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Portable Medicare Alert System

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Abstract

This is a project related to Medicare. Nowadays many aged people are left in homes alone since their wards are working. Approximately 82 percent of people who die of coronary heart diseases are 65 years and above. These aged people may face the situation of medical emergency anytime. Heart attack, sudden blood pressure rise or fall, sudden sugar level drop may occur. To reduce and save the life of our loved ones we came up with the Portable Medicare Alert System. The project monitors the heartbeat rate, blood pressure level, temperature, electrocardiogram, and oxygen level of the person, and location of the person. If there is any abnormal pattern foundin any of the above-mentioned parameters it alerts the person in charge of the person, if the condition lasts for quite a long time it enables the option of informing the concerned doctor. This helps to monitor the health condition of the person 24/7. This project can also be used for all kinds of age groups, disabled persons, and for patients in hospitals and who are discharged for health care..

Keywords: Wireless,GSM, ThingSpeak

1. Introduction

In the emergent world, several people do not get aptmethod to health monitoring and clinics if they had also, people need to travel a long way for clinic or anyhospital. So it is vital to design an effective health monitoring system. The wireless device withIoT can form a conceivable way to monitor patients in distantly rather visiting any doctor. Most humans live a hectic life in which going for a regular checkupis adreadful task. Without observing human health it is not possible to know whether a person is healthy or sick. This problem leads to the proposal of a product which monitors our health every day without going to a doctor. A system is designed as a prototype for monitoring, alerting others, based on the health of a person. Any doctor can monitor his/her patient from whereverin the world via the internet. Practice of mobile and technology is increasing beyond our imagination and usage of smart technology devices in the area of health has caused a great impact. Patients' health monitoring system using IOT is a technique to enable the monitoring of patients. Such patients can be tracked continuously with wireless heath devices and maintaining their daily lives in thesocialenvironment.

These wireless devices constantly measure the patient's blood pressure,pulse, oxygen level, temperature, ECG, location. Here we designed a Patient Health Monitoring system. The data is stored in the IoT platform for future reference. If there is an abnormality found it gives an alert message to the concerned guardianphoneandthedoctor'sphone.

2. Literature survey

STEFANO Di pascoli etatechnologically advanced ECG monitoring system which utilizes low power. The

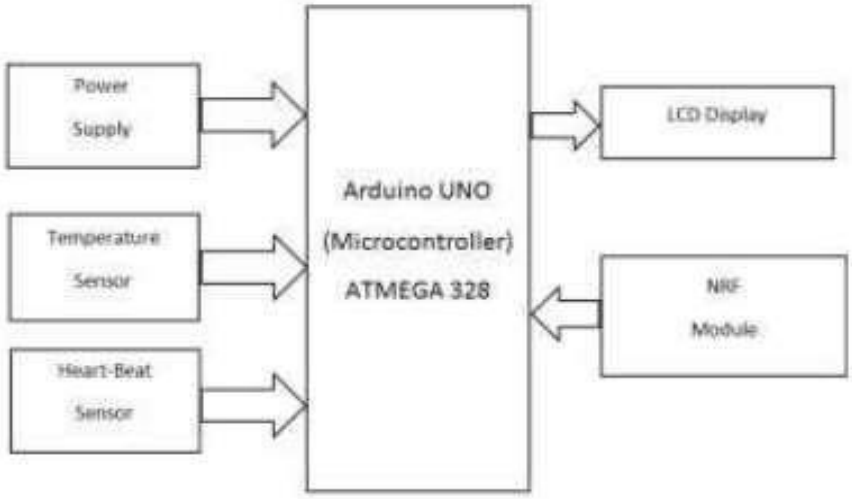


Fig. 2.1: Block diagram of transmitter section

main motive of this improvementis to fabricate a wearable, which can be bought at fewer prices and utilizes minimum power per bit.For the purpose of data transmission from the sensors ZigBee is prioritized. This system usesminimum power analog digital converter which is developed by the texas instrument.

