

IoT Based Health-Care System Using Raspberry Pi

Sangle Sagar D¹, Deshpande Niranjana R², Vadane Pandurang M³, Dighe M. S⁴

^{1,2,3}Dept. of Computer Engineering, SCSCOE, Ahmednagar, Maharashtra, India

⁴ Assistant professor, Dept. of Computer Engineering, SCSCOE, Ahmednagar, Maharashtra, India

Abstract -Nowadays in healthcare monitoring system it is necessary to constantly monitor the patient's physiological parameters. This system presents a monitoring system that has the capability to monitor physiological parameters from patient body at every 10 seconds. A sensor node has attached on patient body to collect all the signals from the wireless sensors and sends them to the BSN care node. The attached sensors on patient's body form a wireless body sensor network (WBSN) and they are able to sense the heart rate, Temperature of surrounding. This system is mainly to detect abnormal conditions in human body and abnormal physiological parameters. The main advantage of this system in comparison to previous systems is to reduce the energy consumption to prolong the network lifetime, speed up and extend the communication coverage to increase patient quality of life.

KEYWORDS: IOT, BSN, LPU, PDA, ECG

1.INTRODUCTION

Now a day's aged people are suffering from at least one deceases and health conscious and increasing. And in hospital difficulty occurs in taking care of that patients. Body Sensor network provides very large portability to patients to detect abnormalities in patient and used to avoid critical situations and gives proper treatment on time. Hence, IoT concept used and sensor are connected to human body with well managed wireless network. For measurement heart bit rate, Temperature etc. can be monitored by sensors. BSN care node server also maintained to store data collects data from sensor and its processing in LPU that is local processing unit and send it to database server. And Internet connection and power supply continuous required to work proper functioning and periodically monitoring physiological parameter of body to avoid the risk. Because sensor is sensing or collecting information after every 10 secs and sends it to database server. Continuous health monitoring

with wearable sensor and implantable body sensor networks will increase detection of emergency conditions in at risk patients. Also, this system is useful to operate remotely because of in built Wi-Fi in raspberry pi that we are using in system, hence sensors and software system can

remotely work because of integration of all component. In this system, we are using sensor to detect biological parameters and it processes along with raspberry pi and that all hardware component is integrated with software system to display data to user and user can able control system.

2.Proposed System

In A Secure IOT Based Modern Healthcare System, Internet of things is used to give flexibility and fast operational speed to get expected outcomes. In this, hardware elements are used that are Raspberry pi 3, heart beat sensor, Temperature sensor etc. and more sensors also can be used to detect various biological functionality. In this Hardware elements are integrated with software system that controls the hardware and report generation. Heart beat sensor is Easy pulse 1.1 is used and general temperature sensor is used to detect temperature. By using This System, we can detect abnormal conditions in human body at real time.

Raspberry pi3 is device which is connected with sensors, sensors are connected with human bodies, and this raspberry pi3 is connected with software systems by using wireless connection. When all elements are connected together, sensor senses data from human body, then sends that data to server. after that these data is compares with standards values that are already stored in system. According to that normal and abnormal conditions checking is performs. And if there are any abnormalities are occurring the it sends message immediately to doctor to avoid critical situations. In this System Administrator is there to control system, it can control new patient's entries and doctor's entries, when it will get data from sensors and stores in database is displayed in separate UI page which periodically loaded and fetches data from database. Time interval is ranging from 5 to 10 second. When abnormalities occur, message is get send to doctor's mobile within 1 minute. In this system, we should have to connect system and hardware device and server centrally.in this we required two servers, one for system deployment and another for database which stores data. In this system, all data coming from LPU is in

