Android Based Health Monitoring System for Cardiac Patients

Uttara Gogate[1], Manali Marathe[2], Jay Mourya[3], Nipunya Mohan[4]

[1]Associate Professor, Department of Computer Engineering,Shivajirao S. Jondhale College of Engineering,University of Mumbai, India
[2,3,4] UG Student, Department of Computer Engineering,Shivajirao S. Jondhale College of Engineering,University of Mumbai, India

---

***Abstract*- Everyday many lives are affected by heart attacks and more importantly because the patients did not get timely and proper helps. In the future what if due to lack of urgent service we are not able to save the patient. The answer to such a problem is that the patient needs to be monitored constantly. Due to which we would be able attend the patient immediately. Hence we introduce a system consisting of a wearable device that will monitor the patient health. The wearable device will consist of different sensors such as temperature sensors and pulse sensor. The device will send its data to the server through the android application of the patient. This data will be available to the doctor on his desktop. We have made a prototype of an automated electronic system comprising a Bluetooth module and ATMEGA 32-bit AVR microcontroller which is capable of measuring the Body Temperature and Heart Beat of a moving Patient no matter where the patient is and in case of emergency sends wireless plea for the rescue/emergency help.**

The system that we have proposed give an advantage when compared to the wired system in the view that the doctor can get real time information about the parameters as well as location of the patient so that instant medication can be provided. In case of emergency the patient can be tracked using his latitudes and longitudes.

Keywords—Health Monitoring System; Android application; Cardiac Patients; GPS; Arduino Uno;

I. INTRODUCTION

Day by day stress level of people is increasing due to competitive lifestyle and increasing pollution levels. These days maintaining a healthy life is tough. It is vital to keep track on body by regular check-up.

Patient monitoring refers to the continuous observation of repeating events of physiologic function to guide therapy or to monitor the effectiveness of interventions and is used primarily in the intensive care unit and operating room. At least in India there is no system which continuously monitors the patient when patient is on move.

Wireless sensors are standard measurement tools equipped with transmitters to convert signals from process control instruments into a radio transmission. The radio signal is interpreted by a receiver which then converts the wireless signal to a specific, desired output, such as an analog current or data analysis via computer software.

Wireless Sensors are also used in diagnosis. One of the applications of Wireless Sensors in the field of Medicine is Remote Patient Monitoring.

Remote monitoring, also known as self-monitoring/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.

II. LITERATURE REVIEW

The system is proposed based on the review of some previous work in the wireless sensor network area and the use of mobile phones in health

monitoring.

Many applications are now-a-days available where use of smartphones in health monitoring is experimented. Such system consisted of a wearable device comprising of Temperature and Pulse sensors. The device will send its data to the server through the android application. This data will be available to the doctor using his android application. [1]

In some application systems, the authors proposed a monitoring scheme based on android smartphone. Emergency alarm, Alerts, reminders help the doctor to take timely decisions at emergency situation. Doctors can check the status of patients all the time and even by staying at remote locations by having synchronization between web application and web server. [2]

Some papers focused on handling multiple patients at a time. The System uses an android application. [3]

In few other papers, authors developed a system which continuously monitors Patient's parameters and also the patient history will be stored on the web server. [4]

While in some papers we explored mobile sensor agent and adapter towards intelligent M2M communication in healthcare scenario. The system is implemented using adapter and mobile sensor agent program in C2430 HyBus healthcare sensor motes and experimented their performance with test results. [5]

Weili Zhou et al proposed the design of a family medical monitoring system which is based on uC/OS-II and GPRS. The system tries to build a medical monitoring system for family usage which is effective, small and low-cost. It overcomes the shortcomings of the traditional monitors such as expensiveness, not designed for patient, large in volume, low level of integration. [6]

Smart alert generation system is available which is an automated context aware dynamic alert system from an Intensive Care Unit to smart phones using GPRS. An Internet interface allowed data inspection from a remote location and individual patient details for alert generation to be programmed through a web page. The smart alert generation system delivers the alert based on the current context of the recipient. [7]

While few authors presented the development of a microcontroller based system for wireless heartbeat and temperature monitoring using ZigBee. The system is developed for home use by patients that are not in a critical condition but need to be constant or periodically monitored by clinician or family. In any critical condition the SMS is send to the doctor or any family member. So that we can easily save many lives by providing them quick service. [8],[10]

Some of the authors proposed a remote mobile health monitoring system with mobile phone and web service capabilities. It provides doctors and family members with necessary data through a web interface and enables authorized personnel to monitor the patient's condition and to facilitate remote diagnosis. [9]

III 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 available systems are huge in size and only available in the hospitals in ICU.