A model using open source technology for unified patients' records was created by Shihab A. Hameedetal (2008). These records can be viewed and updated by physicians using any web browser.

Gupta etal designed a system which studies the data of electrocardiogram (ECG) and notifies the respective

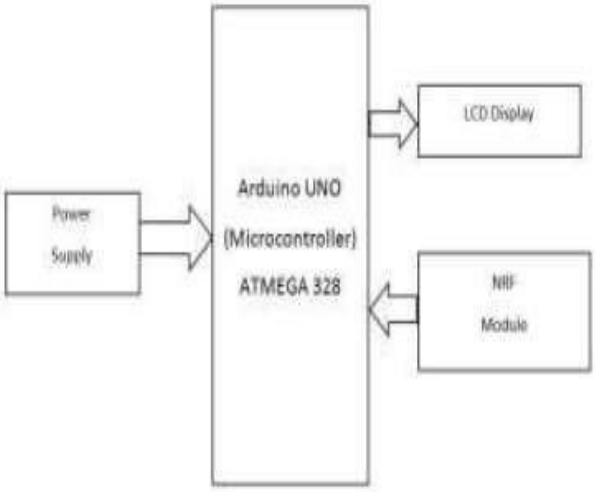


Fig. 2.2: Block diagram of Receiver section

person by giving alert messagesdepending on irregularity.

Acharya et al proposed aIoToriented kit which can monitors health factors such as heart beat, ECG, body temperature, and respiration. The keyprofit of this is it can provide a flexible connection with multi-modal sensor network and IoT data that helps in emergency.

3. Existingsystem

Currently device with several biosensors has to be positioned on the body and it is processed by labs using the raw data transmitted.

Smart wearable devices used fordistant health monitoring systems are improved in usage for good quality in health monitoring and provided at low costfor avoiding unnecessary hospitalizations and to guaranteecrucial care.

Many projects consist of only a few combinations (like heartbeat monitoring and temperature, only ECG, and oxygen level) to monitor the patients.

Our projects consist of all the possible monitoring systems including the GPS location andtransferring data to IoT platform for future reference.

Block Diagrams

Disadvantages

- In most monitoring systems, data is printed on paper and stored so there is a chance of losing thedata.
- The doctors and the guardians of the patient can't monitor their health conditions when there in a distance.
- To measure the health parameters a person need to go to the health center or the laboratories or thehospitals and it may take the whole day and need to wait for the appointment.
- Nowadays smartwatches and many wearable devices are not very accurate in measuring the parameters so it confuses.

4. Proposed system

Inthisproject, thepatient's(i.e.,aged people and people who are returned from hospitals) blood pressure, heartbeat rate, oxygen level, electrocardiogram, temperature, and location of the patient is monitored 24/7 and the data is sent to the IoT platform and data is saved and can be used for future reference. If there is any abnormality sensed an alert message is sent to the concerned patient'sguardianandthedoctor's phone. This project can also be used in hospitals, where the patient's blood pressure, heartbeat rate, oxygen level, the temperature is continuously monitored and recorded by the nurse or paramedical staff and report to the doctor at regular intervals, instead, it can be done by using this project automatically the above-mentioned parameters can be sensed. In case of any abnormality is found an alarm and alert message isgiven.

5. Basic Theory and Materials ArduinoMega:

Atmega2560, usually found in the ArduinoMega 2560 as its key microcontroller. It is an **AVR RISC-based microcontroller** that performs commanding instructions in a single clock cycle. This permits it to strike a well balance between power consumption and processing speed. Itperformsnumerousintricatealgorithm and process numerous operations. For more precise operations and functions to integrate multiple applications, we have chosen this in our proposed model.

MAX30100 (Pulse OximeterSPO2):

MAX30100 is a system where it measures heart rate and oxygen concentration. This is used in wearable healthcare devices, fitness devices, medical monitoring devices, etc. For these distinctive functionsto be performed in our proposed project, this module is used.