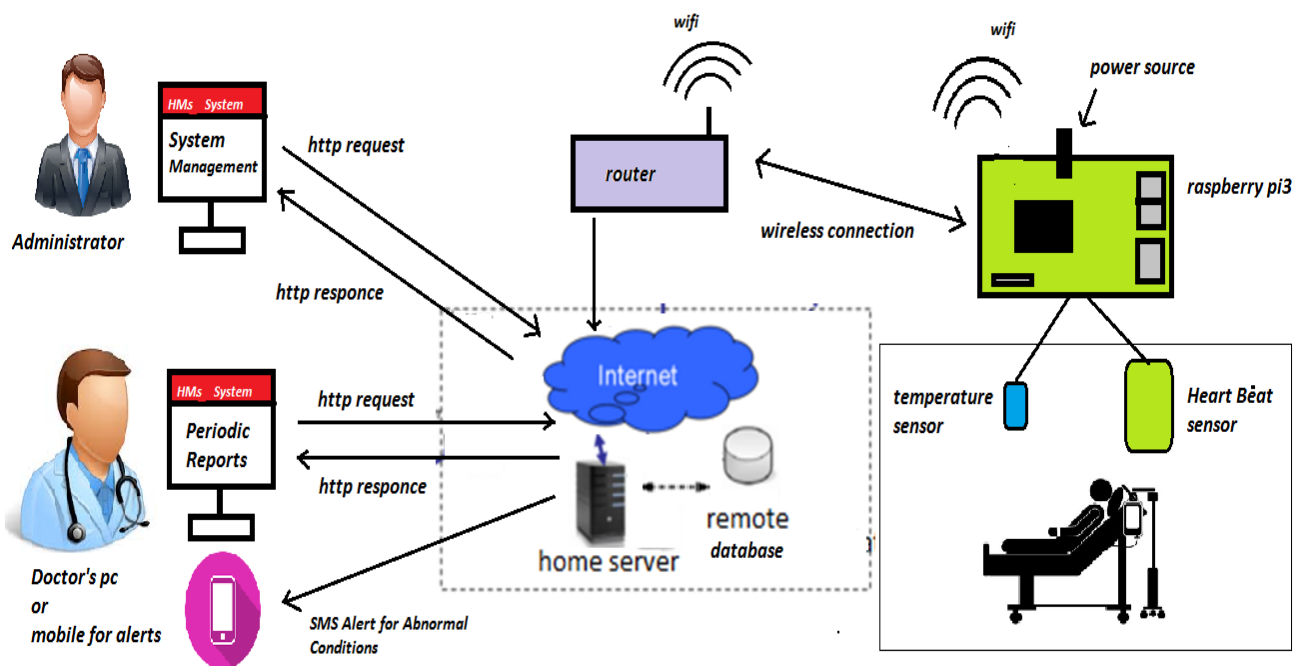


Fig 2.1 System Architecture

Digital format so that it gives advantage on operational speed, and digital processing is much more efficient than analogue signal. For connectivity, we are using PuTTY application to connect devices and software system that works like a mediator, when raspberry pi send data to comes to PuTTY and then it forwards to database through system. To develop system, development tool used is NetBeans 8.1, Servers used are Apache Tomcat, Glassfish Servers. System developed is mainly java based, hence it requires JDK and JRE as java development tool supports. Framework used to develop system is MVC framework(Model-View-Control). Database used is in Mysql 5.1, This database is used because system stores data in table format and records format so for this Mysql database is easy and flexible to use. Sensors used is mainly low power so power consumption is low and it gives advantage for long life operationality. Data is coming from sensors to raspberry pi is processed to convert it to digital format that's make easy to process data in system digital format so that it gives advantage on operational speed, and digital processing is much more efficient than analogue signal For connectivity we are using PuTTY application to connect devices and software system that works like a mediator, when raspberry pi send data to comes to PuTTY and then it forwards to database through system To develop system, development tool used is NetBeans 8.1, Servers used are Apache Tomcat, Glassfish Servers. System developed is mainly java based,