Fig 1. Existing system

DRAWBACKS OF EXISTING SYSTEM

Now-a-days many systems for continuous monitoring of the patient are available.

But they have following drawbacks.

1) In existing system patient needs to be hospitalized.

2) Regular monitoring of patient is not possible once he/she is discharged from hospitals.

3) These systems cannot be used at individual level.

4) Existing systems are bulky in size and their maintenance and cost pose a hurdle.

5) Most of the Existing systems use wired communication which is too tedious for long distance communications.

6) They are not successfully implemented when patient is moving.

IV SYSTEM ARCHITECTURE

We propose a system to overcome the above mentioned drawbacks with the following features:

1) Remote Monitoring
2) GPS: To track location
3) Wireless communication

The system architecture is explained.

This System Mainly Contains Following Blocks:

1) Sensors

The sensors for Heart Beat and Body Temperature will be mounted on a board along with the other required things like AVR ATMega32 IC, Bluetooth module, crystal oscillator etc. which the patient will have to carry.

2) Bluetooth Link

The link will be established between the patient's Bluetooth Enabled Mobile Phone and the Sensors circuit via a Bluetooth Module which will be mounted on the Sensor Circuit. This helps in continuous monitoring of the parameters which will be send across to the patient's mobile that will contain software that monitors parameters.

3) Arduino UNO

Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world.

4) Website for Uploading Data from Mobile

Here we are creating new website for uploading data from mobile continuously using GPRS, on website we need do programming which will receive and store data. On request from server data will transmitted to the server on specific interval. New website will acts like third party in GPRS Communication.

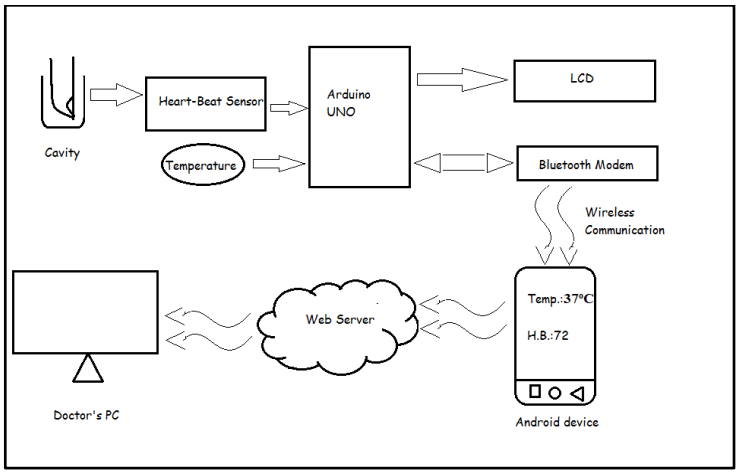

Fig 2. Block diagram of proposed system

V ALGORITHM

Step 1: Start.

Step 2: Connect power supply.

Step 3: Connect Bluetooth to patient's android device.

Step 4: Insert your finger in the cavity.

Step 5: Wait for some time for it to be displayed.

Step 6: Hold the temperature sensor between your fingers/place under the tongue.

Step 7: Wait for some time for the parameters to be displayed.

Step 8: Open the app.

Step 9: Login using user id and password.

Step 10: Establish the connection between the Smart Phone and Hardware via. Bluetooth.

Step 11: Display the received data.

Step 12: Calculate latitude and longitude.

Step 13: Send the above data via. Internet to doctor's pc.

Step 14: Launch the application.

Step 15: Display the receiving data i.e. patient's parameters and location.

Step 16: Record the data when doctor clicks on enable logging.

Step 17: Display patient's history when doctor clicks on show history.