OLED Display Module:

OLED otherwise known asOrganic Light-Emitting Diode is a self-light-emitting technology self-possessed with thin, multi-layered organic film placed between an anode and cathode.It doesn't require backlight. It offers a put forwards more contrast ratio than the other display screen. An OLED display is incorporated in our plant because of its better advantages over LCD.

An additional advantage is, it is light, thin, and power consumption is too less when compared to LCDs. The above mentioned qualities are exceedinglymandatory for every instrument which is used for presenting real-time values.

Wi-Fi Module ESP8266:

ESP8266 is a self-contained System-On-Chip (SOC) with an integrated TCP/IP protocol stack which offers any controller to gain admittance toany Wi-Fi network. This WiFi module is employed in our projected model to transfer infoof toThingSpeakplatform.

GSM Module SIM800L:

It is a miniature cellular module which enables us to transmit and receive SMS, calls.This works on various frequencies and facilitates use to put one sim card. We used this to send alert note in acute condition of the patient.

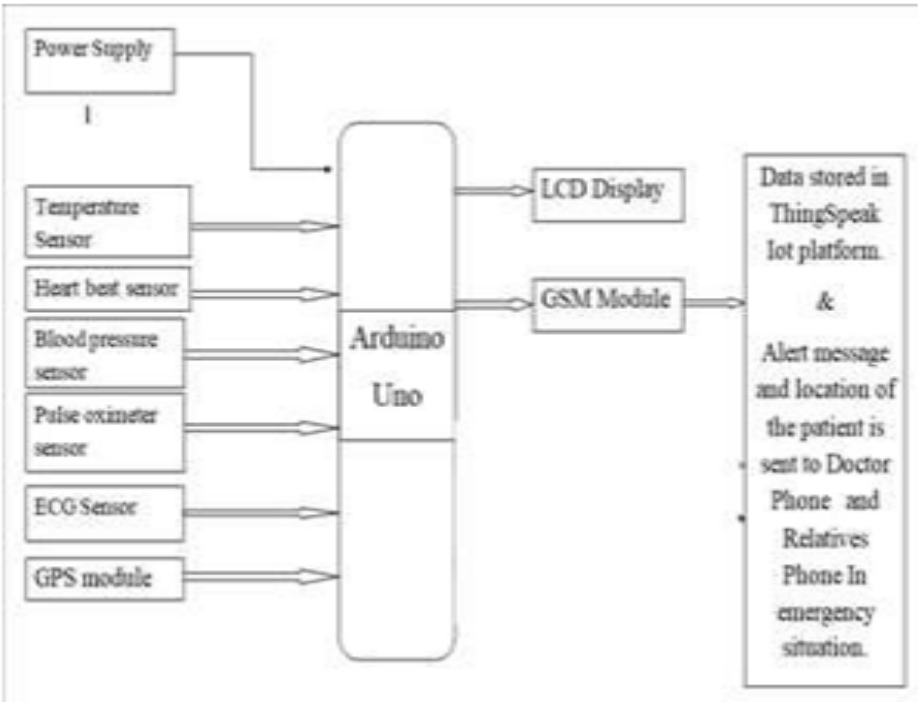
LM35 Temperature Sensor:

It uses basic norm of diode. Temperature measurement is more precise than a thermistor. Because of its correctnesswechosethis tomonitorepatient'sbody temperature

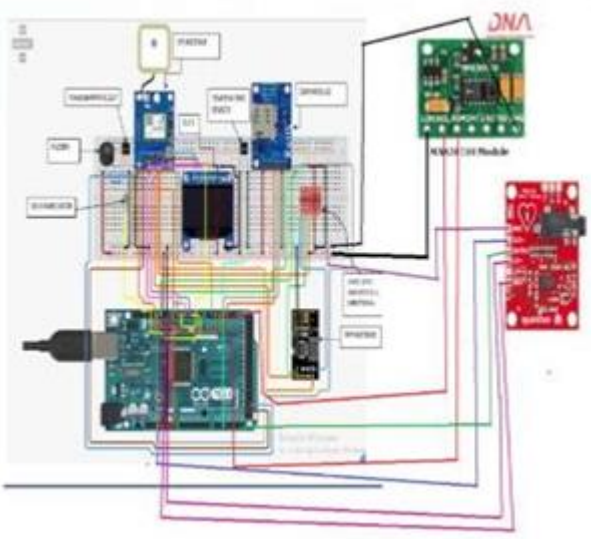
Buzzer:

The buzzer is also known beeper is a device that produces sound. The purpose of this in our project is, it creates sound if parameters go abnormal.

