Remote Health Monitoring for Elder Patients Using Wearable Sensors

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Abstract—Health devices are increasingly helping people to monitor their status both at an activity/fitness level for self-health tracking and at a medical level providing more data to physicians with a potential for earlier diagnostic and guidance of treatment. Most of heart attacks will lay to death before getting any treatments because traditional methods are passive, by which patients unabe to call the services and fell unconsious. Internet of things(IoT) visualizes the way forward in solving in problem of medical care for something anyplace by anyone at anytime. In order realise pervasive healthcare system a remote healthcare monitoring is essential. Multiple physical signs such as ECG,heartrate,blood pressure, blood gulcose,SpO2 with patient's location are designed to be sampled at different rates continuosly using IoT with live GPS location tracking system.A sample prototype is implemented to present an overview of an system.

Keywords-Arduino UNO;heartbeat sensor;ECG sensor;SpO2 sensor,blood pressure sensor,laser,LDR,GPS module and GSM module

1. Introduction

In the recent years wireless technology has increasing for the need of upholding various sectors .In these recent years IoT graped the most of industrial area specially automation and control. Biomedical is one of recent trend to provide better health care. Not only in hospitals but also the personal health caring facilities are opened by the IoT technology. So having a smart system various parameters are observed that consumes power, cost and increase efficiency . In traditional method, doctors play an important role in health check up. For this process requires a lot of time for registration, appointment and then check up. Also reports are generated later. Due to this lengthy process working people tend to ignore the checkups or postpone it. This modern approach reduces time consumption in the process. In the recent years use of wireless technology is increasing for the need of upholding various sectors .In these recent years IoT groped the most of industrial area specially automation and control. Biomedical is one of recent trends to provide better health care. Not only in hospitals but also the personal health care facilities are opened by the IoT technology. So having a smart system, various parameters are observed that consume power, cost and increase efficiency .In accordance with this smart system, this paper is reviewed. Medical scientists are trying in the field of innovation and research since many decades to get better health services and happiness in human lives. Their contribution in medical area is very important to us and cannot be neglected. Today's automotive structures have the root ideas coming from yesterday's basics. Remote monitoring, also known as selfmonitoring/testing, enables medical professionals to monitor a patient remotely using various technological devices. This method is primarily used for managing chronic diseases or specific conditions, such as heart disease, diabetes mellitus, or asthma. These services can provide comparable health outcomes to traditional in-person patient encounters, supply greater satisfaction to patients, and may be cost-effective. In remote monitoring, sensors are used to capture and transmit biometric data. For example, a tele-EEG device monitors the electrical activity of a patient's brain and then transmits that data to a specialist. This could be done in either real time or the data could be stored and then forwarded. This paper focuses on how the android application is used to send the patient's parameters to the server. Also helps the patient in case of emergency by generating an alert when the threshold values are crossed.

2. Existing System

Currently the system used for patient monitoring is the fixed monitoring system which can be used only when the patient is on bed. The availablesystems are huge in size and only available in the hospitals in ICU.

2.1. Limitations of Existing System

Now-a-days many systems for continuous monitoring of the patient are available. But they have following drawbacks. In existing system patient needs to be hospitalized. Regular

monitoring of patient is not possible once he/she is discharged from hospitals.These systems cannot be used at individual level. Existing systems are bulky in size and their maintenence and cost pose a hurdle. Most of the Existing systems use wired communication which is too tedious for long distance communications. They are not successfully implemented when patient is moving.

3. System and Overview

3.1. Overview

Our system will be beneficial to all age of people especially for the old aged or ICU patient. It will measure the Heartbeat, ECG, SpO_2, Pulse, Blood pressure and Blood gulcose of the patient and upload the result in the text message, web server and mobile apps. Therefore, we have developed website as well as mobile apps in which people can get access and see the output by searching date and time. Moreover, in case of emergency, nurse or patient‘s relative check out patient’s condition by using LIVE monitor option. Our goal was to build up a system with high accuracy with minimum cost so that anyone can use and afford this.

3.2. Proposed System

The primary actors concerned area unit patients, guardians,physicians, medical laboratory, clinics and hospitals,attendants, nurse, public authorities. beneath boundconditions if the health care details area unit in wouldlike for validation and authorization of any legal authorizing or auditing, then the general public-authorities area unit concerned in it. It provides the way to collect the patient’s details and store it within the cloud information victimisation IOT.