Step 18: Show patients location on map when doctor

clicks on "locate patient"

Step 19: Doctor can adjust the threshold values for heartbeat and temperature.

Step 20: An alert will be raised when the predefined threshold values are crossed.

Step 21: End.

VI FEATURES

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 and temperature.

VII RESULT

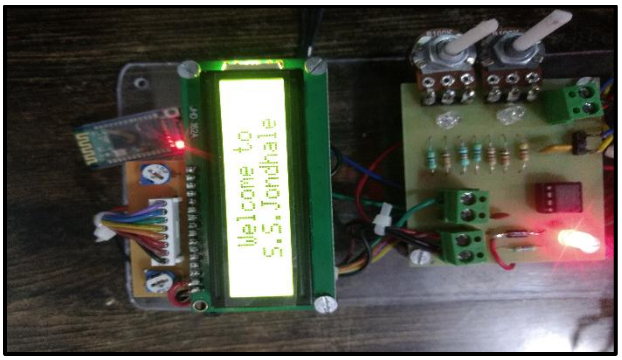

Fig No. 3 Initializing system

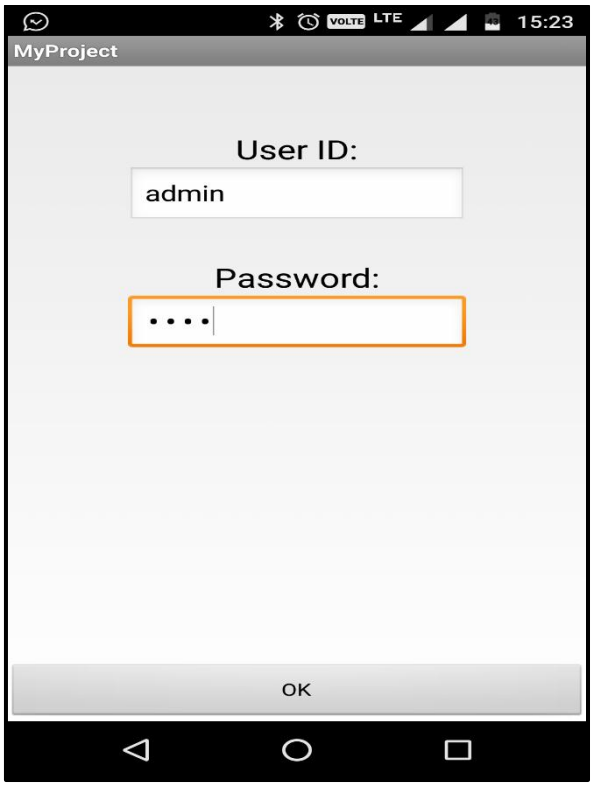

Fig No. 4 Logging in