Hence it requires JDK and JRE as java development tool supports. Framework used to develop system is MVC

framework(Model-View-Control). Database used is in Mysql 5.1, This database is used because system stores data in table format and records format so for this Mysql database is easy and flexible to use. Sensors used is mainly low power so power consumption is low and it gives advantage for long life operationality. Data is coming from sensors to raspberry pi is processed to convert it to digital format that's make easy to process data in system. This System is made to avoid critical situations and treatment on time and immediately. When abnormal data is indicated, message will be send to doctor's mobile. And it can avoid risk and handle critical situation. It also gives advantage that it reduces time laps between situation and their alert to doctor, that means doctor will know situation as immediately it happens. In this system, we are using BSN care server to deploy system and also using separate database server to store data. Mysql is relational database that stores data in records format. Separate tables are made to store data which is coming from sensors. Sensor are connected to (LPU) Local Processing Unit to Process data into digital format. And all that components are able to connect with system with wire media and wireless also hence it gives high portability to operate from remote place. It also gives centralize control to system by administrator. Administrator is one user that can control whole system.

3. HARDWARE MODULE

A] Raspberry pi :-



fig 3.1 Raspberry pi 3 model B

In our project is important hardware we used. Main tasks are get physical parameter from heartbeat sensor and temperature sensor and converted into digital form. It also called as local processing unit (LPU).

specification of raspberry pi 3:

1. 64bit ARMv7 Broadcom BCM2837 Quad Core Computer running at 1.2GHz
2. 1GB RAM
3. BCM43143 WiFi on board
4. Bluetooth Low Energy (BLE) on board
5. 40pin extended GPIO
6. 4 x USB 2 ports
7. 4 pole Stereo output and Composite video port
8. Full size HDMI
9. CSI camera port for connecting the Raspberry Pi camera
10. DSI display port for connecting the Raspberry Pi touch screen display
11. Micro SD port for loading your operating system and storing data
12. Upgraded switched Micro USB power source (now supports up to 2.4 Amps)

B] DHT11:

The DHT11 is low-cost digital temperature sensor. From high-performance 8-bit microcontroller it gives fast response and high accuracy. The sensor is you can only get new data from it once every 1 seconds.



fig 3.2 DHT temperature sensor

Features

1. Full range temperature compensated
2. Relative humidity and temperature measurement
3. Calibrated digital signal
4. Low power consumption
5. 4 pins packaged and fully interchangeable

C] Easy pulse :-



Fig 3.3 Easy Pulse

Easy pulse used for measure heartbeat and DIY heartbeat sensor because just put finger inside it measured cardio vascular wave form. The latest version of Easy pulse(V1.1). It uses infrared light source to illuminate finger at one side and photodetector on other side to measured variation in the transmitted light due to change blood volume inside the tissue. Analog wave as well as digital pulse as output and synchronous with heartbeat.

