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Wireless Sensor Node for Simultaneous Monitoring of Health Parameters in Dengue Patients

Shikha kamboo, Vipra Bohara , Laxmi Narayam Balai

***Abstract*— The wide speed enhancements & acceptance of wireless communication & networking techniques & miniaturization of electronic circuits has created an ever increasing demand for automatic monitoring & logging of various processes & parameters human physiological & vital parameters also need tabe monifored & logged especially in the case of elderly conically ill or ander intensive case WBAN (wireless body area network) technologies are emerging day by day to provide for automated monitoring of various vital& non vitsl parameter of the human body the sfandarsds for medical WBAN are defined as IEEE 802.15.6 & IEEE802.15.6 WBAN allowe for weareable non invasive miniaturized sensor nodes to monitor various parameter & human baby functions this technology has the potiential to revobionize medice and allied industries especially telemedicine. Dengue ,is a vector generated disecase ,a type of painful fever ,with canse quential and life threating effects as sudden drop in blood pallet .this work is aimed at autenatic monitoring and logging of various vital parrameters of a dengue patient ,who needs continous monitaring ,The propased system ,implements measurement and software defined filtering of ECG Signals along with acquisition of temprature ,Spoz ,& Blood pressure (Systalic and Diastolic) .All these parrameters are accquired by the sensor mode & Sent to the central service over TCP/IP protocol .The server also in corporades on artifical never all net work ,which analyzes all the parrameters and predicts patient over all health status and generates alomms in case of emmergencies.**

***Index Terms*-- wireless body area Net work, Artificial Neural network, Dengue, IEEE802.15.4 ,IEEE802.15.6, Leven berg marquard neural network , critical case.**

I. INTRODUCTION

Blood pressure, heart rate and body temperature are commonly known as vital health criteria because most human diseases can be identified by monitoring them periodically. For example, high blood pressure (hypertension) or hypotension (hypotension) leads to diseases such as kidney failure, nervous problems, heart attacks, paralysis, etc. In addition, a person with dengue needs to periodically monitor these vital health parameters. Sometimes, continuous manual monitoring of these standards in themselves is a stressful occasion for a patient who needs rest. This continuous monitoring of biometrics is necessary for an accurate clinical diagnosis. Dengue fever, in particular, is a viral infection transmitted by mosquitoes. Currently, approximately two thirds of the world's population live in areas affected by the dengue vector. It is endemic on all continents, except in Europe, and FHD is produced in Asia, America and some Pacific islands. There are three stages in DH, namely, fever, critical phase (leakage phase) and recovery phase. When the patient enters, it is important to determine the stage to which he belongs. At this stage, for the early detection of trauma, vital parameters such as blood pressure, pulse rate and body temperature should be monitored periodically (usually once per hour). Currently, hospitals in Sri Lanka maintain a table for each patient that shows how these vital factors change periodically. The purpose of this research is to design and develop a wireless sensor node to periodically monitor a person's vital health parameters in real time and display the results on the mobile phone screen. The phone also generates alerts every time it detects an abnormal state. This system is best suited to monitor patients in the clinical setting and monitor the elderly in the home.

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II. OBJECTIVES OF STUDY

[1.] Design & Development of a continuous penitent monitoring system for dengue using state of art technology such as Wireless Sensor Networks, IOT (Internet of Things), and advanced Signal Processing Technologies.

[2.] Improvement in overall accuracy and precision of existing systems , by employing hybrid measurement technologies or redundancy , along with advanced time or frequency domain signal processing , thus enhancing overall receptivity & reliability of the system.

[3.] Implementation of a smart architecture on low power 8-bit microcontroller along with WiFi connectivity to realize an IOT (Internet of Things) connected smart patient monitoring system.

[4.] Integration of various parametric alarms with various level of reliability and plethora of mediums such as E-mail client, GSM Modem. Optionally alarm communications can be integrated on popular apps such as Whatsapp or Hike.

[5.] The proposed system shall be supportive of multiple protocols for wireless communications such as Zigbee, Z-Wave, WiFi(802.11.4), along with long distance protocols such as LORA WAN.

[6.] Integration of the above system implemented as embedded system using 8 bit microcontroller as slave and MATLB server acting as master node for coordinated multi sensor data collection, plotting & data logging solution.

[7.] Integration of the proposed system with commercially available cloud platforms such as Amazon or Google, to provide App Based monitoring and control on mobile devices.

