IOT BASED HEALTH MONITORING SYSTEM AND TELEMEDICINE

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Abstract - *The goal is to design and implement a low cost, portable effective patient monitoring system. It can transmit the vital signs of a patient in emergency situation continuously through a wireless communication network system. IoT has devices which have intelligence and can collect data intelligently; they can process this data and send it to the network. Abilities of IoT networks can be used to monitor the health of a patient by periodically analysing the data collected. It ensures the privacy and which offers secure communication using Data security Algorithm. The smart health systems are primarily helpful for elderly persons and people with disabilities and can be provided at a reasonable cost .Wearable sensors monitor the parameters of the human body like temperature, pressure, heart beat by using sensors and also display on the screen. Data are collected from the patients and display on the personal computer or mobile phones.. The proposed system is to monitoring the patient's health data continuously from remote areas using wearable sensors. For wireless transmission, these sensors are connected to a sensor node through GSM module. In the case of any emergency it sends the alert message.*

Key Words: *Iot, Gsm, RSA Algorithm, Sensors, Wi-fi module*.

1. INTRODUCTION

The goal is to remotely monitor health condition of any individual. Various sensors are used to collect their individual health data, store these data in cloud, perform some complex analysis on these collected data and share the result with the doctors for further examination. This system can provide effective, efficient and timely health advice.

Umar Albalawi and Shital Joshi [1] proposed a revolutionary technology in Internet of Things (IoT) for the modern society. It considers the application of IoT in the field of health sector. IoT in E-medicine takes the advantage of emerging technologies inorder to provide immediate treatment to the patient as well as to monitors and keeps track of health record of person. IoT performs complex computations on the collected data and can provide health related advices. Though IoT can provide a cost effective services to any people of all age groups, there are several key issues that need to be addressed. System security, IoT interoperability and unified access mechanisms are some of the many fundamental issues related with IoT.

Ashwini Gutte and RamkrishnaVadali [2] concerned with Health has become one of the global challenges for humanity. Cardiac diseases, Lung failures and heart related

diseases are increasing day by day. Monitoring the health of elderly people at home or the patients at hospitals is necessary but it requires constant observation of medical Practitioners and Doctors. Information Technology and its applications are performing major role in making human life more easier. Internet of Things is transforming healthcare and the role of Information technology in healthcare. IoT consists of physical devices, such as sensors like glucose, blood pressure, heart rate and monitoring devices for patients activity monitoring to connect to the internet and transforms information from the physical world into the digital world. The proposed system, with the help of IoT's will help to keep the necessary details and reports of a patients in the system. IoT devices like low power sensors will be used to collect the data from patients and it will be displayed on the LCD screen and stored on any personal computer and system can refer to it.

2. IOT IN HEALTHCARE

Internet of Things (IoT) devices are made for remote monitoring in the healthcare sector to keep patients safe and healthy, and empowering medical practitioner to deliver sudden care to the patients. It has increased patient satisfaction as interactions with doctors have become easier and more efficient. Furthermore, remote monitoring of patient's health helps to reduce the visit to the hospital and keeps tracks of patient health records. IoT also has a huge impact on reducing healthcare costs and improving treatment outcomes

3. SYSTEM ARCHITECTURE

Data collection here refers to the collection of health parameters like temperature, Blood Pressure, Heartbeat rate, ECG parameters etc. using wearable sensors. The temperature sensor is used to measure the body temperature of a person. The Pressure sensor is used to measure the pressure level of a person. Heart beat sensor is used to measure the pulse rate of the person. The monitored physiological data from various sensors are interfaced to Arduino UNO. The data collected will be sent to Doctor via Wi-Fi module. Here WIFI module acts as IoT in this system. In a simple explanation, an IoT is an interconnection of various physical entities, which includes routine items, electronic equipment and devices that are connected to the internet through wireless medium. The main components used for sensing numerous physical data are the sensors. These sensors collect and transmit the data to the controllers for further action. In recent times, a number of IoT based

systems were developed for IoT healthcare systems. The data collected will be stored onto the IoT server as per patient-ids and then forwarded to the Doctor for analysis of the patient. The Doctor will analyze health records of the patient and will give assessment according to the patients data and hence health monitoring of patient is done. The protocol used for data transfer and communication is HTTP. The gateway devices play significant role in the process, they collect the patient data and then pumped toward into IoT hub system. As computational devices, IoT gateway offers networking interfaces in order to communicate with sensors as well as communicate with the internet using wired interfaces or wireless. The IoT health monitoring system involves three major functions:

- Identification and authentication

- Sensing and Data collection

- Tracking an object or patient

IoT has devices which have intelligence and can collect data intelligently; they can process this data and send it to the network. Abilities of IoT networks can be used to monitor the health of a patient by periodically analyzing the data collected. It provides security at the communication link as well as by providing user authentication Using Data Security Algorithm.
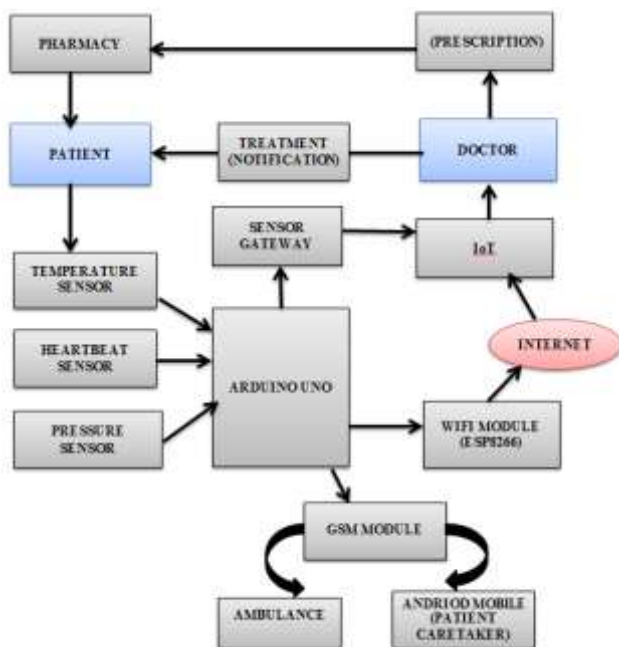

Fig -3.1: Proposed architecture of health monitoring system

3.1 GSM Module

The patient is monitored wirelessly using a sensor. It detects the critical condition and alert message is send to the receiver unit. The receiver can view data and the message regarding patients health status through internet connectivity in system or mobile. The main purpose of GSM module is to provide the mobile healthcare for remote areas. This efficient system reduces the time, easy to use and also used for self monitoring the patients anywhere at any time. If it exceeds the condition immediately send the information or doctor's mobile phone or relatives via SMS using GSM modem and the doctor sends back the precaution notification to them. For emergency situations, the alert message is send to the ambulance with the help of GSM module. So that user will be aware of the health and can take care accordingly.

3.2 Tracking Module

Doctors can diagnose their patients and make decisions based on the recorded data. After the decision made, the doctor type the prescription for the patient on the system. The system sends a medicine request for the pharmacy if it is needed. Later the pharmacy contacts with the patient caretaker to pick up the medicine or send the medicine to the patient.

4. RSA ALGORITHM

Healthcare information of the patient and these devices are connected to internet, anywhere at any time. So it may lead the hackers to steal private information of the person. The Private health information of the patient must be used after patient authorization. According to the official reports, it presents 51% of total the security risks is theft of laptop or medical device for healthcare. Data security in healthcare should addresses the following challenges:

- Physical security of health devices.

- Providing secure routing for data communication.

- Maximum security with minimum resource consumption.

In order to provide security to this system, RSA algorithm is applied to this system. Rivest–Shamir–Adleman is an algorithm to encrypt and decrypt messages. It is an asymmetric cryptographic algorithm. Asymmetric means it actually works on two different keys i.e. Public Key and Private Key. As the name describes that the Public Key is given to everyone and Private key is kept private. This is also called public key cryptography.
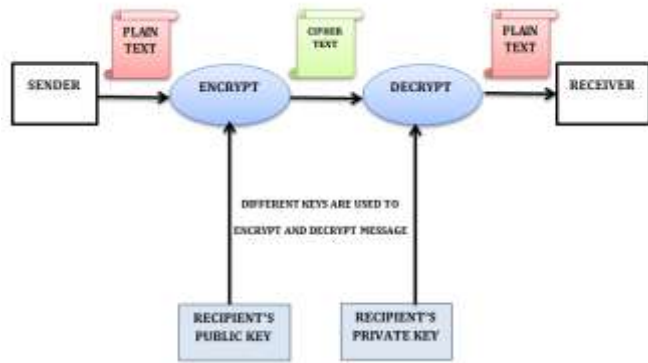
Fig: 4.1: Structure of RSA Algorithm

It offers the following advantages to its users:

- Fast computation

- Easy to understand and analyze

- Easy to implement

- Widely deployed and better industry support

It ensures the privacy and which offers secure communication using this Data security Algorithm.

