



HelpMe-App: Android Based Health Management System

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Abstract - Emergencies in life can occur at any time, they happen suddenly, and no one have the power to stop them. However, if we can take some precautionary measures, we can save ourselves from a serious damage. There are so many sudden accidents in our life; heart attack is one of them. This application aims to help the patient and take measures that could possibly save the heart patient immediately from the serious danger. This research work involves designing an android application using smart phone, that sense the pulse rate of the patient and the application automatically send the patients' physical location and his/her heart rate to the doctors immediately via SMS. After analysing the patient's data, the doctors will suggest the patient either to take some medicine or get hospitalized on immediate basis. The development involved using Android Operating System to design the smart application and Pulse Sensor connected with Arduino UNO, which is used to sense the heartrate of patient. The microcontroller Arduino UNO will read the sensor signals and send it to the Bluetooth shield connected in the hardware circuit. This Bluetooth shield then sends the sensor signal to the android app by communicating with Bluetooth of the smart phone and send the pulse rate to the android application user interface. Then the application will send the pulse rate coordinates and current location of patient by using GPS tracker of the smart phone and send these parameters to the cardiac surgeon immediately. The proposed android app is based on health care management to help the people to secure his/her life from worst situation.

Keywords: Components based software engineering, Engineering Process, Software development process

I. INTRODUCTION

The motive of health management system is to facilitate the doctor to monitor their patient in real time to reduce sudden death ratios. Health management system provide real time monitoring system for doctors to monitor the patient, in real time [3]. eHealth management system faces some challenges of increasing population, high cost, low services but popular technology advances are the solutions of these challenges [5]. One of the technology like mobile application have great importance and convenient way to monitor patients in real time [9]. This technology provides low cost monitoring system to the health industry [11]. The mobile application technology is widely used and efficient way for health management system to provide urgent health cares, anywhere any time conveniently [11].

Emergencies can occur suddenly in life, to fight with these emergencies some of the people cannot take better decision due to fear. The heart attack is a disease under which patient must need 24 hours observation which is difficult for the doctors. According to survey of WHO (world health organization) on Cardiovascular diseases (CVDs) (the diseases of heart and blood vessel, the CVDs include coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease for more detail [10]) the CVDs are the biggest cause of increasing death ratios globally, more people die due to CVDs, then any other disease. The

estimated ratio of 17.7 million people was calculated by World Health organization, who were died due to CVDs in 2015, which is the 31% of global death ratios. To overcome this, Emergency management system provide services to send patient's physical record like heart rate to the doctor with the help of mobile application [8]. Pulse rate is the important part to check the heart health. It measures the human heart beat per minute, the pulse rate matches up with heart beat which pumps the blood through the arteries. According to the medical science the normal heart rate of human is 60 to 80 beat per minute but during heart attack, heart rate may slow down to 40 beat per second or less this is caused by the disruption of blood flow. With the help of pulse rate measurement doctor can diagnose fitness of the heart and blood pressure level throughout the body. During heart attack, the pulse rate deviate, this may become too slow or fast to palpitations and in some of the situations even miss the heartbeat. Our proposed application uses pulse rate sensor to monitor heart patients' pulse rate, through which doctor can diagnose the heart condition and suggest some precautions in real time. The application benefits to reduce sudden death ratios due to the lack of proper health care management.

The paper is divided into the following sections: section 2 describe some existing system in health industry found from literature, section 3 gives overview of the proposed system Section 4 shows the UML of the system control flows and working of the proposed system section 5 shows implementation (software and hardware) and the material used.

Section 6 shows how easy to access the system. Section 7 Conclusion of the proposed research and some Future work consideration.

II. LITERATURE REVIEW:

Health management industry is at great peak, now days lots of research is taking place in this area. This section presents analysis on health management technology based on android applications.

