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# SensDataTrans- An Android app for Healthcare

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*Abstract*— **Mobile technology is changing the landscape of health care delivery across the developing world. In this paper, we have developed an Android application to view the vital parameters of a patient located at a remote location. The processes involved in this type of control system are to monitor the patient's health status. This way of communication is actually done with Zigbee network topology.**

***Index terms - Android, Healthcare, Sensors, Web Services, Remote Access and Zigbee.***

## I. INTRODUCTION

In case of emergency and dangerous situations we have to alert the doctor immediately. For this we are using a Zigbee based network for doctor to patient communication in the hospital and even to communicate and indicate the status of the patient through SMS. This way of communication is actually done with Zigbee network topology. Each patient will be given this module and with the help of this module the patient health condition is monitored and if there is any change in the condition of the health then it immediately sends that changed data through Zigbee to the local system where the main module is connected to the computer to maintain the status of the patient.

The heart beat is monitored with the pulse rate of the body. The high intensity light sensor senses the expansion and contraction of the heart with the help of the nerves. That beam will transmit the signal to the receiver and the minute change in the pulse is noticed as the heart beat. If there is any change in the pulses then it is noticed as the change in the heart and then the controller will get a disturbed pulse count which indicates the fault or malfunction of the heart. The controller is fixed for a number of pulses initially. If there is any change in the any of the pulse count then it considers as a malfunction of the heart and then it transmits the pulse count with the patients ID to the doctor in the hospital and at the same to it sends a sms to a fixed number. This is convenient process to monitor the patients health conditions form any of the distance we present. Since we are using both the networks like Zigbee this makes the user to communicate for internal system and as well as to the longer distances.

Android operating system is an open source, Linux based platform. The data which is sent from the server is displayed to the doctor on his, Android device in the form of graph. The data is sent in binary format. The doctor can view patient record, and can provide feedback.

## II. RELATED WORK

In the Year 2011, Shobaranimada and Sandhyarani S [2] has developed a biotelemetry system use the biosensor to measure heart rate and blood pressure from human body, Using Zig-Bee the measured signal sends to the PC via the RS-232 serial port communication interface. Through the internet system send the signal to remote PC or PDA. When the measured signals change over the standard value, the personal computer will send short message to absent manager's mobile phone.

In the Year 2011, S.Josephine Selvarani[3] has developed an on-line health monitoring of physiological signals of humans such as temperature and pulse using Zig-Bee by which the temperature and pulse of humans can be monitored from a distant location and some abnormalities can be easily indicated via SMS .The physiological measurements obtained from the Temperature Sensor and Heart Beat Sensor are transmitted to the programmed microcontroller to the PC through Zig-Bee. The PC collects the physiological measurements and also sends SMS, to the indicated mobile number through a web services.

In the year 2012, Ms. Kadam Patil D. D, Mr. Shastri R. K[4] has developed an embedded digital stethoscope using an embedded processor with the help of PC connectivity. The data can be transmitted through wireless transmission using Zig-Bee module. A microphone is used to pick up the sound of the heart beat PC connectivity is provided through serial port where from audio and video can be made available through LAN and internet for telemedicine consultation. Heart beat signals are sensed, sent, displayed, monitored, stored, reviewed, and analyzed.

In the year 2013, V. Ramya, R. Uma Maheswari and B.Palaniappan [5] developed a Remote Patient Monitoring that is an alternative to regular home check-ups of patients with special medical conditions, physically challenged and the elderly who are unable to regularly visit a healthcare facility. Remote Patient Monitoring system allows the patient to be monitored remotely from their home itself. The system described allows data acquisition from the fixed sensors. It is cheaper to monitor the elderly and infirm about patient physical states to the remote system. The doctor can directly monitor the patient's information. This paper also includes the web part; the patient's database is monitored through embedded web server. The monitoring center receives the

information from the patient and maintains the database, based on it the doctor can judge the patient status and then diagnose. The system uses the IEEE 802. 15. 4 standard and low cost Zig-Bee technology for wireless communication between the patient data acquisition system and the patient monitoring system and it supports the distance from 30m to 100m depends upon the power and output. Zig-Bee uses frequency bands of 2. 4 GHz, and its transmission rate is 20 kbps to 250 kbps. The proposed system uses the high end processer ARM (Advanced RISC Machine).

