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ANDROID APPLICATION BASED LIVE HEALTH CARE MONITORING SYSTEM

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Abstract-The design of proposed system is based on a smart real time system health care to monitor the patients suffering from blood pressure, chronic diseases and for aged people who resides in their home. In this system is mainly to eliminate the need of a PC and to develop the system probably to reduce the cost. The smart phones create many opportunities to improve health monitoring and many technologies are developed every year with large scale adoption. The system was developed to monitor the non-invasive signs such as temperature, blood pressure, heart rate, and to detect smoke in atmosphere the gas sensor is used and if the patient fallen down to detect fall detection accelerometer. The proposed system consists of an Arduino controller, GSM 900A, android application. The monitored values are always sent through the smart phones and it detects the normal and abnormal state. The buzzer indicates it when it is abnormal state and can be passed to particular member through mobile android application by using gps/gsm module. The patient can be monitored through mobile phones by doctor and need not to visit to home place for the monthly check-up. The doctor monitors the patient health condition through the android application and ECG waveform generated by graphical tool through jelly bean.

Keywords– Arduino Uno, Electrocardiogram(ECG), Global Positioning System(GPS), Global System for Mobile Communication(GSM).

1. Introduction

The Global population for every year it is growing and aging. As a consequence of this demographic change, there has also been a corresponding increase in chronic age related diseases, such as congestive heart failure, dementia, cancer, diabetes, and chronic obstructive pulmonary diseases. Numerous of people are suffering from lot of types of disabilities like injured related and chronic conditions. For this population, healthcare costs are increasing, quality of life and productivity are reclining, and in many cases, family members serve as primary are assistants. This project is designed with low cost and to reduce the work of

doctor in case of visiting to the hospital. The patient work is reduced for usual check-up no need to visit hospital. To protect the ill patients with blood pressure and other abnormalities in human body this system will detect by using embedded system based real time patient health monitoring using GPS/GSM Technologies. The smart phones by using android application it created new technologies to monitor the patients about their health conditions made possible and easy to handle.

2. Related Works

Wearable health monitoring systems (WHMSs) is a real time monitoring by using biosensors it detects the vital signs and patient physiological parameters and in case in emergency situation the patient can be treated with medical equipments. In this paper multimodal WHMS is called prognosis [13]. The mobile health monitoring was designed and implemented in this paper and it is capable of measuring the physiological parameters and it interpret with measured signals. The user receives a biofeedback about sense of monitoring the notifications are detected during medical emergency and are sent to the medical team for analysis. By bio signal extraction methods the system was designed. Using required software algorithms it was designed with an optical pulse oximeter sensor [11]. For calculating the heart rate the photoplethysmographic signals were extracted for the saturation of oxygen and pulse transits time user's fingertip and palm it is based on sensing the pulse oximetry. The temperature is measured by using digital temperature sensor. The system is capable of providing feedback to the user by means of a smart phone application receiving data from the device via Bluetooth [10].Practical limitations are considered and properly dealt with the human volunteers are given a room setting to test experimentally to detect the normal condition values with normal values to target the success rate attained 94.3%. [8]**.**

3. Proposed Work

From the above section, the existing system technologies manage the health monitoring in many ways. But in such those systems they are insufficient to take over the problems of the doctor make decisions about the patient condition is based on physical parameters values. The doctor observes the health condition through tests or sensors connected to the human body. The outdoor patient location and about patient health condition cannot be identified whether the human fell down due to abnormalities.

