A Light Weight Secured and Efficient Health Monitoring System Implemented Over IOT Based Networks

Desu Pavani Ramya, Md.Ali Hussain

Abstract: The main aim of the using a Light weight cryptography in a body sensor network(BSN) is to provide security to the data and devices using limited resources. The body sensor network(BSN) designed to monitor patient continuously. The BSN consist of various sensors placed on the body of the patient to obtain various parameters to diagnosis patient such as the temperature,pulse rate and saline level the values of the sensors are stored in cloud in the form of PHR's by this automatic entry in the cloud platform it helps in eliminating the manual entry which is time effective and accurate . The data in the PHR's can only be accessed by the concerned doctor and the nurse.In the abnormal condition of the patient the alert alarms are generated in the concerned API's.The data present in the cloud is stored in encrypted form .The proposed model is a combination of the sensors,internet of things ,encryption is done in the board level and the security algorithm called LICI is a lightweight algorithm which is efficient in both hardware ,software and also stops various Biclique and Zero correlation attacks. In many cases due to negligence of hospital staff or relatives the saline level is not monitored it leads to the "AIR EMBOLISM" causes heart attack .In this model the patient data is maintained in to two PHR's of doctor and nurse the security of PHR's is provided basing on the sensitivity level of the data present in PHR's.

***Index Terms*: Arduino, Encryption, health monitoring, Lici**

I. INTRODUCTION

The main purpose of designing of body sensor network (BSN) is to establish connectivity among various sensors placed outside of the patient body through this we can monitor patient continuously . In-now-a-days the people are opting for automation to increase the accuracy and to avoid the problems caused due to human negligence .[1] In hospitals the staff need to monitor the saline level, pulse rate and temperature manually continuously. due to many number of patients present in a hospital there may be a chance of negligence in monitoring patients. In the monitoring of saline level there should be no chance of negligence.[8,9] If any negligence occurred by the patient relative or staff may lead to death of the patient.[4,6]the death may happen if the saline bottle is totally fed and not removed causes a difference of pressure between the patient blood flow and the empty saline bottle. In case the sensor values of temperature, pulse rate and saline level is beyond limits the immediate notification is[8,9]send to the hospital staff by this the immediate care to the patient is taken in critical situations[1]. The patient monitoring data is needed to share among various users in a hospital in order to provide fast attention in case of critical situations.[5] PHR's are contain the various data of the patient .The data of the patient present in a PHR may be sensitive and the security provided to the PHR's basing on the sensitivity level(encryption,password authentication) this leads[10,11] to enhancement of the system i.e if all the data patient present in a single record will take more amount of time for processing .our main aim is to provide fast service to the patient so the data of patient is in different PHR's[5].

The encryption is done by using the Lici encryption algorithm[7] .The lici is a light weight encryption algorithms.lici has a feistel based network[7] . It works at 64 bits of plain text. Lici has 128 bit length is used to generate the 64 bits of cipher text .It has low power dissipation of 30mW.It has good performs in both the platforms (hardware and software).the project discussed in this paper has the both hardware and software, both plays vital role. Lici requires only 1944 bytes are flash memory which is a less amount of memory till date used by any encryption algorithm. Lici provides best security by preventing attacks from basic level to the advanced level[7].

Revised Manuscript Received on April 18, 2019.

Desu pavani ramya M.Tech student ECM, KL deemed to be UNIVERSITY, VIJAYAWADA, INDIA..

Dr. Mohammed Ali Hussain, Professor ECM, KL deemed to be UNIVERSITY, VIJAYAWADA, INDIA.

II. LITERATURE SURVEY

In this section we are going to discuss some previous methodologies and their corresponding method of implementation. PoojaKanase *et al* discussed the data from different sensors such as temperature sensor,ultrasonic sensor,LDR(Light Dependent Resistor) will acquired.the temperature sensor will acquire the values of room temperature.LDR will sense the amount of light illumination in the room of patient. All the data acquired by the sensors will be transferred to the ardunio mega through a universal serial bus. The data collected from the sensors will be published in a MQTT broker through a ethernet cable. The MQTT platform used to control the switch of the electric applications(fan and light)[1].by controlling the switch the power management will be done.The saline level can be monitored continuously without going to the patient room as the values are displayed in a webpage.Vikas Vippalapalli *et al* proposed model is the consist of sensor network which monitors the patient continuously.It monitors various parameters such as the temperature ,pulse rate,blood pressure ,

by using LM35,IR pair and a photo diode for pulse rate, Sphygmomanometer for blood pressure measurement. all the sensors are connected to the arduino fio.Arduini fio is connected to the xbee module by using a USB. All the data of the sensors are converted into the ASII values in a write to measurement file which is present in LABVIEW which checks the abnormal values. In case of abnormal condition it generates a alarm By this method the manual data entry by this the hospital staff can manage the patient efficiently[2]. the generation of alarm causes no delay in arrival of patient information in accidents or emergency incidents.