## III. ARCHITECTURE

The system uses two sensors namely Temperature sensor(LM 35) and Heart Beat sensors (IR). These sensors are attached to the microcontroller. Embedded C is used to program the microcontroller. It introduces a number of features not available in normal C and basic I/O hardware addressing. It is having the declaration of microcontroller registers and special function as header files, this makes the implementation easy.

If the threshold value is crossed, it sounds a warning in the form of a continuous beeping sound.

Zigbee is used to transfer the data to the server from the microcontroller. The data that is stored on the server can be remotely accessed by the doctor using his Android phone. Web service is used for remote communication.

Images are encoded and retrieved in binary format over the network, then decoded at client side to provide security.

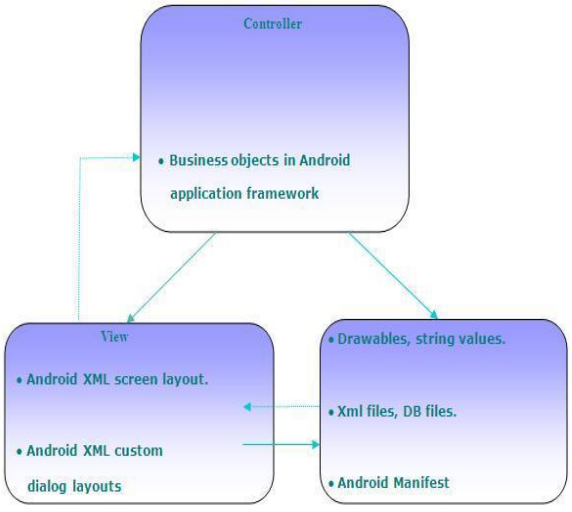


Figure 1: MVC Architecture

***Model Tier:***

Drawables, string values were used to display graph of heart beat and temperature with text on UI screens.

Xml files, DB files were used to store patient's meta-data and graph which were to be used to develop & study Tree of particular patient. Android Manifest was used to access different permissions for internet, write to external storage.

Shared preferences were used to save user credential as key value pair.

***Controller Tier:***

Business objects implementation – client server communication, event handling, adapters, handlers, data controllers, validations.
Sources developed in Android application framework, garbage collected, implementation.

***View Tier:***
Android XML screen layout is used to show different search results. Android XML custom dialog layouts are used to show status and notification for particular request process.

Custom dynamic tree view is used for showing patient's study details with thumbnail images.