Proposed System Flow Diagram-

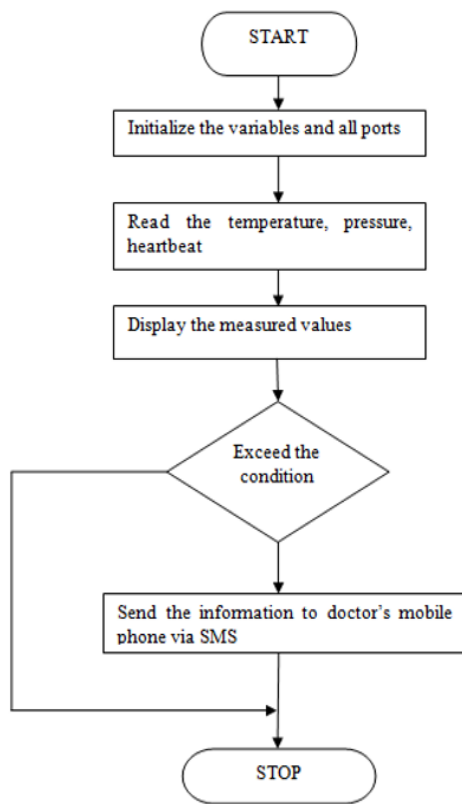


Fig. Proposed System Flow Diagram

2. Data Goes to PuTTY Server

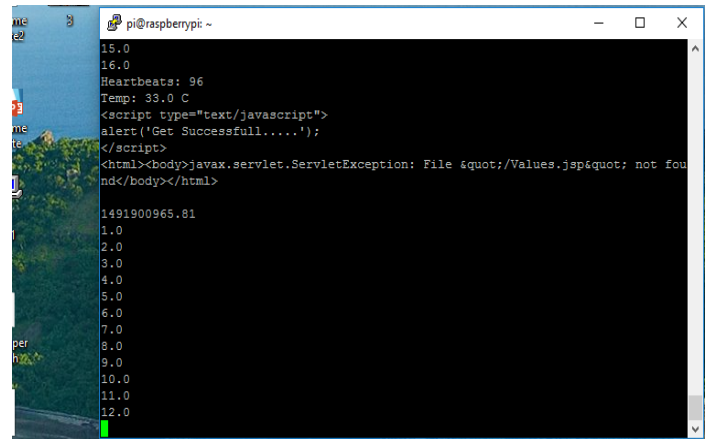


Fig. PuTTY Server Screenshot

3. Data is periodically Update on UI

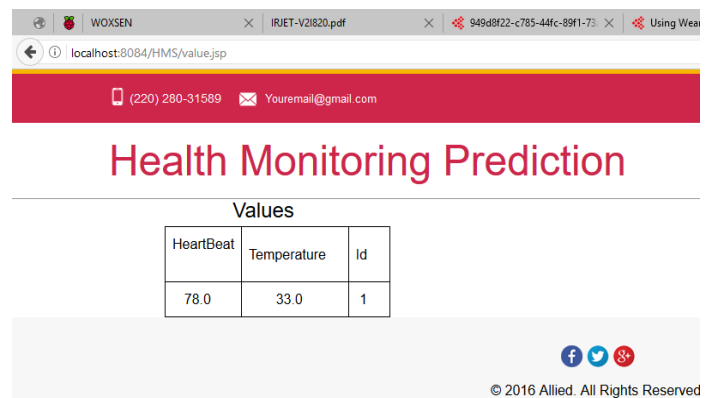


Fig. UI Screenshots Data Report

4. RESULT: -

1. Sensors Working to sense data and sends to PuTTY server



Fig. Sensors Attached to Body

4. Message goes to mobile as a alert

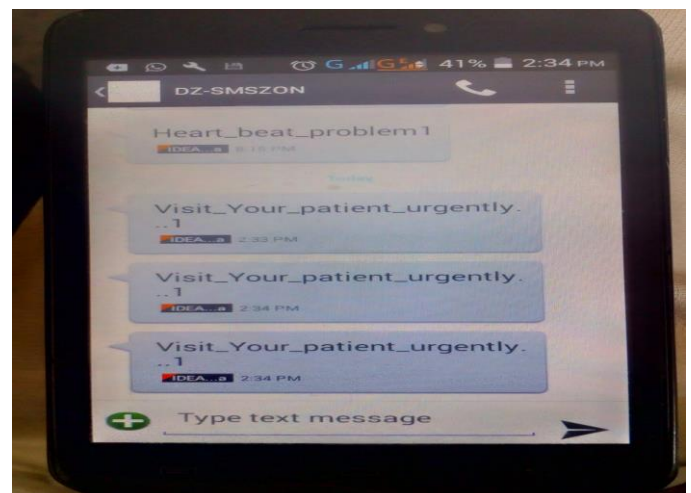


Fig. Message Alert On Mobile

5. PERFORMANCE ANALYSIS

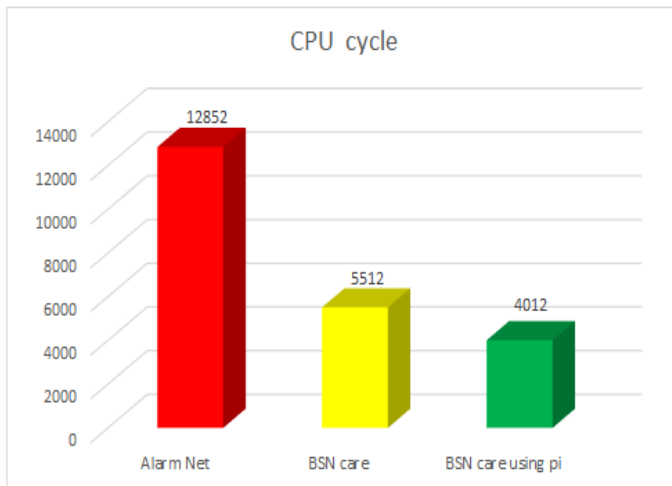


Fig. Performance Benchmarking based on CPU Cycles

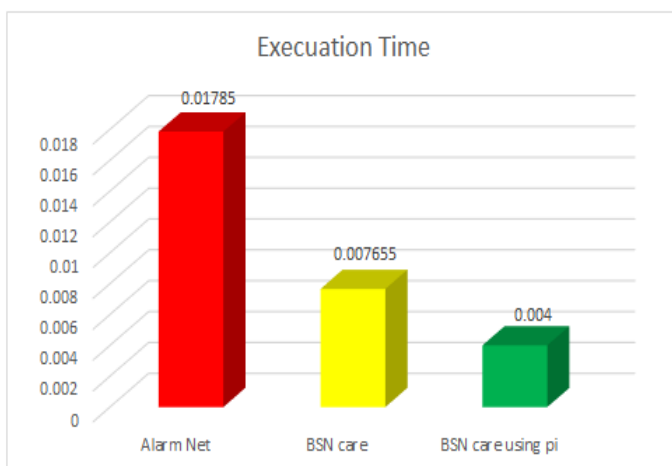


Fig. Performance Benchmarking based on Execution Time

6. CONCLUSIONS

The outcome of project has showed that it works on real time monitoring and when abnormalities occurred, message alert goes to registered number. Hence, we can avoid critical situations and can be able to give treatment on time.

REFERENCES

- [1] Predictive Monitoring of Mobile Patients by Combining Clinical Observations With Data From Wearable Sensors Lei Clifton, David A. Clifton, Marco A. F. Pimentel, Peter J. Watkinson, and Lionel Tarassenko
