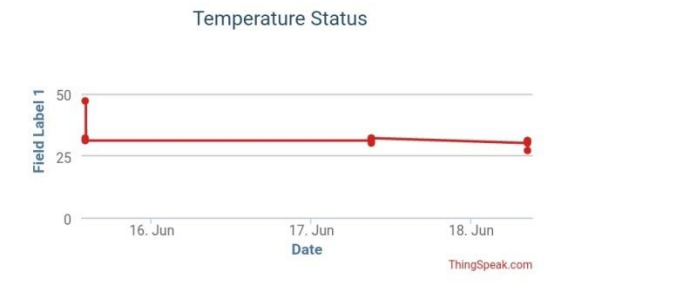
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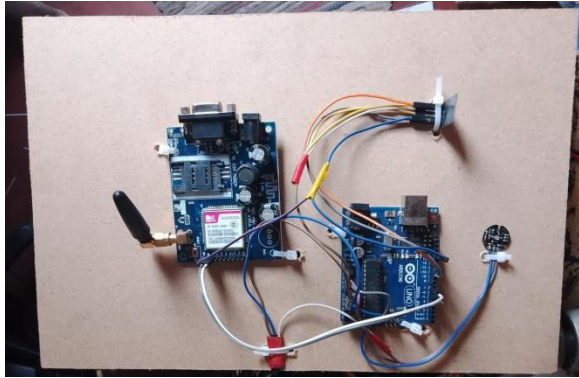
WORKING MODEL

MESSAGE THROUGH SMS

HEART BEAT READINGS IN CLOUD

TEMPERATURE READINGS IN CLOUD

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