***Server side:***
Client server was implemented using advanced JAVA.

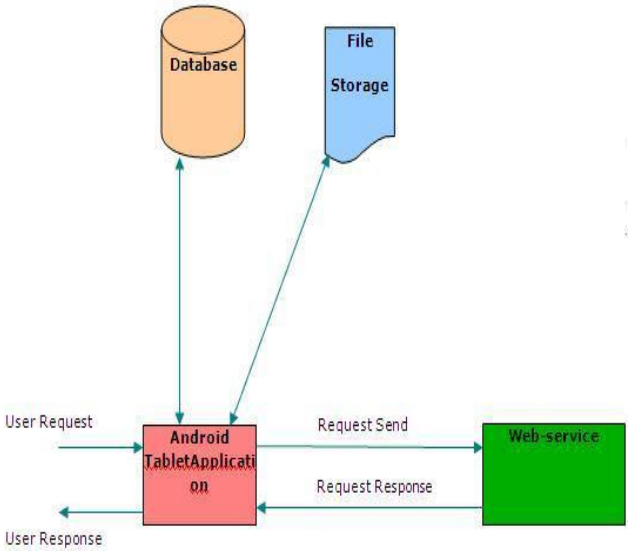


Figure 2: Deployment Diagram

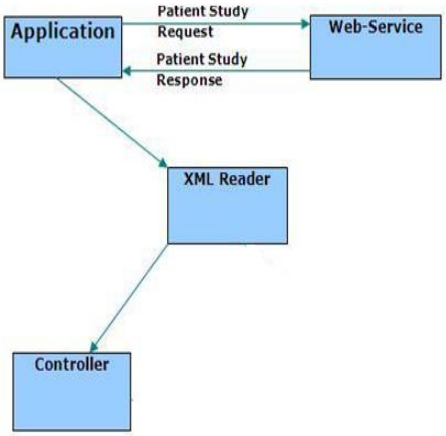


Figure 3: Patient Detail Request Work Flow diagram

## IV. HARDWARE IMPLEMENTATION

The hardware component used are as follows :

1.8051microcontroller
2. ADC0808
3. ULN2803
4. LM35 (temperature sensor)
5. IR (heartbeat sensor)
6. Buzzer

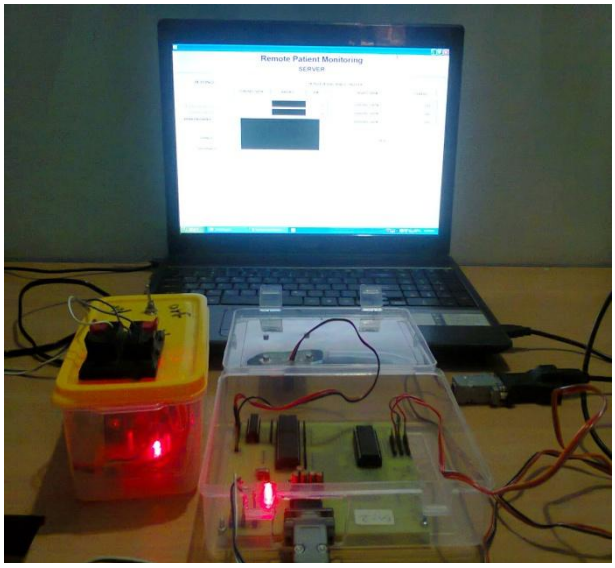


Figure 4: System Hardware

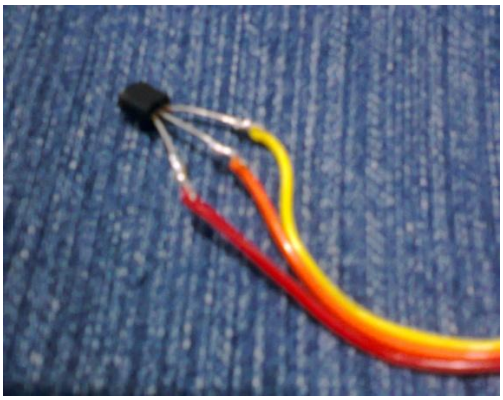

Figure 5: Temperature Sensor

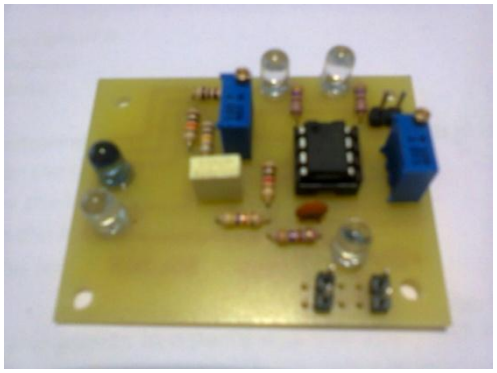

Figure 6: Heart Beat Sensor Circuit

## V. CONCLUSION

The system will enable the medical practitioners in monitoring of patients outside of conventional clinical settings (e.g. in the home), which may increase access to care and decrease healthcare delivery costs. The system will be very useful for medical practitioners who are on the move and still want to be in touch with the patient's condition. A key feature of this project is like remote monitoring and trend analysis of physiological parameters, enable early detection of deterioration; thereby, reducing number of emergency department visits, hospitalizations, and duration of hospital stays. The need for wireless mobility in healthcare facilitates the adoption of remote patient monitoring system both in community and institutional settings. The time saved as a result of the implementation increases efficiency, and allows healthcare providers to allocate more time to remotely educate and communicate with patients.

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