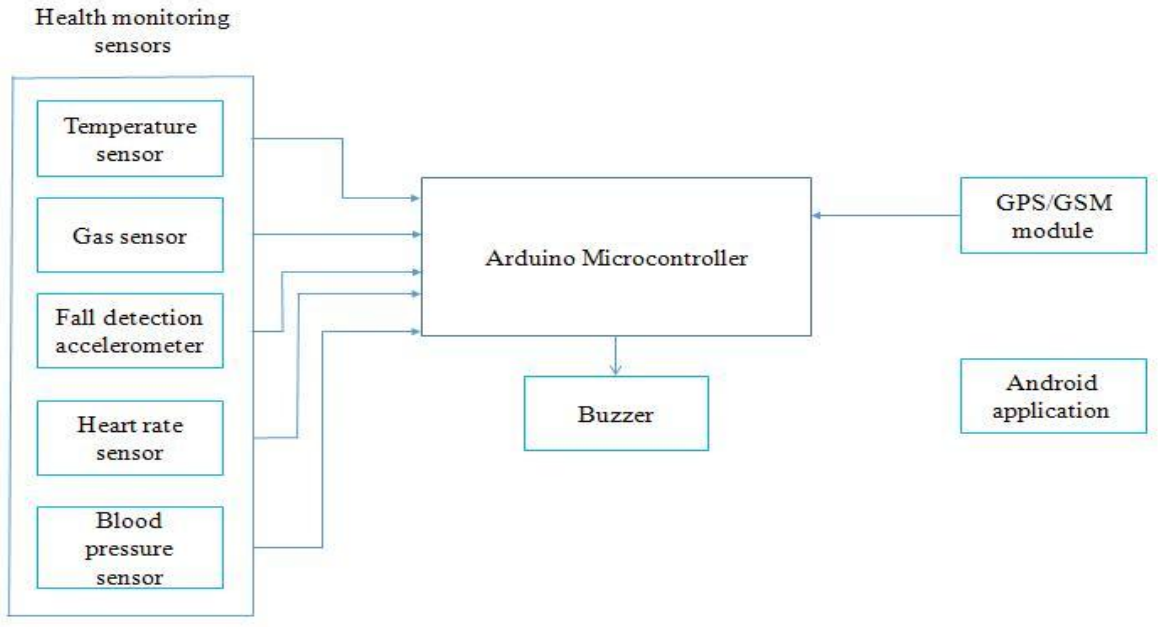

Fig-1: Block Diagram of Health Monitoring System

The proposed system figure-1consists of arduino microcontroller heart of the basic building block, temperature sensor, fall detection accelerometer, gas sensor, heart beat sensor, blood pressure sensor, buzzer, gsm module and android application for receiving the data.

3.1 Working Process:

The Arduino microcontroller is the heart of the system it detects the temperature sensor, fall detection accelerometer, gas sensor, heart rate and blood pressure in both normal and abnormal conditions of the patients. The normal and abnormal values are always displaying on mobile screen. The aruduino microcontroller compares the maximum and minimum values and if the patient is in abnormal condition then abnormal values are detected and the buzzer indicate a beep sound and the data are sent through the gsm/gps module always the mobile receives the data by the android application jelly bean 4.1 by using graphical tool the ECG waveform will be generated. The doctor / relatives receive the data and if the patient is in critical condition by their turn can send an ambulance to the patient location.

4. Hardware Products

It consists of arduino microcontroller, types of sensors temperature sensor, gas sensor, fall detection sensor, heart rate sensor, and blood pressure sensor with gps/gsm module.

4.1 ARDUNIO MICROCONTROLER AT mega 32 bit Microcontroller:

The arduino is the basic building block of the proposed system. AT mega 32 bit microcontroller is a 8 bit AVR RISC based microcontroller .It operates between 1.8 volts to 5.5 volts. The arduino receives the inputs from the types of sensors it compares the maximum and minimum data sent through the GSM/GPS.

4.2 Temperature Sensor LM35:

The body temperature is measured by using the temperature sensor LM35.The body condition of a gender will vary due to food, recent activity and in women the stage of menstrual cycle. The normal temperature of a gender will range from 97.8 degrees Fahrenheit to 99 degrees Fahrenheit. The abnormal values of temperature sensor are compared to be high with normal value then it detects the patient need emergency.