Deepesh K Rathore *et al* discussed wireless system is present that enables the real time health monitoring of the patients present in a hospital or health care center.The patient's heart rate is measured by using Photoplethysmograph, potential irregularities and the data is transmitted by using the zigbee module to the device[3] present in a doctors office and the decoded data can be viewed by using a laptop or a smart phone that displays the data page and in case of any emergency warning signal of audio or video signal is sent to the doctors cabin using a GSM module (message). so the immediate care /attention to the patient id done[3].

III. PROPOSED MODEL

In proposed model the sensors continuously monitor the patient pulse rate, temperature,saline level.the saline level is monitored by using ultrasonic sensor .The data acquired by sensors are transmitted to Ubi dots from arduino uno by using wifi module .the transferd data is saved in the form of two PHR'S.The one PHR is considered as main PHR .the main PHR consists of all data collected by sensors and other PHR consist of only saline level.the phr's are secured by sensitivity of data present .The main PHR is secured by Lici which is a light weight encryption algorithm and other is secured by the password authentication. if any drop of saline level is beyond level the alert message is sent to the nurse. If any case of temperature or pulse rate the emergency message is sent to the doctor.

IV. BLOCK DIAGRAM OF PROPOSED MODEL

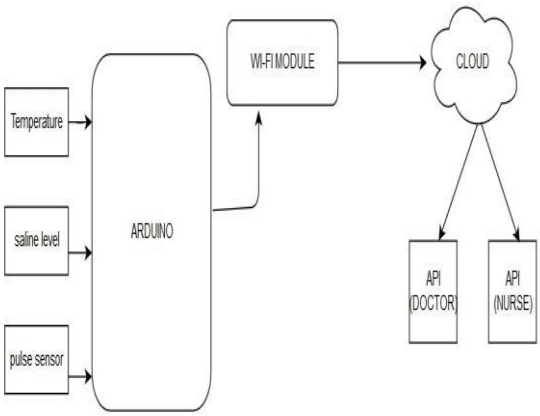


Fig.1The Fig.1 is the block diagram of the proposed model.The arduino is connected with temperature,pulse senor and the ultra sonic sensor is used to monitor the saline level.The data from arduino is transferred to the cloud using the wi-fi module from cloud the data is is sent to the doctor and nurse .

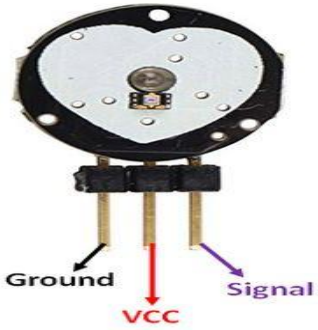
Arduino uno:

Arduino uno is a micro controller. It is developed by the arduino.cc. It is based on the ATMEGA328.It is risc architecture of 40 pins,2 8 bit timers ,one 16 bit timers,2 master-slave SPI Interface ,one programmable serial USART,6 PWM channels,131 powerful instructions,32*8 general registers,1KBytes EEPROM,2KBYTES internal. SRAM, operating voltage 1.8-5.5V.

The Arduino UNO board is used as a microcontroller all the sensors are connected to arduino

PULSE SENSOR

It is a biometric sensor(plug and play type sensor) works at the voltage of +5.5V to+3.3V, the rate of current consumption is 4 milliamps. It is used to sense the pulse rate of patient and later transferred to the cloud .



TEMPERATURE SENSOR

DS18B20 is best for temperature measuring of patient .The pins namely VCC,GND and DATA are present in DS18B20 .The sensor is waterproof as it can be placed inside of a persons mouth and underarms.It works at the operating voltage of 3.0V to 5.5V.

The main advantage of DS18B20 sensor is it can be powered by data line present in sensor and works at the accuracy of +-0.5c.It can measure temperatures from -55C (-67F) to +125C (257F).
The fig 2 is the flow chart of the working model of the proposed model .