[8.] Usage of advanced Machine Learning or Artificial Intelligence algorithms along with high performance

Shikha kamboo, Electronics and communication, Yagvyalkya institute of technology, Jaipur, India
Vipra bohara Electronics and communication, Yagvyalkya institute of technology, Jaipur, India
Laxmi Narayan Balai, Electronics and communication,, Yagvyalkya institute of technology, Jaipur ,india

clustering algorithms to interpret health hazards, predict health risk & correlate with clinical data.

III. LITERATURE REVIEW

In this document, the telehealth system is provided based on a wireless sensor network. This new technology has the potential to deliver a wide range of benefits to patients, medical professionals and the community through continuous outpatient monitoring, early detection of abnormal conditions and supervised rehabilitation and discovery of potential knowledge by extracting data from all the information collected.[1]

This document explored the current WSN technique that can be used in health care monitoring. The current state of modern technology has been analyzed based on its ability to meet the information requirements of dictatorial authorities. Based on the deficiencies of the current system, this document planned to overcome these deficiencies, especially energy consumption and privacy issues to meet the needs of the growing field. Safety issues will also be considered in future work.[2]

In this research, we have provided an impact on usage of wireless senor networks specifically in healthcare sector. There is credible future of self organizing WSN in healthcare sector. Wireless sensor networks can improve the systems like in-home assistance and smart nursing. Patient can ensure their privacy while remaining at home and healthcare services will be provided to them at their door step. [3]

The proposed system will be developed to detect the first symptoms of dengue and monitor the patient suffering from this chronic disorder using the cloud data log. It can be used to allow the doctors to attend multiple patients in rural areas without constant focusing on a single patient.. The proposed system will be implemented by integrating features of all the hardware components mentioned. All modules will be organized and placed properly to the best working of the system. [4]

By mistreating wireless device networks, we tend to build the lives of lighter patients and provide viable solutions. Security is vital to monitor the medical care that a wireless device network can offer. Therefore, she participates in a nursing research topic that increases the price of learning. This document provides a clear and comprehensive study of the safety analysis in WSN of abuse of health care applications. [5]

After reviewing several articles and research, that has been conducted, we may conclude that: there is still a long way to go in the area of wireless sensor network. Existing medical applications based on sensor networks are in the first-line potential research for use in the future of WSNs and their medical device looks extremely promising. Security issues are a significant area, and there are still a number of large challenges to overcome. [6].

Infusion therapy is one of the common medications being administered in hospitals. This study could not be evaluated in actual situation. Before evaluating the IVPB system in actual situations such as in hospitals, there are some changes that need to work on such as the GUI to add more functions since it will be evaluated in the hospitals, the aesthetic design of the system to attach easily to the drip chamber and realtime monitoring of the fluid level. [7].

Enables the mobile device to lower blood pressure. Since our device is in a chassis with me, new sensors can be connected and reprogrammed accordingly. In addition, the system of monitoring vital brands (blood pressure and heart rate) can be used periodically, especially in the elderly and patients with hypertension white coat. [8]

Security is very important to monitor the medical care that a wireless sensor network can provide. This document presents the design and implementation of a health care monitoring system using WSN with a GSM modem. A test bench is constructed to assess the performance of medical care supervision where the sensor nodes measure blood pressure, electrocardiogram, heart rate, temperature and respiration. [9]

The biggest benefit of owning a wireless network is that it allows service providers to apply bedside technology as part of normal health care workflows. It is also used to detect chronic diseases beforehand. With the technological development expected very soon, the world medical side will take a new turn by replacing large physical monitors with a wireless network system and WBAN will play an important role in the long term. [10]

By using wireless sensor networks, we make patients' lives more comfortable and offer viable solutions. Security is very important to monitor the medical care a wireless sensor network can provide. Therefore, it is an emerging research topic and deserves to be studied. This document provides a clear comprehensive study of safety research in health care applications used by WSN. [11]

The wireless sensor network (WSN) with the advantages of low energy consumption and low cost has gained more attention from researchers, due to the application of WSN in fields as diverse as pollution control, habitat control , health monitoring, monitoring military objectives, etc. Improved reliability of the link between the sensor and the screen. [12]

IV. METHODOLOGY

Process Block Diagram

This block diagram show that the ECG signal going to the software refined butter-wroth filter which is produce by ECG Machine from patient. Then this signal give to the QRS complex detection then this signal give to the mean and T-wave Based filter.