4.3 Heart Beat Sensor TCRT1000:

The heart beat sensor TCRT1000 is used for continuous monitoring the heart beats of a user per minute. The pulse rate is the measurement 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 heart rate is the measurement of pulse measured, but also it can represent the following.

- Heart rhythm
- Pulse strength

The pulse value of normal healthy adults will range from 60 to 100 beats per minute. When the adult exercise, get injured and affected by emotions then the pulse rate will fluctuate and get increased. Athletes, such as runners when running their heart rate ranges in 40 beats per minute due to cardiovascular condition.

4.4 Blood Pressure Sensor BMP180:

The blood pressure sensor BMP180 is the next-generation of sensors from Bosch, and replaces the BMP085 for measuring blood pressure.According to the National Heart, Lung, and Blood Institute (NHLBI) the high blood pressure for adults is given as 140 mm Hg systolic pressure and 90 mm Hg diastolic pressure. The pre hypertension ranges from 120 mm Hg – 139 mm Hg systolic pressure and diastolic pressure ranges as 80 mm Hg – 89 mm Hg .The normal blood pressure range from below 120 mm Hg systolic pressure and below 80 mm Hg diastolic pressure.

4.5 Gas Sensor MQ6:

The MQ6 gas sensor is a sensitive material made of SnO_2 it has lower conductivity in clean air. If the combustible gas is detected then the sensor will have higher conductivity rising. The MQ6 gas sensor will detect the propane, LPG; butane that has high sensitivity around the atmosphere it is suitable for different application because its cost is low. The range of MQ6 gas sensor in environment from 100ppm to 200ppm.

4.6 ADXL345:

The ADXL345 is used for measuring the patient's activity whether they are stable or fell down due to high blood pressure and other abnormalities. It measures the gravity and acceleration whether the patient is in standing or sitting. When a sudden fallen down it detects the patient fallen in vertical position and the sensor output will be interfaced to the arduino microcontroller.

4.7 BUZZER:

5 volts buzzer is used in the proposed system. The buzzer will indicate that patient is in abnormal state through an audio signaling device. The other types of buzzers consist of alarm devices with timers.

4.8 GSM/GPS:

Global system for mobile communication (GSM) and Global positioning system (GPS) is a modem built with dual band GSM/GPRS engine SIM900A.The GSM/GPS always receive the inputs from aruduino and the data are sent to the mobile android application through the database of the server. It enables the message transfer and location information using GPS.

5. Software

5.1 Ardunio 1.7:

It is a open source software combining the hardware and software which is a cross-platform java application. The programming code can be compiled with the software environment. The output of simulation is verified using arduino.

5.2 Android Jellybean 4:

Android jelly bean is a android application used in the proposed hardware model to receive the data of the patients and an ECG wave form will be generated using graphical tool. The developer writes the programming language in java for android application and the user will interface with android application.

5. Hardware Module

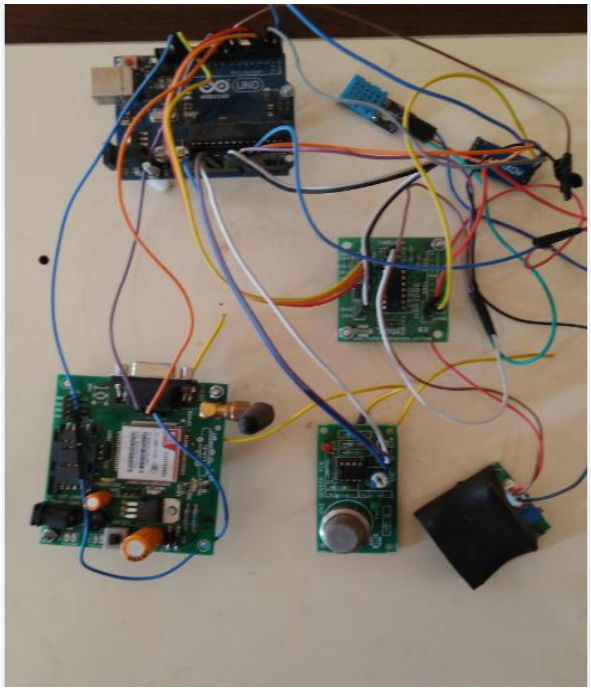

Fig-4 Hardware Module

The Hardware module figure-4 consists of Ardunio, GSM/GPS Module, sensors to detect the normal and abnormal values of the patient.