Cloud is thought for its logical information storage of digital information. This information will be served to multiple purchasers at a time. The physical surroundings is managed by the holding organization. The cloud service suppliers area unit liable for providing the information to be on the market all the time and it ought to be accessible from anyplace. The physical surroundings should be in an exceedingly running state. the information security is additionally taken care by the hosting organization. The users will read this information any time.In this paper, the patient is monitored victimisation IOT devices with numerous sensors and their details area unit hold on within the cloud. every actor except the patient is given a singular RFID enabled positive identification. it's obligatory for the patient, doctor and therefore the guests to try to to registration initial. The hospital management can method this. The registration part consists of details like user name, email address, contact range . Once after registration, the users are going to be supplied with ID. The continual watching system monitors the information however it's not displayed on the monitored till the attested actor logs in ID for identification. once the doctor enters the patients then the patient’s details like ECG , Heart beat, SpO_2 , Pulse, Blood pressure, Blood gulcose displayed on the monitor.Also, the doctor’s details like name, login details area unit hold on within the information. The time, the doctor leaves the area is also hold on within the information. This helps USA to understand the period the doctor spent for a patient.

3.3. Methodology

The sensors are interfaced with the arduino and it senses the parameter from the body. The levels are set for each parameters and if it varies form the fixed limit it sends the alert message to the concerned physician and their belongings. The readings are continuosly recorded and datas are stored through IoT module via Cayenne application. It is able to view all the details of the patients in the application and normal message is send via GSM module.

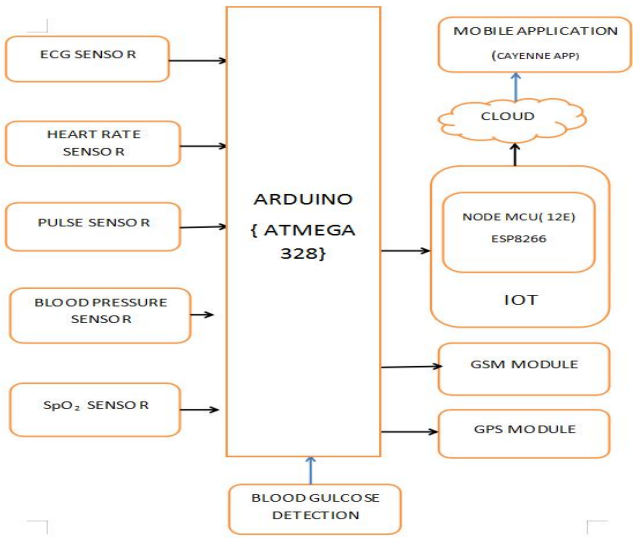

Fig.1 Block diagram of proposed system

Fig 1 shows the proposed system .The health monitoring sensors are used to collect health related data i.e. for data acquisition. Communication can be done by controller for sending data on internet wirelessly. Data processing has been done at server. All data collected and aggregated at server point. To get health related information in understandable format it can be shown on web page.

4. Implementation and Results

The results are to illustrate that all the modules are operating correctly without any data loss and each sub-module in all modules are performing their function.The modules are extracting the accurate data and able to send the data to the Arduino.The Wi-Fi module which is also a part of the sensing module must send the values to the server without any delay and without any data loss. The cloud server must store all the

data sent by the Wi-Fi module and disclose the data to the Cayenne application.

4.1. Experimental Setup

After checking all the pin connections and adding the library to the Arduino IDE and uploading the source code, run the code.