6. Blockdiagram



Circuitdiagram



7. Working

Heart beat denotes how often heart shrinks and relaxes every minute. Heart beat varies according to age groups. Humans between 18 and more, have more or less seventy two beats in a minute (bpm). Children have 90

bpm and younger ones have 120 bpm. Bradycardia is a condition where heart functions below the standard. In tachycardia function of heart is above the usual condition. 75 to 100 millimeters of mercury (mm Hg) is the normal oxygen level which every human's possess. SPO2 sensor module that MAX30100 is an intergraded module which contains the ability of measuring heart rate and oxygen level.

Electrocardiogramis used to monitor or record heart rhythms. If there is an irregular pattern of heart doctors suggests ECG. AD8232 ECG sensor records the way of electrical impulses through the heart muscles and aid to increase the conductivity between the skin and electrodes. Electrodes pass electric heart rhythms into the body surfaceand the heart pattern is seen on the monitor.

Similarto heart rate and ECG, body temperature also differs from person to person. The temperature is minimum in the outset and maximum in the early evening. 37° C or 98.6 ° F is considered as normal. 36.1° C (97°F) to 37.2° C (99° F) is normal range. So, the standard range for body temperature is 97 to 100 degrees in Fahrenheit or 36.1 to 37.8 degrees inCelsius. LM35 sensorcreates an analog output voltage that is in correlative with the temperature. As it is an analog device it requires ADC so that the analog output voltage isaltered to digital format.

The OLED is comfortable to show offdigitally of diverseequipment's. The Wi-Fi Module ESP8266 pays path to transfer data to the ThingSpeak platform for forthcoming references.

A GSM module enables us to send alert during any distinctspecificationovershoot the restriction or any atypical situation arises. The text alert system would send text SMS, mentioning the health parameter and the location of the patient, to a predefined mobile number. Through this SMS, the corresponding surgeon, nurse or guardian would be notifiedinstantaneously allowing them to provide the appropriate treatment on time.

Each and every dectectors are connected with Arduino Mega except MAX30100, which is connected to Arduinonano. The sensors are affiliatedwith coding the microcontroller so that they do their respective functions promptly.

In this IoT system, the particulars isassembledtogether through the Arduino and it is stored ThingSpeak channel through the Wi-Fi system. This allows thecorrespondingdoctoraccessdataof thepatient's in instantaneous condition from all over the world through the usage of internet. This system is presented so that doctors, nurses, or any medical staffs can keep an eye on the patient in actual condition deprived of any hurdle. There is an emergency button provided that permitsthe patients to call an emergency.

ThingSpeak Data Recording and Monitoring

After login to a particular channel of a particular patient, the diverse data of that patient which was collected in different time frames could be seen. This is greatlysuggested since a graphical representation is provided to monitor variations of various major data of patient that indicates the complete current condition and helps the resultant doctor to guess the approachingrisk or health issue.

Emergency SMS Alert:

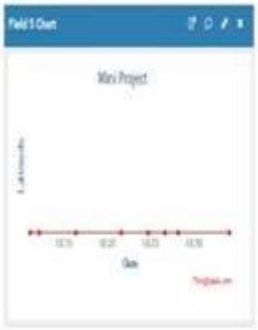
One of the notable features of our proposed prototype is sending emergency alert. If atleast one value of goesbeyond the normal parameters, with the help of the GSM module and coded functionality, the system directs an emergency alert through SMS to the concerned users'guardians to initiate the proper control actions.

