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DESIGN OF LOW COST WEARABLE REMOTE HEALTH MONITORING AND ALERT SYSYTEM FOR ELDERLY HEART PATIENTS

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ABSTRACT

Monitoring the elder people`s health becomes a difficult task in the modern day life. Keeping track on their health status continuously is a difficult task. Apart from elders nowadays many young peoples were facing lot of health problem. Many authors were developed different methods to access the information about the health status of the patient. By referring those papers we propose this project in advance which senses the health status of the person continuously which includes Pulse rate, Blood pressure and Temperature. These are the basic health problems which may cause unpredictable diseases. Advanced sensors for pulse rate, Blood pressure and temperature are used to obtain the accuracy in the health status.A Bluetooth module is used to receive and transmit the acquired data to the web address give in it. A webpage has been created using PHP for viewing the health status of the patient for every sixty seconds.

KEYWORDS: *Helth status,Internet of Things,previous records.*

1. INTRODUCTION

Internet of Things plays a major role in our day to day life. We can access anything through internet .our project is mostly based on IOT. The health status of the elderly people is viewed through internet. It contains many smart devices which are used to collect temperature, blood pressure and pulse rate of the corresponding person to evaluate the health condition of the

patient from anywhere. The health status of the patient can be viewed through internet and also through LCD display. The inputs to the sensors are given in different ways as follows.

The input to the heart beat sensor (TCR1000) is given through the index finger. This sensor is suitable for the measurement of the pulse rate and it is accurate. The input for the temperature sensor is by holding the sensor for a while and it is not necessary to hold continuously. If no input is given to the sensor room temperature will be displayed.

The input for the blood pressure sensor (MPS2000) is given through the belt .The PIC microcontroller (16f874A) model is used to receive the input and check the input with the corresponding range of the given datas. The Bluetooth module (HC-05) is used to receive the data from the microcontroller and transfer it to the corresponding web address. The webpage has been designed to check the data with previous values.

The data are refreshed for every 60 seconds. This system is designed not only for viewing the current updates it is also used for comparing it with previous datas. The health status of the patient should be continuously checked or it should be checked for a particular interval. The main purpose of our project is to avoid visiting the hospital for continuous checkup.

2. LITERATURE REVIEW

Has,[1] developed a personal health diagnosis based up on the symptoms of the patient. A large amount of collected data is used to analyze the disease and risk of the patients. Franca discussed that the innovation idea that modern generation systems are the development of continuous monitoring features for the persons health status and the improvement in their health. He also developed the various wireless technologies and the advantages of using those technologies for faster and better communication.[2] has proposed a detection system to monitor the movements of patients and the functions of the internal body which recognizes a fall and automatically sends a request for help to the caretakers about the condition of the patient security and safety is a key concern in the IoT devices management. The four identified requirements are,[3] has discussed that the key term distribution is required to secure the e-health applications. He designed a protocol for management which allows the captured data information to be transferred in a secured and safety channel. The health status of the persons should be more secured because it may be misused by some others.[4] has developed a Radio Frequency Identification technology and about an intelligent systems, which is used to detect the disinfected articles and alerts the medical staff to wash the   hands

after the contact with the disinfectant articles and with the ill patients. IoT techniques can be used to promote healthcare in a better and easier way. The health related information data could be interacted with doctors who are in emergency condition. Even in the absence of the doctor near the patient the health status can be viewed by normal persons and can be informed to the doctors in some critical issues. Datas are sensed and then transmitted by the Bluetooth module to the mobile phones or system having internet connections.

Has,[5] presented the full details about the IOT process to avoid some emergency situations. The information data can be collected and integrated for interoperability. They also discussed about the necessary and requirement details of the software for the healthcare process and proposed an architecture detail for healthcare and IoT Device. He has taken the parameters such as Electro Cardio Gram (ECG), blood oxygen, respiration, temperature etc. With the increasing health related problems regularly now a days, and lack of proper solution in healthcare device to monitor the patients health status in the absence of doctor, the patients face serious problems and may lost his life in critical conditions, Hence to overcome and avoid these kind of problems. The new Health Monitoring System is suggest to monitor and evaluate the health status of each patient by the doctor even if their absence in hospital or near the surrounding of patient.