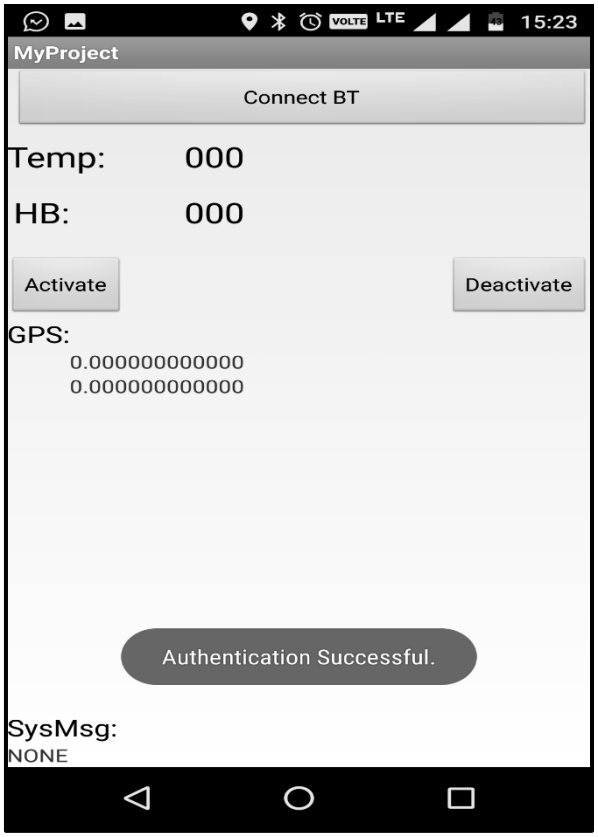

Fig No.5 Android application

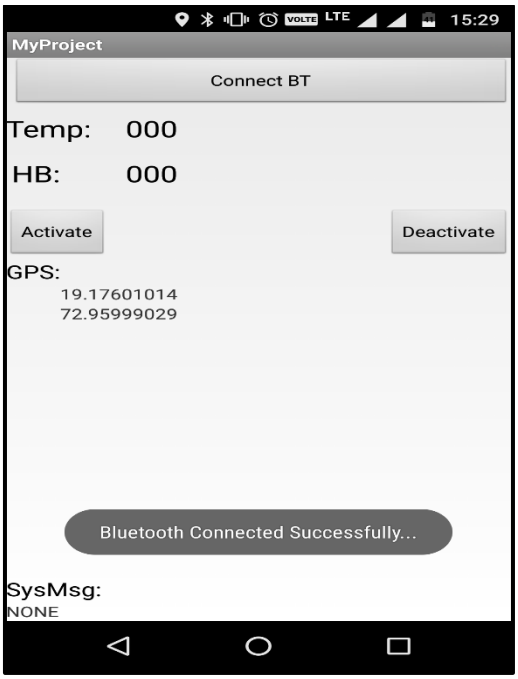

Fig No.6 Bluetooth Connected

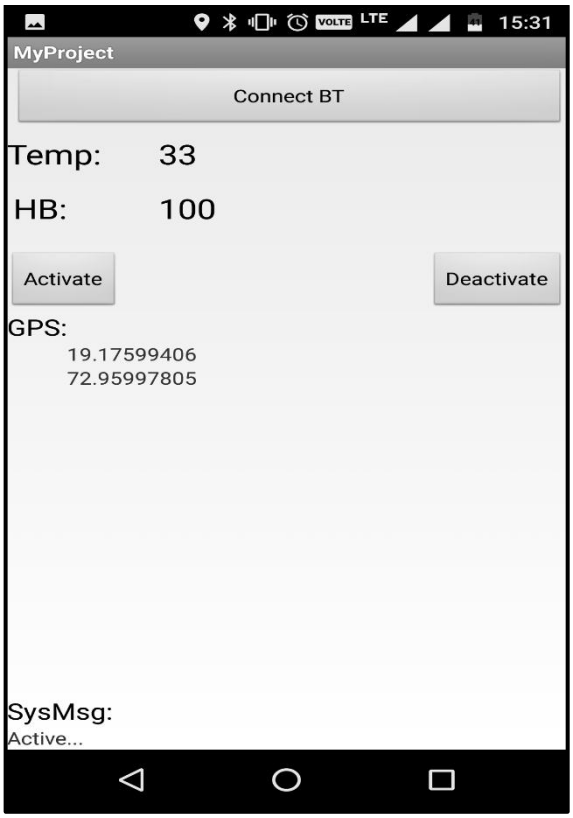

Fig No.7 Application activated

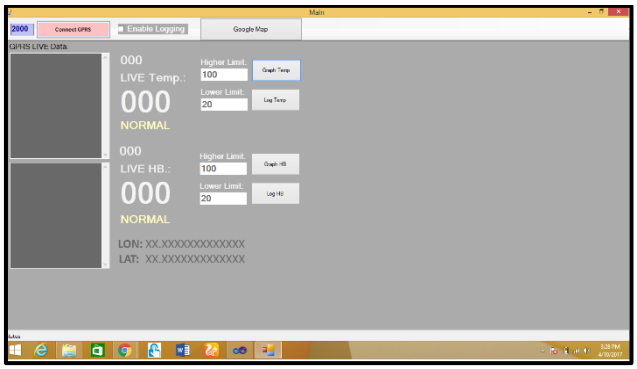

Fig No.8 Doctor's interface

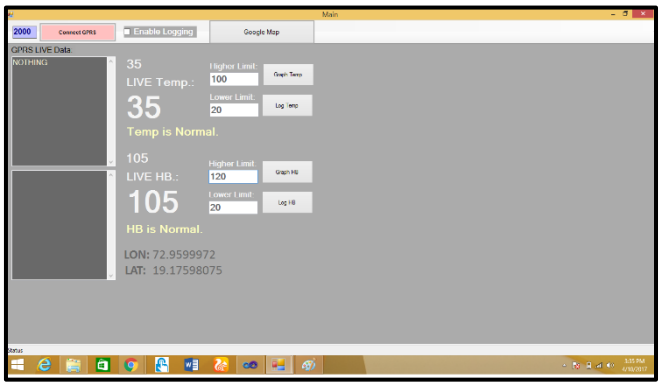

Fig No.9 Parameters appearing on doctor's PC

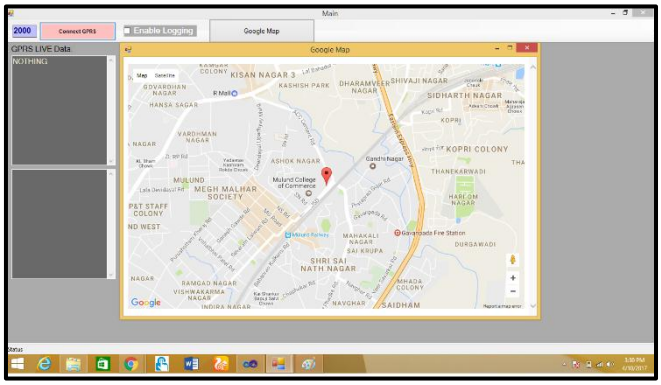

Fig No.10 Using the GPRS coordinates patient's location is displayed on Google map