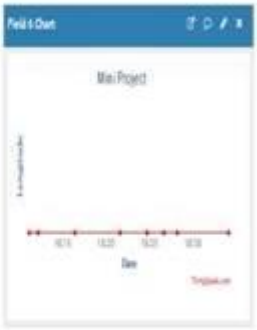
Test was conducted with a person having increased body temperature where it shows the textgot by the respective contact number for the real-time abnormal conditions encountered by the patient at different times. Everytext consists of the particularconcern that the patient faces in the reality.

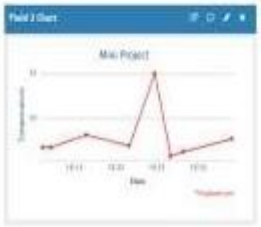
Location:

As an benefit, our prototypehas the ability to share the current location that is latitude and longitude of the patient to the concerned guardian if incase of abnormality. This allows the repectivemedical practitionertotrackthe patient'slocation,which might make it easy for the recovery action in the patient's crisis condition. Test has been performed to check the working of the GPS module, where it sends current location of the patient in abnormal conditions.

8. Our Project Software implementation

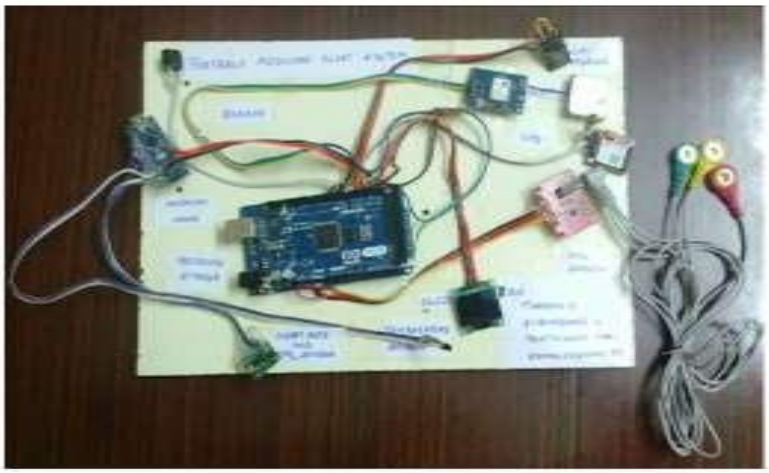






Hardware implementation:

Off condition:



On condition:

Advantages

a) The measured data is stored in the ThingSpeak IoT platform.

b) The measured health parameters of the patient can be accessed by the concerned doctors and the guardian of the patient from anywhere in theworld.

c) The patient is on observation round the clock.

d) If there is any abnormality found, an aware message is to the physicians and the guardian of the patient, so that treatment can be made as soon aspossible.

e) The location of the patient is also sent, so it makes it easy to locate thepatient.

9. Conclusion

Aninnovativeinexpensive and safesystem fornursing of health fromdistantly has been put forth in this paper.Thisaffords a control panel for uninterrupted monitoring of biological parameters in a safeatmosphere. The fusion of IoT and in medical sector could play a dynamic role in monitoring intensive care unit and critical care unit patients and elderly patients.

A thoroughoutline of a data processing and monitoring scheme fortemperature, oxygen level, blood pressure, pulse, ECG, global positioning system, GSM and sending date to ThingSpeak platform has been enlightened in this paper.

Since the data is being transmitted every minute to the platform health workers are in check of heath parameters of concerned patient. Timelyspotting of any ailments assist humans to take promptbettermentactions that would save lives.Moreover providing an SMS alert to the guardian doctor and relatives is vital signfor the rescuepurpose. Moreover, data output from the prototype and that of standard values shows the efficiency of the suggested device. The proposed low-power health monitoring system is an additional in the medical science and engineering which may diminish unwanted deaths and emergencies. This system has the potential to cut down the medical costs by minimizingmonthly hospital check-ups and physician visits..

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