5. RESULTS

The system will analyze the current health status and in case of any emergency it send the message to doctor. Secured IoT health monitoring system which provides security at the communication link as well as by providing user authentication Using Data Security Algorithm. The below figures shows the outcomes from the first part of the system(ie, health monitoring system) by considering the values of temperature and heartbeat.
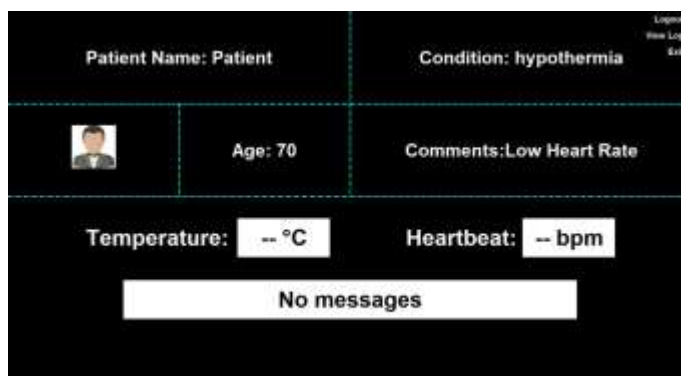

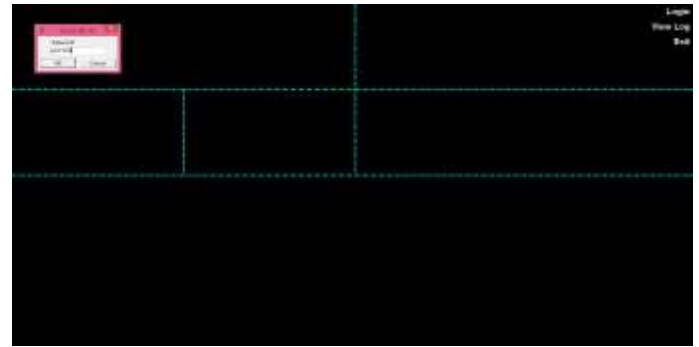**Fig-5.1:** Doctor interface for patient basic information and real-time monitoring
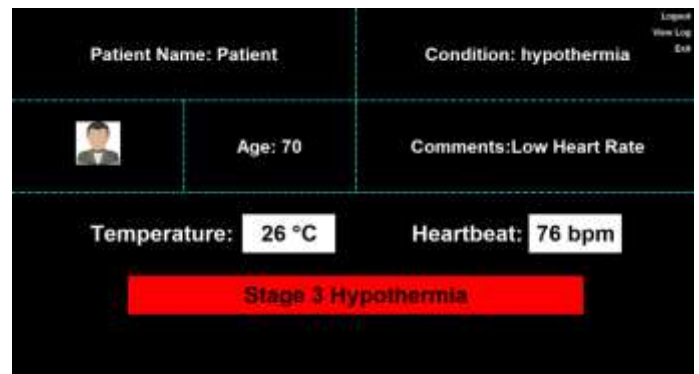

Fig-5.2: Login using patient ID

Fig -5.3: Alert Message interface of remote patient monitoring system.

6. CONCLUSION

The results obtained from different sensor devices will be compared and analyzed in detail. The values are recorded using sensors and processed using microcontroller. For emergency send the message to doctor .This system is low cost, self-monitoring device and used in remote areas efficiently. The health details of the patients is send to patients caretakers mobile phones via SMS using GSM modem. For emergency, the message is send to the ambulance. A new architecture for IOT health monitoring which provides security at the communication link as well as by providing user authentication. RSA Algorithm is implemented in order to securely carry the information.

7. FUTURE SCOPE

As a future work, a simulation work for the whole proposed system architecture will be carried out. Unlike any previously proposed IoT security model, we can provide higher security at the communication link as well as at the end side by providing user authentication and privacy management any time using RSA.

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