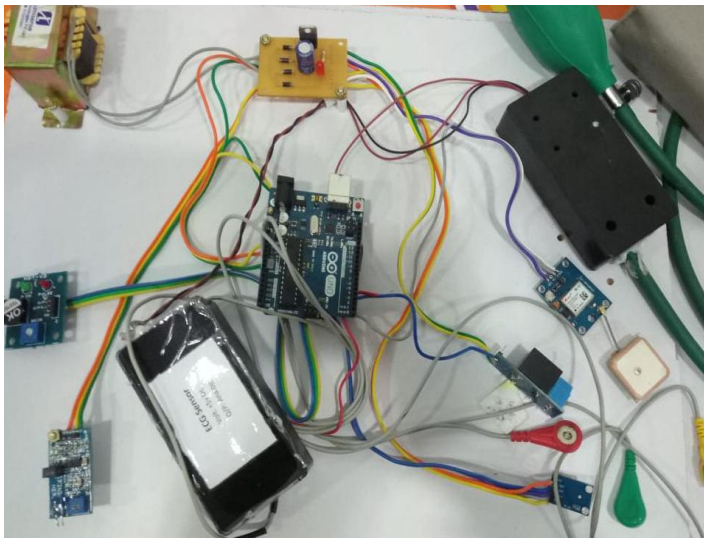

Fig.2 Installation of remote health monitoring system

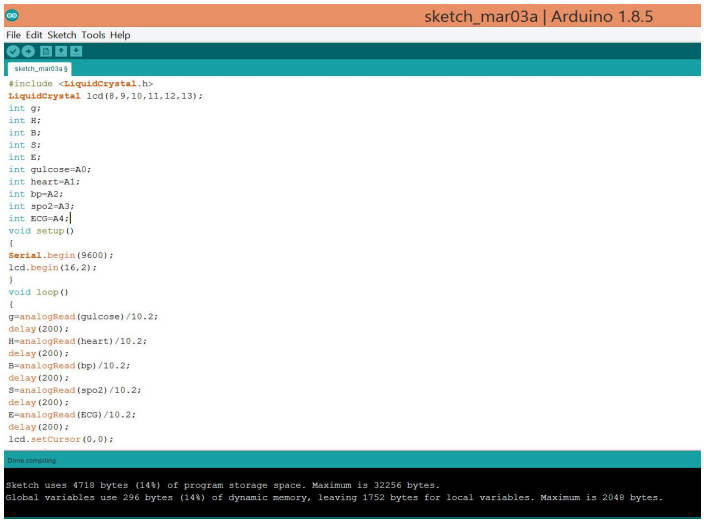

Fig.3 Simulation of program code on Arduino IDE

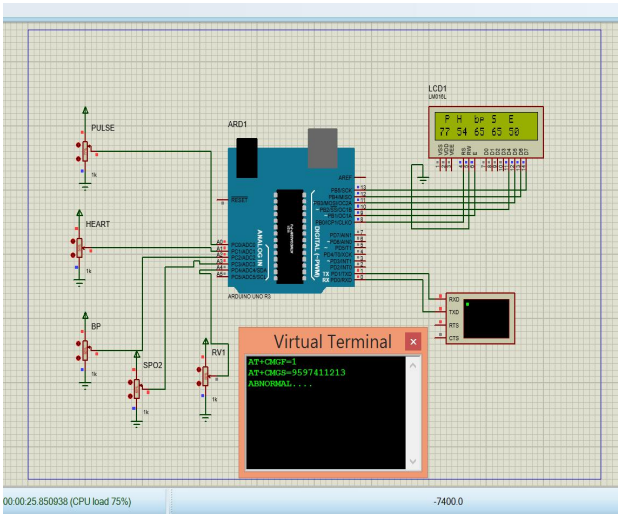

Fig.4 Simulation of prototype in Proteus

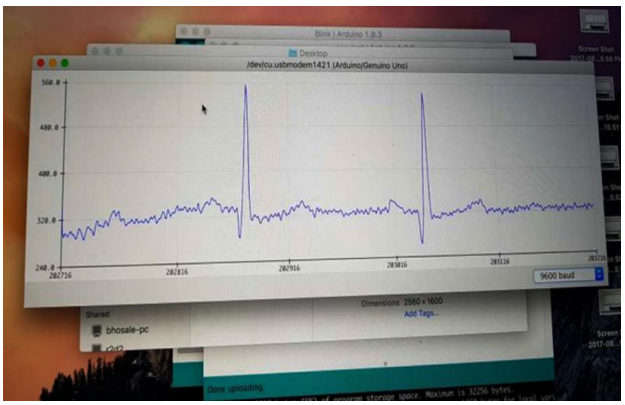

Fig.5 ECG waveform of an patient

5. Uniqueness

The records of the patients are very critical because they involve the life risk, pertaining health on stake. So if any of the records get missed then it means a loss of health resulting in mortality. So the proposed system is offering a local memory storage so that if there is any chance to disconnection of the medium of transmission then the data is stored in the local memory of the system like mobile phone. So whenever the connection get stabled then the batch will the sent to the CMS and will be get stored in the system.

Features of our project are as follows:

1. Highly compact portable.
2. Low power consumption.
3. An alarm will be raised when threshold values are crossed.
4. In case of emergency patient can be traced through GPS.
5. Real time monitoring of patient's vital parameters like heartbeat,ECG,blood pressure,SpO_2 and blood gulcose.

6. Conclusion

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 opportunity to monitor patient continuously by using the web and apps service along with live monitor and mobile message 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.

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