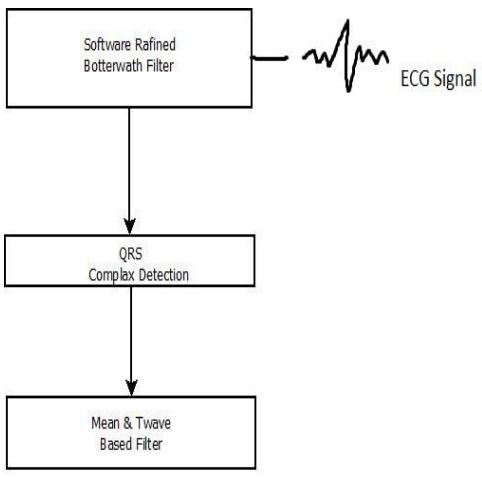

Fig:1 Process Block Diagram

Sensors Data Multiplexing

This block diagram show that different types of sensor data is sense by patients monitoring system.which is shown in figure. Data of temperature measured by temperature sensors then it goes to range filter then it goes to multiplexer. And pulse rate sense by the pulse rate sensor and this data goes to filter and then it goes to multiplexer. As blood pressure and other sensor and then it goes to filter and then these data goes to multiplexer and by using multiplexer these data multiplexed and then this multiplexed data go to TCP/IP.

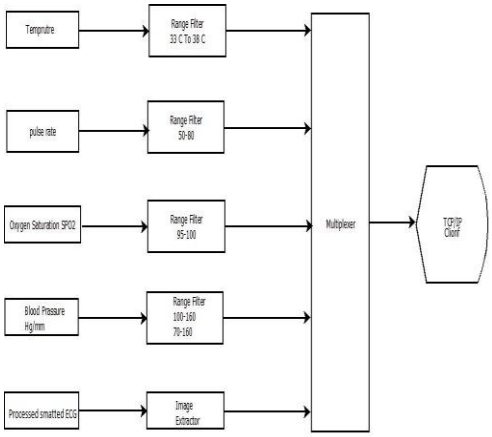

Fig: 2 Sensors Data Multiplexing

TCP IP Data Demultiplexing

This block diagram show that TCP/IP Client data go to for demultiplexing to demultiplexing unit then this data go to muli plot display. And go to for smoothed & filtered ECG Image then it goess to artificial neural network and thed this artificial neural network predict the health status of the patient.

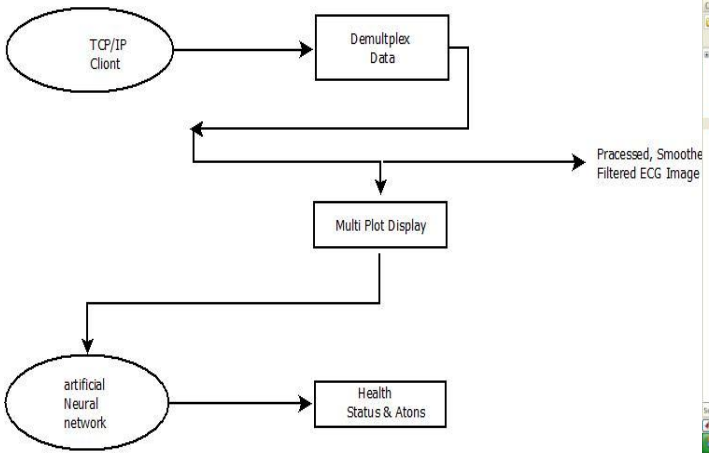

Fig: 3 TCP IP Data Demultiplexing

V. RESULTS

In this window we can see value of sensors which is used for train artificial neural network.

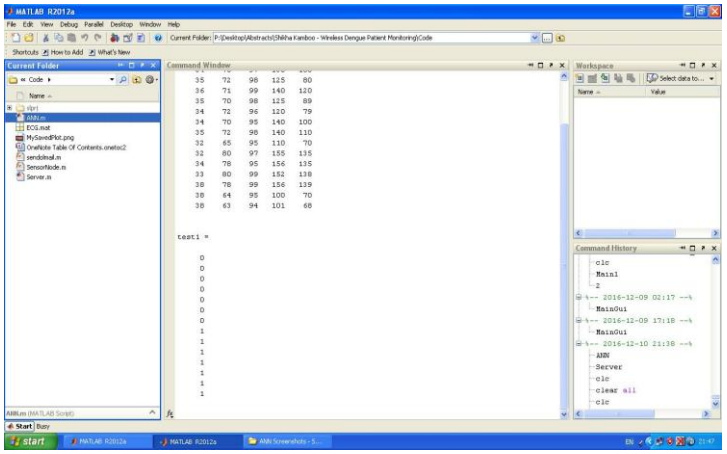

Fig: 4 Value of Sensors

In this window we can see the TCP IP, communication setting, communication status and read/write status.