Zhou et al., design personal diabetes monitoring system using wearable sensor, smart phone, smart home technologies and Google sheet [4]. The system collects the data like heart rate, glucose, blood pressure, breathing rate and temperature via Bluetooth. System provide facility to the diabetic patients to measure daily conditions at home without going to the hospital and locate the nearest hospital with GPS tracker and Google maps facility. The application uses google sheets to store personal health record, which helps patients to this record to the consultant doctor for diagnostic purpose. Orgunduvile et al., design an innovative system of wireless body area network with web services, which collects the patient's physiological data like spo2 and heart rate and uploaded onto the Medical Health Server via internet, so that physicians can conveniently examined the patient in real time [5]. Navale et al., worked on android application which examined patient's heart rate and body temperature via sensor, transform it to the application using Bluetooth [2]. Application verify the data received from sensor, if any danger was found regarding heart attack, then application send the SMS to the doctor and relatives with patient location via GPS to vaccinate urgently. Data was send to server to plot graph so that doctor view the patients using URL. Patient got disease name according to the prescribed symptoms, through telemedicine system. Singh et al., design an android application iCare facilitates the patient to diagnose the disease according to the symptoms provided by the patient [1]. The application processed the data, identify the disease and by using medical expert system suggested the necessary medical treatment. Yarabothu et al., developed an application which continuously monitor the patient's condition (heart rate, oxygen saturation level in blood and temperature) with the web server and android application [6]. The doctor examined the patients on his smart phone and patient history is phone and patient history is stored on web server for ease of doctors during daily checking without physical presence. Raut et al., proposed an android application which works as Emergence Call System [7]. The system proposed application activated before any getting into emergency situation, walking alone in a street can cause sudden emergency cases, in that case press a button in application on smart phone screen the call was forwarded to the friends, family, doctor, police with exact current position. Abdullah et al., developed a system which provide real time online monitoring of patient's physiological data [3]. The system send data to the doctor via SMS and emails, for purpose of the immediate treatment. The system includes microcontroller (Arduino) and software (LabView). Patient's temperature, heartrate, blood pressure, ECG, glucose level was examined.

III. PROPOSED SYSTEM

HelpMe app provide the services during an emergency situation. The application provide facility to the patient or patients' family members to measure the heart rate with the help of the system apparatus which have three main components a microcontroller Arduino UNO, heart rate pulse sensor and HC-05 Bluetooth shield send the data on the mobile device via Bluetooth shield provided with the application, in sudden situation if patient suffering from sudden heart attack and send the physiological record to the consultants added in the contact list through SMS with patient's current location found via GPS tracker. Doctor then provide necessary suggestion to the patient or to the patient's family members regarding patient's physical condition and current location. The purpose is to provide immediate services to the humanity to save the lives and reduces sudden death ratios. The main objectives of the application are: (i)To help out the patient in sudden emergency to reduce the death ratios. (ii)To provide personal health care system to overcome the suspend situations. (iii)To communicate with the consultant in real time without any delay

Application Overview:

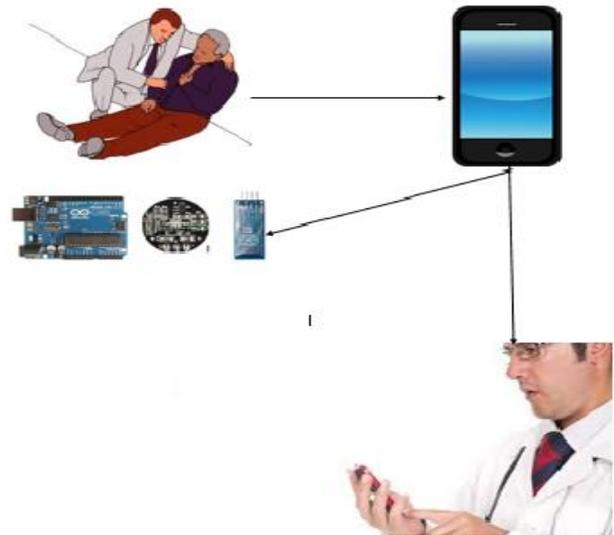


Figure 1. Overview of the System

IV. UML OF THE SYSTEM:

The following section shows system design strategies by visualizing UML (unified modelling language) diagrams.

A. Use Case Diagram

Figure 2 shows the use case diagram of the application which shows the user interaction with application. Patients login into the application with dashboard, then add the consultants numbers into the contact list take heart rate and send SMS to the doctor , receive the response in the inbox.