3. PROPOSED METHODS

The architecture of Health Monitoring System for elderly people contains three sensors like temperature sensor, pressure sensor and heart beat sensor. The connection for the blocks is clearly explained in the figure.1. Three sensors are connected to the Microcontroller as input when the input is given in the sensors the sensors senses the given input and checks it with the normal level, then the output is displayed in LCD for analysis. The collected data was received by the Bluetooth module and transmit it to the address given by the user. The output can be viewed in the corresponding webpage created by the user. The normal minimum range and maximum range of blood pressure (Bp) for each age category is shown in Table.1.This is measured with the sensor (MPS2000). he average normal body temperature for the human being is 98.6°F (37°C) This can be measured by the temperature sensor (LM-35). The average pulse rate for a normal person is 72 per minute, but it differs for different activities. This is clearly explained in the Table. 2. The pulse rate is measured with the sensor (TCR1000).
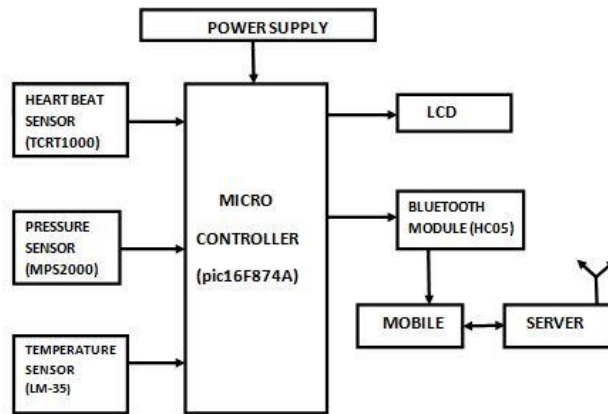
Fig. 1: Block diagram for Health monitoring system.

The table given below explains the normal blood pressure levels for different age groups.

Table 1: Normal Blood Pressure Values.

Age Group	Gender	Min/Max (mmHg)
<18	Male	80/120
18 to 20	Male	80/125
21 to 40	Male	85/135
40 and above	Male	85/135
<20	Female	80/123
21 to 40	Female	85/133
40 and above	Female	85/133

The table given below explains the pulse rate at different positions of the person

Table 2: Pulse rate Range.

Status	BPM
Rest / Normal	60-100
Sleeping	40-50
Tachycardia	>100

4. REQUIREMENT ANALYSIS

Requirement Analysis is the first and important phase of the software developing activity in developing any kind of project effectively. I started to list out all the functionalities that my application should provide. There have been some minor changes with respect to the functionalities over the course of development.

Software Specifications

• Operating System: Windows 7 or higher

• Platform: IoT Cloud

- IDE: Arduino 1.8.4
- Database: MySQL
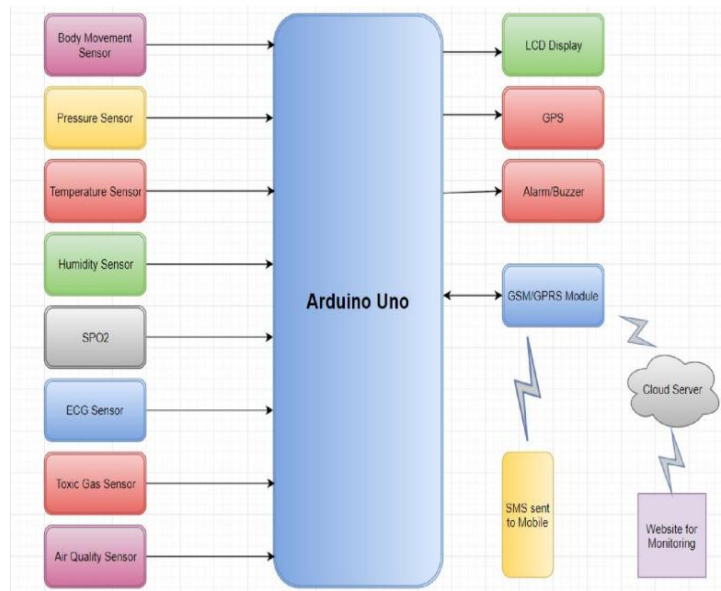- Technologies used: C, SQL, PHP

Proposed Block Diagram

Fig. 2: Block diagram.