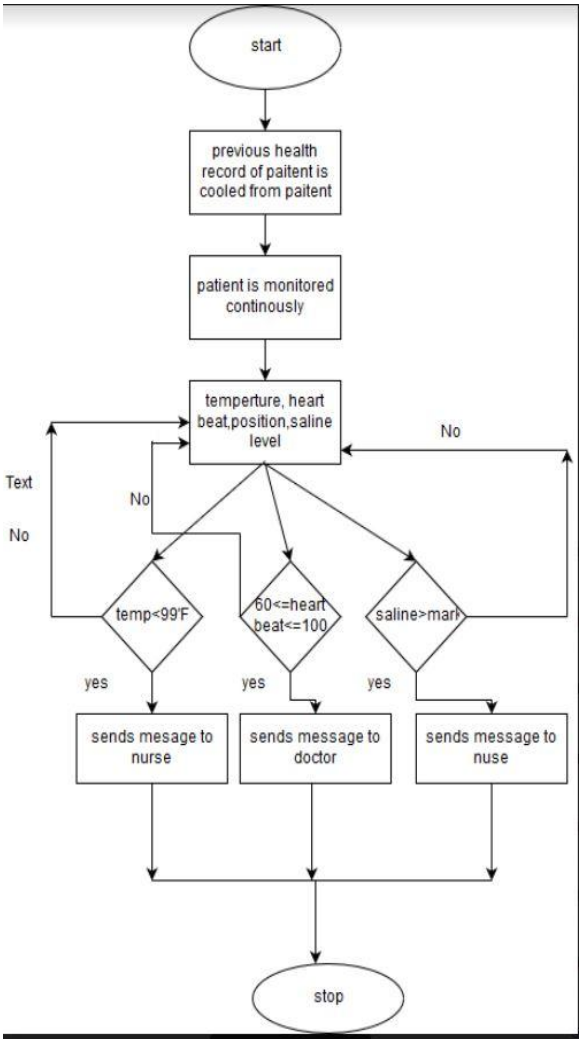


fig-2

PESUDO CODE:

Step1: start.
Step 2: previous health record of paitent will be collected.
Step 3: paitent is monitored
Temperature,
Heartbeat,
Saline level.
step 4:
if the temperature is greater than 99'F a message sent to the specialist

if heart beat is less than 60 bpm or greater than 100 bpm an alert Message sent to doctor
if the Saline level is less than 20 ml a message sent to the nurse
Step 5: status check
Step 6: stop

SYSTEM IMPLEMENTATION

After the hardware is connected the sensors present in the BSN starts monitoring the parameters of pulse rate,temperature,saline level of patient are monitored using DS18B20 ,pulse rate sensor,ultrasonic are attached to the arduino UNO and encrypts the data in board level and sends the data to the cloud the data in cloud is stored in form of two PHR's and the decrypted data is sent to doctor and through password authentication the nurse can monitor saline level.

RESULTS

In the proposed system is implemented by using the arduino uno , DS18B20, ultrasonic sensors.All the sensors are interfaced to the arduino and the values are encrypted using Lici algorithm and sends to the doctor and nurse.

Fig3,4 represents pulse rate, temperature and saline level graphs k of the patient are displayed in the Ubidots and the hardware kit of the project.