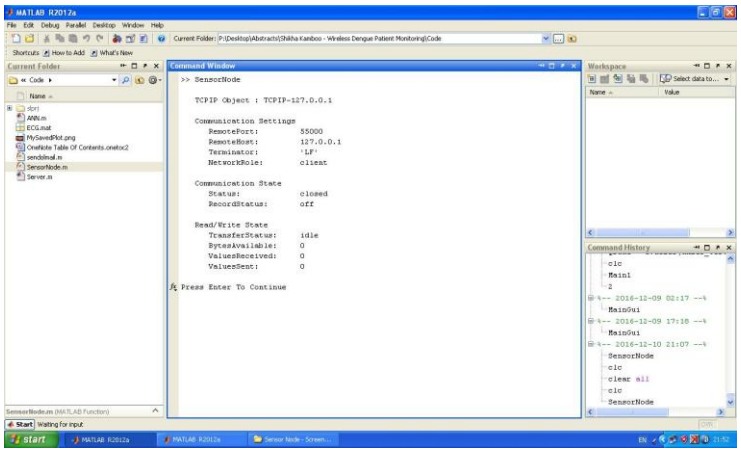

Fig: 5 TCP IP Communication

In this window we can see the different data graph of sensor nodes like ECG, temperature, blood pressure.

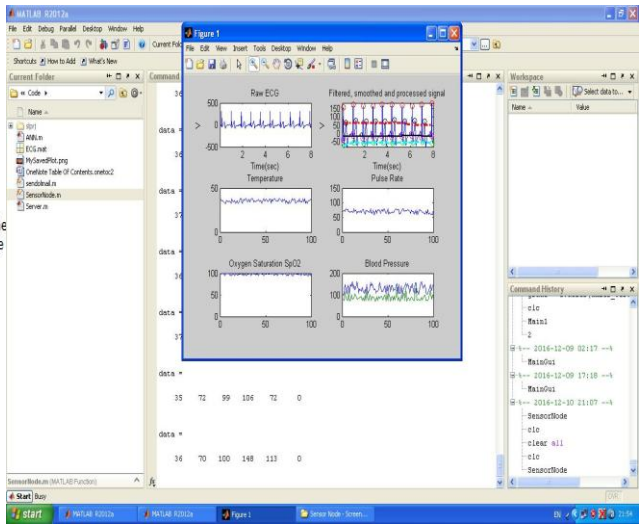

Fig: 6 Data Graph

In this window we can see the different data of different sensors.

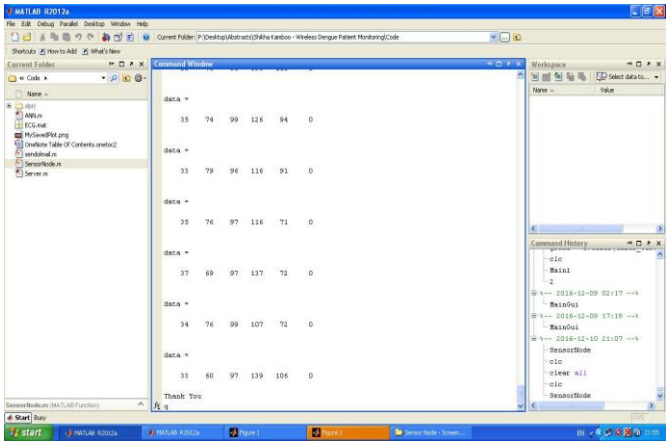

Fig:7 Sensors Data

In this window we can see the different data of different sensor with alarm status.