- [2] Body sensor network – a wireless sensor platform for pervasive healthcare monitoring [benny p.l. lo, surapa thiemjarus, rachel king and guang-zhong yang] 2015

- [3] A Unique Health Care Monitoring System Using Sensors and Zig Bee Technology [Ekta Madhyan Mahesh Kadam, Department of Electronics & Telecommunications, Mumbai University, India] 2013
- [4] Discovering Multidimensional Motifs in Physiological Signals for Personalized Healthcare. [Arvind Bal Subramanian, Jun Wang, and Ramakrishnan Prabhakaran] 2014
- [5] Coexistence of zigbee-based WBAN and WiFi for Health Telemonitoring Systems [Yena Kim, Student Member, seungseob Lee, Student Member, and sukyoung Lee, Member,] 2013
- [6] Automated Patient Handling Activity Recognition for At-Risk Caregivers Using an Unobtrusive Wearable Sensor. [Feng Lin, Xiaowei Xu, Aosen Wang, Lora Cavuoto, and Wenyao Xu]2015
- [7] Effective Ways to Use Internet of Things in the Field of Medical and Smart Health Care. [Kaleem Ullah, Munam Ali Shah, Sijing Zhang, Department of Computer Science, University of Bedfordshire, Luton, UK] 2015

BIOGRAPHIES



Mr. Sangle Sagar is final year student in computer department in, SCSCOE, Ahmednagar



Mr. Deshpande Niranjan is final year student in computer department in, SCSCOE, Ahmednagar



Mr. Vadane Pandurang M³ is final year student in computer department in, SCSCOE, Ahmednagar