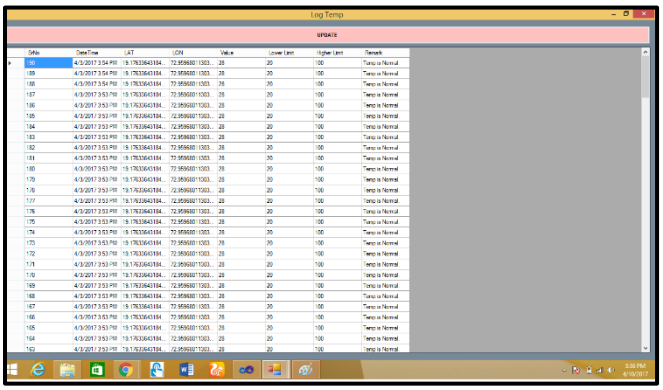

Fig No.11 Database for temperature

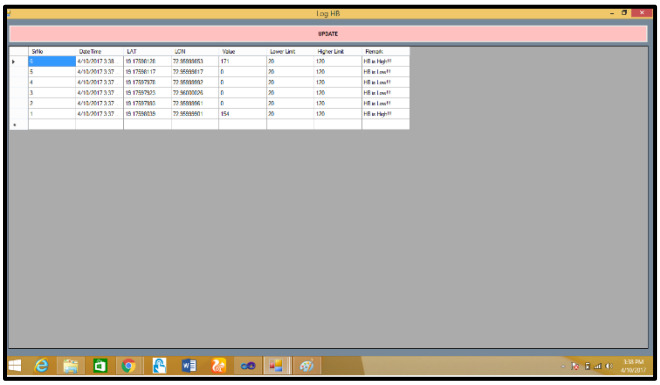

Fig No.12 Database for heartbeat

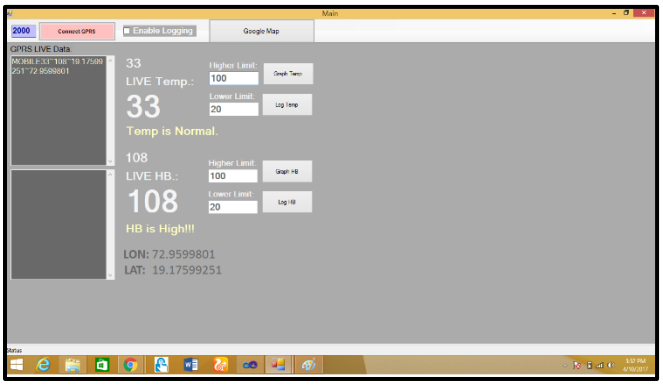

Fig No.13 An alarm is raised at doctor's PC when threshold value is high

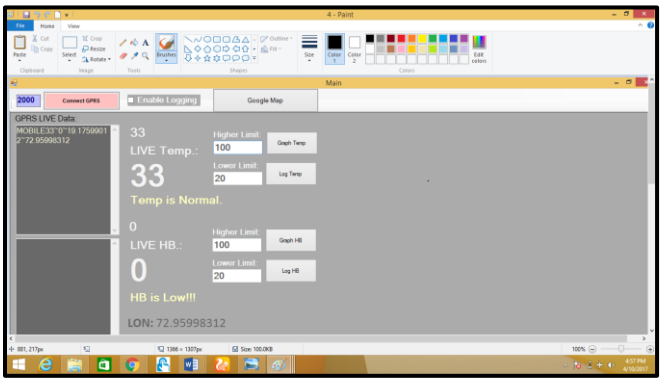

Fig No.14 An alarm is raised at doctor's PC when threshold value is low

VIII Conclusion and Future Scope

A smartphone based health monitoring system has been presented in this paper. The proposed system, mainly consist of an Android application, Arduino Uno microcontroller, a LM35 temperature sensor as well as heartbeat sensor. The link is established between the patient's Bluetooth enabled Mobile device and sensors via a Bluetooth modem, this helps in continuous monitoring. Wirelessly data from hardware is transmitted to the server using Bluetooth and GPRS technology. By using this system, the healthcare professionals can monitor, diagnose, and suggest medication to their patients.
The project can also be implemented as IOT in future.

IX References

[1] Nancy Fernando E, "A Survey on Android Based Patient Monitoring System"

GRD Journals | Global Research and Development Journal for Engineering | International Conference on Innovations in Engineering and Technology (ICIET) - 2016 | July 2016 e-ISSN: 2455-5703

[2] Rajesh Naidu, "Android Based Healthcare Monitoring System"

International Journal of Applied Sciences, Engineering and Management

ISSN 2320 – 3439, Vol. 05, No. 01, January 2016, pp. 98 – 100

[3] Nidhi Mutha1, "Patient Health Monitoring Using Android Application"