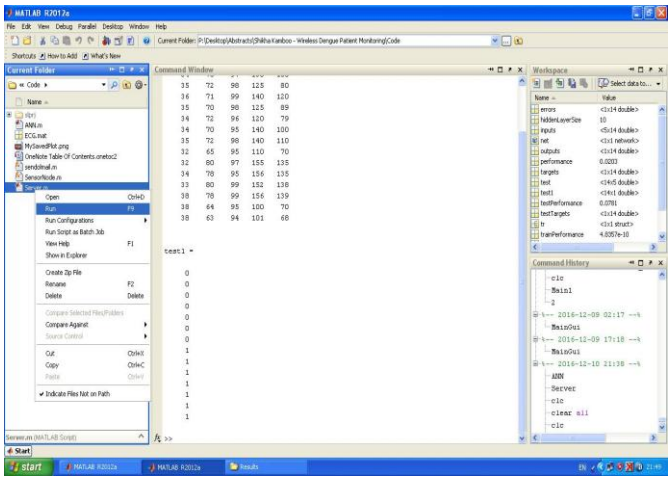

Fig: 8 Sensors Data With Alarm Status

In this window we can see when we press enter key then the local host is initializing here we can see Host IP and we can also see communication setting and status of communication and read/write status.

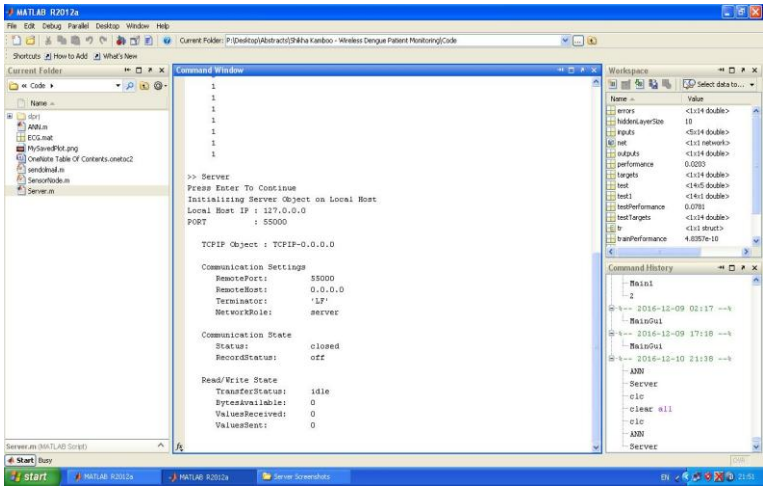

Fig: 9 Host Initialization

In this window we can see the graph of temperature, pulse rate, oxygen saturation, blood pressure, ANN health prediction and Alarm.

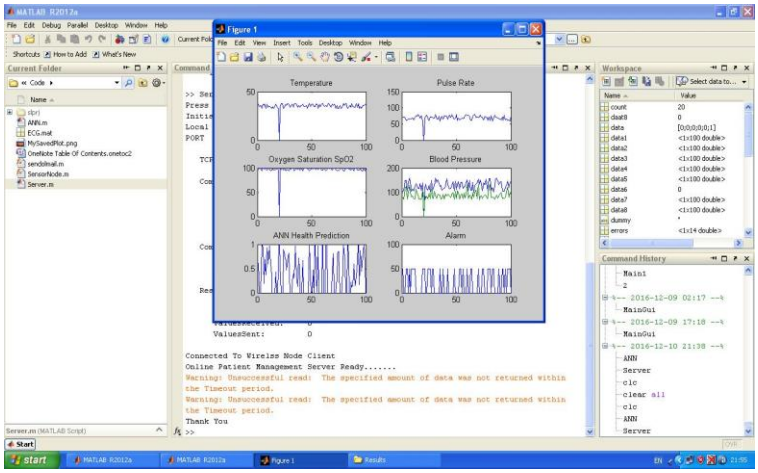

Fig:10 Different Parameters Graph

Table: 1 Data of Different Sensors With Alarm Status

Sr. No.	Temp.	Pulse Rate	SPO2	Systolic pressure	Diastolic pressure	Alarm Status
1	34	70	97	130	100	0
2	35	72	98	125	80	0
3	36	71	99	140	120	0
4	35	70	98	125	89	0
5	34	72	96	120	79	0
6	34	70	95	140	100	0
7	35	72	98	140	110	0
8	32	65	95	110	70	1

9	32	80	97	155	135	1
10	34	78	95	156	135	1
11	33	80	99	152	138	1
12	38	78	99	156	139	1
13	38	64	95	100	70	1
14	38	63	94	101	68	1