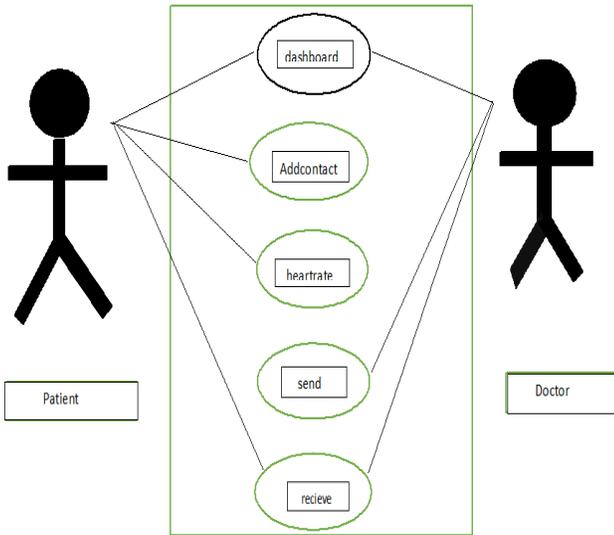


Figure 2. Use Case diagram of the system

B. Component Diagram of the system

Component diagram of the system shows in Figure 3. The component diagram shows the system files used to develop the android application. The diagram shows the interfacing provided by different components to manage overall working of the application.

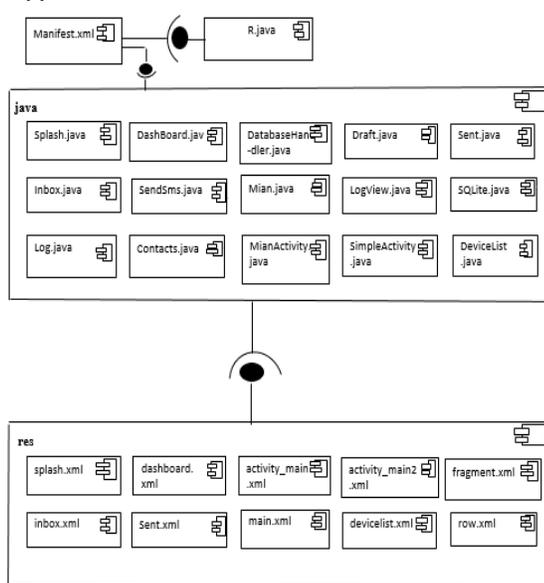


Figure 3. Component diagram of the system

C. Activity diagram

Figure 4 shows activity diagram to show the actual flow of the application. First patient log into the app, dashboard activity is appear choose the contact icon and add the contacts. To take the heart the condition Bluetooth checking is required, that whether

the system (smart phone) enabled Bluetooth then if user click on yes then it receive the heart rate from the chosen device from the device list. After measuring the heart rate patient go into the send activity where when patient click on to the send button it checks the GPS condition whether the GPS setting is on or not. If yes, then send the SMS with particular location if no then terminated.

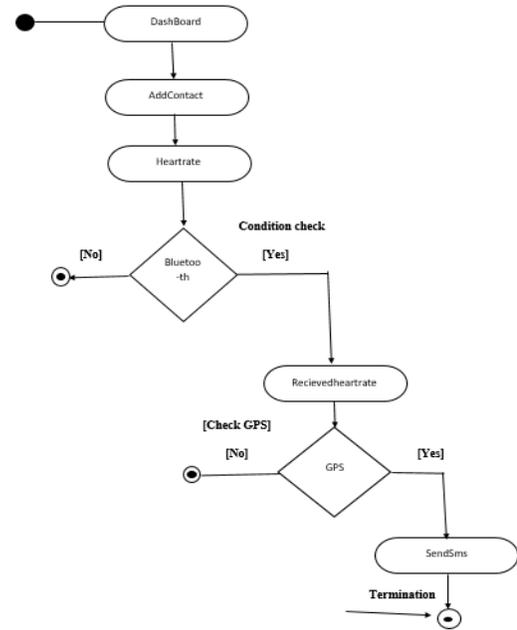


Figure 4. Activity Flow Diagram of the system

V. SYSTEM IMPLEMENTATION

The proposed application based on two modules, Hardware and Software. Hardware to get patient physical condition e.g. heart rate by using heart rate pulse sensor with Arduino microcontroller to send the sensor signal to the android application via HC-05 Bluetooth shield. The software module based on android application. The working mechanism of both modules are described below:

A. Software Implementation

Proposed application uses Android operating system led by google with java platform. Used Android studio as integrated development environment with android SDK libraries. Bluetooth connectivity - To send the data from Arduino to android need Bluetooth connectivity, pair the devices, the smart phone and Bluetooth shield HC05. The Universal Unique Id (UUID) is encoded by the system. `UUID.fromString("00001101-0000-1000-8000-00805F9B34FB");`

Receiving data - incoming bits of data in the form of heart rate can be read by mobile device with,

```

    Constants.MESSAGE_READ:
    byte[] readBuf = (byte[]) msg.obj;
    String readMessage = new String(readBuf, 0, msg.arg1);
    mConversationArrayAdapter.add(readMessage);
    
```

Send sms - Send patient heart rate via send sms manager, SmsManager
 smsManager SmsManager.getDefault();

GPS location - send location with the help of location manager

```
locationManager = (LocationManager)
mContext.getSystemService(LOCATION_SERVICE); and GPS Tracker
double latitude = gps.getLatitude(); double longitude =
gps.getLongitude();
```

B. Hardware Implementation:

Application uses Arduino Uno R3, Bluetooth module HC05 and heart rate pulse sensor to measure the physical data of the patient, jumper wires and OTG cable. The Bluetooth shield has serial communication, import serial library for Arduino <SoftwareSerial.h>, system uses Rx and Tx receive transfer port of Bluetooth and Arduino devices.

The data measured from the Arduino microcontroller attached with a smart phone with OTG cable integrated with Arduino. To receive the data application installed in the android device pair the Bluetooth device. Patient keep finger on sensor and sensor send data to the smart phone. Application send data to multiple consultants saved in the contact list of application. With another feature, the current patient location.

The Entire user manual is as (i) connect Arduino with android device with OTG cable(ii)start application and add contacts in the contact book of application (iii)click on heart icon(iv)start a Bluetooth (v) pair with HC 05 (vi)keep a finger on sensor (vii)click send to doctor button(viii)click on send button.

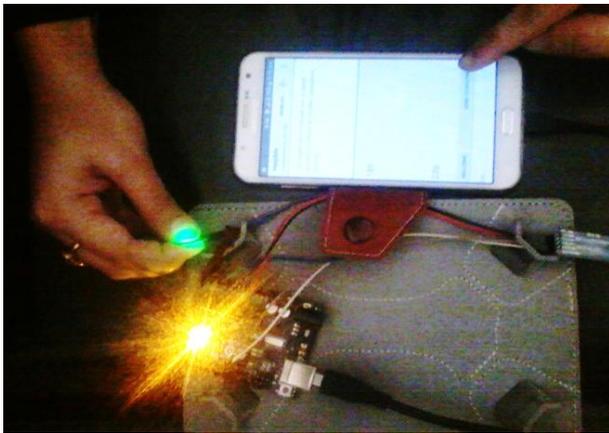


Figure 5. Actual working of the System.

VI. HOW SYSTEM WORKS:

Figure 6 shows the 1st screen of android application. The six icons show working of each screen 1st icon shows the message box from where the message can be send. Second is the inbox where the doctor’s reply can be view. Third is the draft box. Forth one is the contact activity where u can insert and view the consultant phone numbers. The green icon shows sent messages. And the heart shape icon activity is used to connect Bluetooth with Arduino and sensor via HC-05 Bluetooth shield.