International Journal of Innovative Research in Computer And Communication Engineering

Vol. 4, Issue 3, March 2016

[4] Rajesh Naidu, D. Bindu, Asha Jyothi , G. Roshini, "Android Based Healthcare Monitoring System". International Journal of Advance Foundation and Research in Computer (IJAFRC)

Volume 2, Special Issue (NCRTIT 2015), January 2015. ISSN 2348 - 4853

[5] Amit Maurya," Design of a Wireless Health Monitoring

System based on M2M Communication", International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT) 2014

[6] Weili Zhou," Family Medical Monitoring System Based on

Embedded uC/OS-II and GPRS",Proceeding of the IEEE International Conference on Information and Automation Shenyang, China, June 2015

[7] Sundaramoorthy, Anand Kumar Sai, Arunprakash,

Dr.S.Srinivasa Rao Madhane, "Automated Dynamic Alerts from Intensive Care Unit to Smart

Phone using GPRS" IOSR Journal of Engineering (IOSRJEN) ISSN (e): 2250-3021, ISSN (p): 2278-8719

Vol. 04, Issue 03 (March. 2014), PP 43-48

[8] Manisha Shelar, Jaykaran Singh, Mukesh Tiwari, "Wireless Patient Health Monitoring System", International Journal of Computer Applications (0975 – 8887) Volume 62– No.6, January 2013

[9] Yunzhou Zhang1, Huiyu Liu, Xiaolin Su, Pei Jiang and Dongfei Wei1, "Remote Mobile Health Monitoring System Based on Smart Phone and Browser/Server Structure" 2013 International Conference on Electronic Engineering and Computer Science

[10] Uttara Gogate, Jagdish Bakal, "Smart Healthcare Monitoring System Based on. Wireless Sensor Networks." Computing Analytics and security trends. 2016