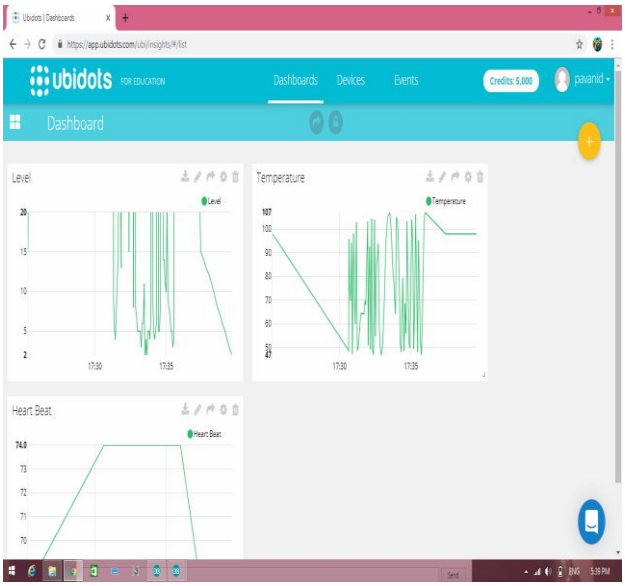


Fig.3

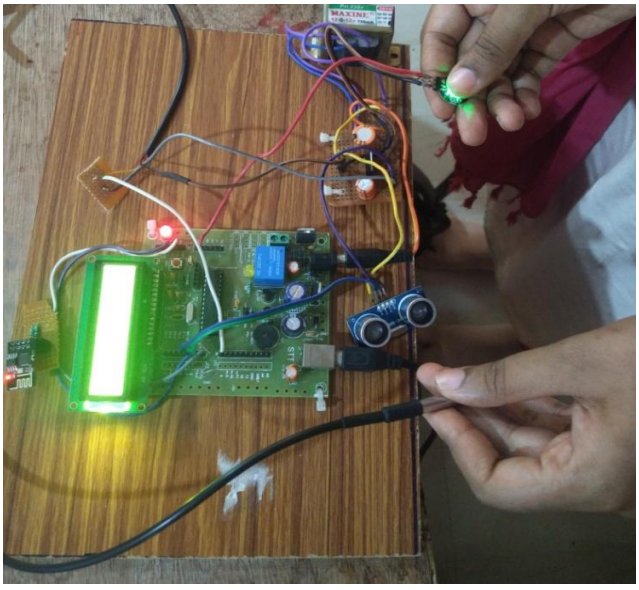


Fig.4

CONCLUSION

The proposed model plays a important role in the patient health care system .All the parameters are observed acuratly by using ultrasonic, temperature sensor ,pulse sensor and the values are encrypted by using a Light weight algorithm called LICI . The proposed method is less cost and provides the security to health records of the patient efficiently.

REFERENCES

1. Pooja Kanase, Sneha Gaikwad "Smart Hospitals Using Internet of Things(IoT) ",IJRET Volume: 03 Issue: 03 | Mar-2016
2. .Vikas Vippalapalli,Snigdha Ananthula" Internet of things (IoT) based health care system ", International conference on Signal Processing, Communication, Power and Embedded System (SCOPES)-2016.
3. Deepesh K Rathore,Ankita Upmanyu,Deepanshu lulla" Wireless Patient Health Monitoring System ",978-1 -4799- 1 607-8/1 3/$3 1 . 00©2 0 1 3 I E E E.
4. Shweta V. Pawar,T.R. Pattanshetti"LIGHTWEIGHT CRYPTOGRAPHY: A SURVEY "," IJRET
5. Volume: 05 Issue: 05 | May 2018.
6. Md. Rafiqul Islam,Mansura Habiba,Mir Injamamul Ibne Kashem."A Framework for Providing Security to PersonalHealthcare Records"NSysS 2017.Department of CSE, BUET. 5-8 January, 2017.
7. Jian Liu , Yingying Chen, Yan Wang, Xu Chen, Jerry Cheng, and Jie Yang,"Monitoring Vital Signs and Postures DuringSleep Using WiFi Signals",IEEE INTERNET OF THINGS JOURNAL, VOL. 5, NO. 3, JUNE 2018.
8. Jagdish Patil,Gaurav Bansod,Kumar Shashi Kant,"LiCi: A new ultra-lightweight block cipher",2017 International Conference on Emerging Trends & Innovation in ICT (ICEI) Pune Institute of Computer Technology, Pune, India, Feb 3-5, 2017.
9. .Neha R. Pandya, Vitthal K. Bhosale,Rajesh M. Autee"Wireless Sensor Based Handy Patient Monitoring System",2016 IEEE 6th International Conference on Advanced Computing.
10. Niharika Kumar"IoT Architecture and System Design for HealthcareSystems",2017 International Conference On Smart echnology for Smart Nation 1119.
11. Rahul Vishwakarma, Ramesh Kumar Mohapatra,"A Secure Three-Party Authentication Protocol for Wireless Body Area Networks",2017 IEEE 3rd International Conference on Sensing, Signal Processing and Security (ICSSS).
12. .Yinghui Zhang,"Security and Privacy in Smart Health: Efficient
13. Policy-Hiding Attribute-BasedAccess Control",IEEE INTERNET OF THINGS JOURNAL, VOL. 5, NO. 3, JUNE 2018.

AUTHORS PROFILE

Desu pavani ramya M.Tech student in ECM, KL deemed to be UNIVERSITY, VIJAYAWADA, INDIA..

Dr. Mohammed Ali Hussain, Professor in ECM, KL deemed to be UNIVERSITY, VIJAYAWADA, INDIA.