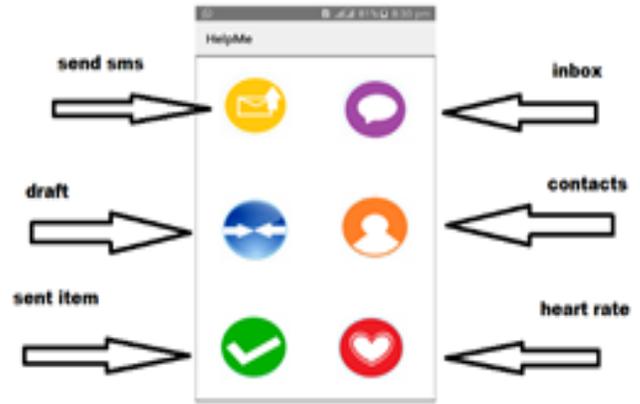


Figure 6. First Screen of android App

First user inserts the contact numbers of his/her consultant the user interface to add the phone number is shows in the figure 7. If the user need to view the phone numbers, click on get Contact button the numbers list will be appeared below the button.

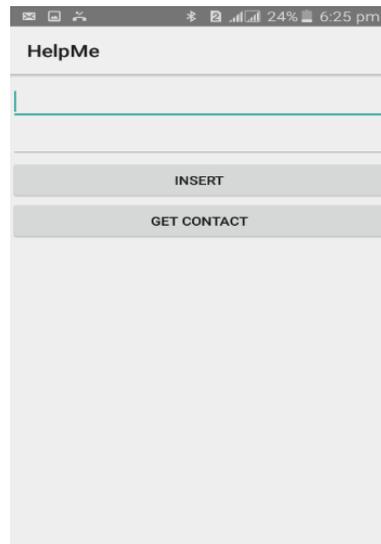


Figure 7. Interface to Insert and View the consultant phone number

To take the heart rate click on heart shape icon the screen appears to ask for Bluetooth permission (on, off). Click yes the screen appears the steps shown in the following figures 8(a) and 8(b).

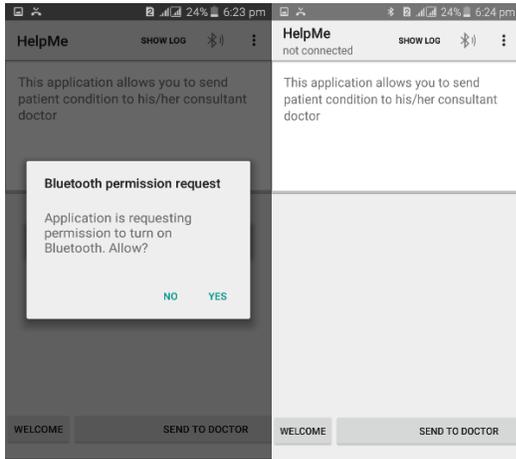


Figure 8a. Bluetooth permission 8 (b) Screen after permission

Connect the Arduino with your laptop, personal computer or with your smart phone with OTG cable and connect with HC05 go to menu click on connect a device the Bluetooth device list appears, select the HC05 device, the incoming heart will receive, shown in Figure 9.



Figure 9. Connecting with HC-05 Bluetooth shield connected with Arduino.

The complete working of the project is shown in Figure 5. When the user Click on send to doctor the send SMS screen appears which shows the heart rate in text box click on send the heart rate with your location will be send to the doctors saved in the pre-list of contacts. If the GPS of the user’s phone is off the access permission dialogue box appears click to yes will redirect you to the location app of the phone click on and click to the send button the heart rate will be send to the doctor with the location of the patient. The doctor’s response message can be received in the inbox off the app.

VII. CONCLUSION AND FUTURE WORK

The aim of this research work was to develop a health management system that would behave as emergence response system, sending elevated heart pulse rate tot eh doctor via SMS. This system was developed on android platform using Ardinoa processors. The system sensors accurately detects the heartrate and send the SMS to desired doctor and family member, informing of some higher fluctuations in heart. The system

reads the patient heart rate and send it to the doctor in emergency situation, based on anywhere any time facility. The system help to reduce sudden death ratios and provide better humanity services. The whole study concluded the health management system core priorities and services for mankind. The future work of the application contains enhancement of sensor with more better functionality, more than one sensor integration as blood pressure or diabetic sensors. Location parameters replace by exact place address. Integration of cloud computing technology.

VIII. REFERENCES

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