Hardware Specifications

- Microcontroller: Arduino Uno Board
- Sensors: Temperature (LM35), Toxic gas(MQ9), GSM Module, GPRS Module, ECG, Humidity, Air Quality, Pressure
- Processor: Pentium IV or higher
- Processor speed: 1.6GHz
- RAM: 512 MB

4.1 System Design

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Overall product architecture, the subsystems that compose the product, and the way subsystems are allocated to processors are depicted using the System Design. UML is used to model system designs. Unified Modelling Language is a standard object-oriented analysis and design language. Use Case diagram and Sequence diagram, which are types of UML diagrams, of the application are shown below.
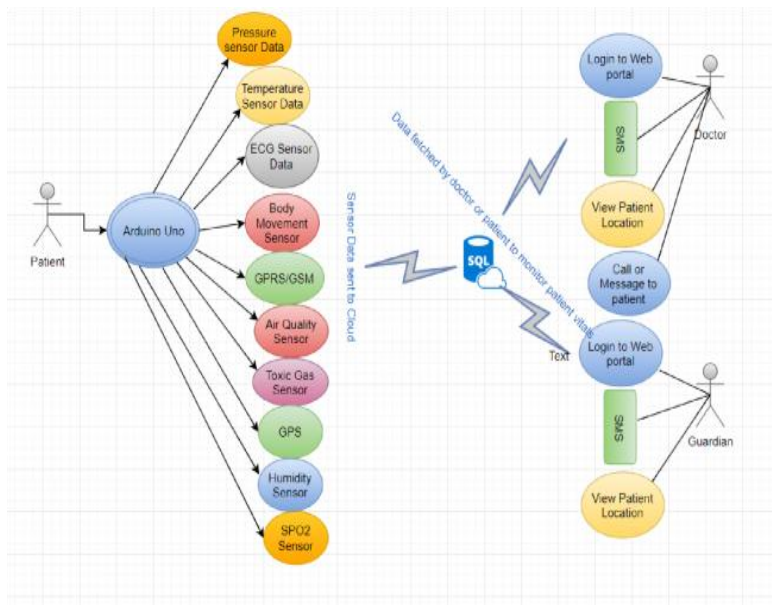
Fig. 3: Usage of the system.

I have identified a set of use cases based on the functionalities and goals of the application.

- Login- This use case denotes a set of actions required for Subject to login into the application.

- Call Service- This use case denotes a set of actions required by doctor to call a guardian or patient in case medical emergencies.

- View Location- This use case denotes a set of actions required by Guardian or Doctor to locate subject on map after receiving his location details.

- Messaging Service- This use case denotes a set of actions required by Doctor to send a message to subject's guardian in case of emergencies.

4.2 System Setup

Fig. 4. Experimntal setup.

In the above image, it is shown complete device setup which includes Arduino micro controller board with power supply attached to it. Micro controller is connected with all the sensors which includes from right bottom Fall detection sensor (Body Movement sensor), Air quality sensor, Toxic gas sensor, Humidity sensor, ECG sensor, Pressure sensor, Temperature sensor, Heartbeat sensor. Micro controller also connected with alarm which will be used in case any of sensor data conditions are not met like temperature spikes, toxic gases etc. And GSM and GPRS modules are connected which are used to send sensor data into server and fetch location coordinates of the patient respectively.

5. RESULT AND DISCUSSION

The result of this project is the health status of the particular patient which can be viewed through internet. If the range of the given three sensors exceeds the normal level then the condition of the patient is considered as abnormal. The Blood pressure range for normal person is 80/120.The Table 3. Shows the sample output for blood pressure range of elderly people

Table 3: Sample Blood Pressure

Patient id	Age & Gender	Min/Max (Mm)	Status
P1	45, Female	85/133	Normal
P2	60, Femle	70/133	Normal
P3	40.Male	85/135	Normal

The Table 4.shows the sample output pulse range for the given input samples.The normal pulse rate for human is 72/min.

Table 4: Sample Pulse Rate.

Patient ID	Age & Gender	Temperature	Status
P1	45, Female	32	Abnormal
P2	60, Femle	36	Normal
P3	40.Male	38	Abnormal

The temperature range for normal person is 37 degree celcius.If it exceeds or reduces the normal range then the patient is considered as abnormal.

6. CONLUSION AND FUTURE WORK

An efficient HMS is developed to monitor the up to date status of the patient besides the presence of the other persons. The input given to the sensors are checked with the corresponding ranges and then the output is displayed in the web page. Thus the health status

of the patient is continuously monitored through internet. This system is helpful for family members of the patient to view the report by comparing with the previous outputs.

This system can be updated by developing an electronic watch through which pulse rate, temperature, blood pressure can be viewed easily. Awareness can be done by the doctors through internet about the diseases. The patient medical evaluation can be improved.

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