VI. CONCLUSIONS

The proposed work has presented a complete to BAN(wire\less body area network). System for continuous monitoring of dengue patients. The proposed system combines various techniques such as active filtering TCP/IP based client- server interaction over wireless networks use of artificial neural network use of artificial neural network for patient healths estimation & raising an alarm in event of critical condition the system also facilitates transfer of patient monitoring data by E-mail concerned doctors as to allow for urgent assistance in case of any emergency. The system has been implemented in MATLAB employing the signal processing TCP/IP sochets & neural network tool box of Matlab. The mode bus architecture of the system allows for the implementation of the proposed system on single chip solutions such as DSP processors to enable mass production of WBAN facilitator ASIC application specific integrated circuits. Continuous monitoring of vital parameters of the patient including ECG, Temperature, Pulse Rate, oxygen saturation (SPO2) & blood pressure are realized in a single sensor node & transmitted to the main server over TCP/IP connection. The employment of TCP/IP protocol provides encapsulation from the network type or device used thus various network topologies & network divices including GSM/GPRS, zigbee, wifi, etc can be intefrated in a single solution. also incorporated is a levenberg marquard artificial neural network at the server side which is trained with historical patient data which predicts the overall health status of the patient by thresholding the ANN predicted health status can be employed to generate alarms in case of critical condition. The proposed system has been implemented & demonstrated by the results above.

FUTURE SCOPES

A unique WBAN system for continuous monitoring of patients under critical case has been presented which combines the best of available techniques such as wireless sensor nodes using TCP/IP with artificial neural networks & active filtering techniques. But as medicine & critical case is an evolving research area the proposed system has to cope up with the rapidly emerging technological enhancements. One of the most sought after improvements is the interaction of an entire WBAN system including the processor & wifi/Zigbee stack with processor & wifi/zigvee stack with radio/RF front end on a single SOC(system on chip). Other , equally important enhancement is the employment of hardware assisted cryptography engine, to ensure privacy of patient data. Also integration with evolving wireless technologies such as LORA (Long Range) is highly desired.

REFERENCES

[1] Deepak Kumar Nishad , Murli Yadav , Kaushal Kumar , Purneshwar Chandra , Miss. Roshini Rathour “Review Paper on Image Steganography and Security Using Cryptography” IJRASET 2016.
[2] M.Logambal, Dr.V.Thiagarasu “A Survey on Wireless Sensor Networks in Human Healthcare Monitoring System” International Journal of Innovative Research in Computer and Communication Engineering 2017.
[3] Ahsan Humayun, Muneeb Niaz, Muhammad Umar, Muhammad Mujahid “Impact on the Usage of Wireless Sensor Networks in Healthcare Sector” IJCSNS 2107.
[4] Karthigai Lakshmi , S Karthik “Dengue Identification and Patient Care Monitoring Using Internet of Medical Things” Journal of Health Informatics & Management 2017.
[5] Rajeswari.R “A Healthcare Monitoring System Using Wireless Sensor Network With GSM” IRJET 2017.
[6] Eduardo Freitas, Amândio Azevedo ” Wireless Biomedical Sensor Networks: The Technology” ICBES 2016.
[7] Gil R. delas Alas Jr* , Jesusa N. Padilla and Bartolome T. Tanguilig “Intravenous piggyback infusion control and monitoring system using wireless technology” International Journal of Advanced Technology and Engineering Exploration 2016.
[8] K.A.D.Y.L. Kuruppuachchi, M.D.R. Perera and R.O.N. Meegama “Wireless Sensor Node for Simultaneous Monitoring of Health Parameters” IEEE 2015.
[9] Mr. Sunil L. Rahane , Prof. Ramesh S. Pawase “Wireless Sensor Network with GSM Modem for Healthcare Monitoring System” International Advanced Research Journal in Science, Engineering and Technology 2015.
[10] Neelanjana Basu Roy and Debasis Das “Role of Body Area Sensor Networks in Smart Health Care” International Journal of Future Computer and Communication 2015.
[11] Sunil L. Rahane , Prof. Ramesh S. Pawase “A Healthcare Monitoring System Using Wireless Sensor Network with GSM” International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering 2015.
[12] Pooja Jain , Rashid Hussein , Sandhya Sharma “HEALTH MONITORING WIRELESS SENSOR DEVICES” IJSRET 2014.