6. OUTPUT OF HARDWARE MODULE

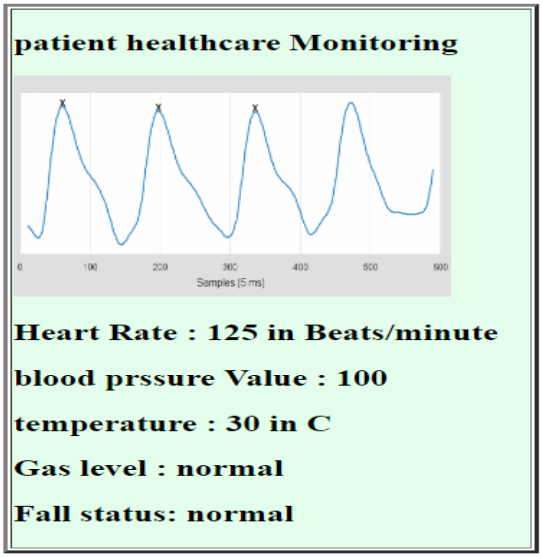

Fig-5 Normal data's and ECG Waveform Signal

The output of the figure-5 shows that by using jellybean android application it is viewed that patient normal values detected with ECG waveform generated by graphical tool.

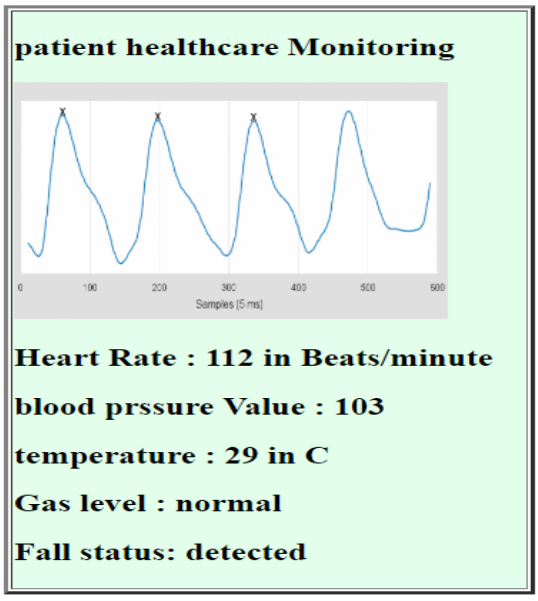

Fig-6 . Abnormal data's and ECG Waveform Signal

The output of the figure-6 detected the patient is in abnormal condition because the fall detection is detected with ECG waveform.

7. Conclusion

The outdoor and indoor health monitoring system which is effectively used in real time medical applications is developed. This system monitors the non-invasive signs and gas, fall detection of the patient in the home and public places and there is no need to visit hospital. It uses the ARDUNIO UNO controller to receive input and transmit to external devices. It uses the GSM 900A modem which transmits the messages to the smart phones through android application and it receives the data collected will be displayed on screen with ECG waveform signal.

The proposed system is designed to reduce the work of doctor and medical representatives and it can be implemented with the low cost and it is used for the daily usage to save life of the patients during emergency condition. The simulation for the whole model is designed and the hardware module tested.

8. Future Work

The health monitoring system can be extended for monitoring some more vital signs such as cholesterol, sugar, etc. This can also be extended by introducing immediate vaccination for the patients that are identified as in critical position.

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