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Research Article

A Novel Approach For Secure & Smart Healthcare Using Internet Of Things Infrastructure

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Abstract: Internet of Things technology has attracted much attention in the forthcoming years, IoT based health monitoring system and automated response retrieval mechanisms would enrich the stabilization of chronically affected lives. A wide range of body sensors are used to observe sensitive data from the patient and store them in the cloud. Such that concern personnel's can monitor the health remotely through a custom application. To ensure that the data is secure, Encryption standards are enabled from the sender end and decrypted at the receivers end with a unique key. This paper propose system model that safeguards the privacy of the users.

Keywords: Patient, Arduino Uno, Wi-Fi module, RFID, Body Sensors, Encryption and Decryption, Android Application

I. Introduction:

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Health is most important part of human life. Human lifetime can be depending on human health condition. But this present generation world can be affect for many diseases. Mainly affected by heart related problems.

Peoples are suffer at any time but we consult to doctor at any time is impossible because the human population is the important reason. So the require of doctors and hospital are increase. Some people body condition is not normal in hospital environment mainly children's and old age peoples. So we need some solution of the problem. IoT is the most wanted technology in this present and future world. Because it can be used to done a human work easily. Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. In this paper using the IoT device, body sensors, cloud storage platform and encryption algorithm to send a data securely from patient body to patient care taker mobile application.

The various sensors to sense the health data from the patient body using for IoT device. Then got data will be encrypting for using some encryption algorithm. After encryption the data will be send and store to cloud storage using Wi-Fi module. The stored data will be received to only the authentication persons mobile application using for some coding in cloud platform and the sending encrypt data will be decrypt in the mobile application using decrypt algorithm. So this process very secure and privacy. Mainly to monitor the patient data at any time at anywhere. This process has some issue because the care taker getting patient data is not acquiring for particular patient body. Because using this sensor any one send a data. We using for RFID module. Using this module care taker receive a patient data from only the particular patient body. So this process gives very accuracy results.

II. System Overview:

This section deals with what are the components that we are used and how they are connected between them. Body sensors are connected to the Arduino Uno board to get the health data from the patient body. This health data will be encrypt by using encryption algorithm. Using ESP8288 WiFi module the encrypt data send and store to the think speak cloud storage. Finally the caretakers receive the data using custom android application. That encrypt data decrypted using decryption algorithm in mobile app. RFID reader is connected to the GPIO pin in Arduino Uno board it will send the signal to active the sensors when it read the RFID tag.

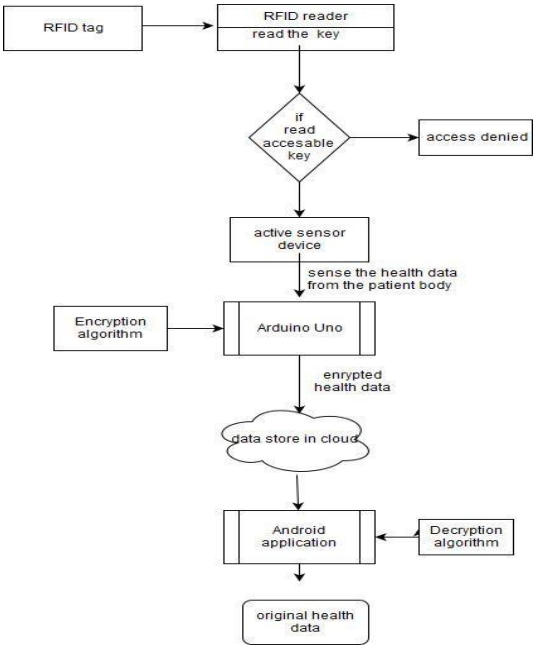

Fig: Data flow diagram

III. Proposed System:

The proposed system is to deals with the as the existing system have only to send a health data from patient to caretaker mobile application and using the same sensors , IoT and Wi-Fi module any one send a his data at a time. But we proposed with encrypt and decrypt the health data and using RFID reader and tag only to get configure patient health data. So the proposed system project is very secure and accuracy.

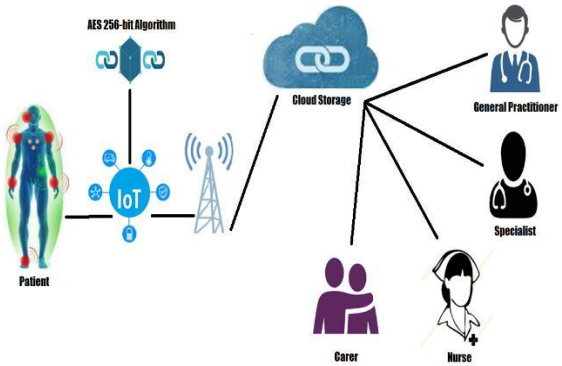

Fig: Proposed Model Diagram

IV.Components:

1. Arduino UNO:

A microcontroller connected to 5Volt power source is uploaded with the server code and acts as a web server. The physical connection with the electrical devices is handled with the help of jumper wires from the Arduino GPIO pins to other modules. It has a 32KB flash memory with read and writes capabilities, 1KB EEPROM. 23 general I/O lines, 32 general purpose working registers. The device operates between 1.8-5.5 volts

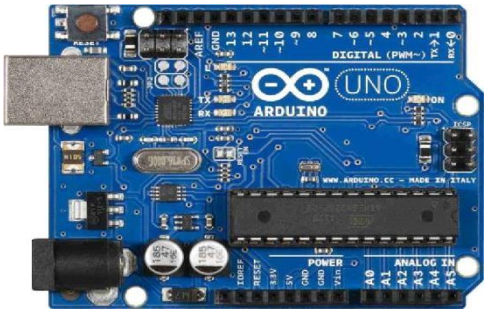

Figure 1: Arduino Uno

2. ESP8266WIFI module:

A 32 bit microcontroller operating at 80160MHz from 3.3v power supply is wired with jumper wires and Serial commands are sent to it via the Arduino Uno.

AT commands:

1. AT+RST: Reset config
2. ATCIPSEND: Sends data to server
3. AT+CWMODE: Sets to AP mode
4. AT+CIPSERVER: Sets it as a webserver

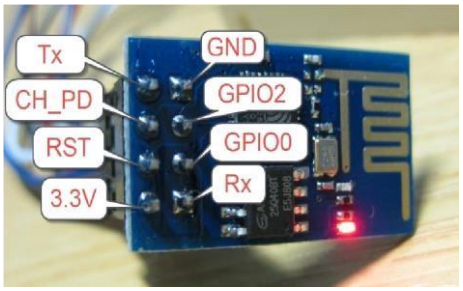

Figure 2: ESP8266 Wi-Fi module

3. Pulse Sensor:

The pulse sensor operates for 3.3v.It can be connected to Arduino Uno, or plugged into a breadboard. The front of the sensor is the pretty side with the Heart logo. This is the side that makes contact with the skin. It is using to find the human pulse rate. The normal pulse for healthy adults ranges from 60 to 100 beats per minute.

Figure 3: pulse sensor

4. ECG Sensor:

The ECG Sensor recording the electrical activity of the heart over a period of time using electrodes placed on the skin. These electrodes detect the tiny electrical changes on the skin that arise from the heart muscles electrophysiological pattern of depolarizing and repolarising during each heartbeat. The ECG normal range 60 - 100 beats per minute (specifically 82 bpm).

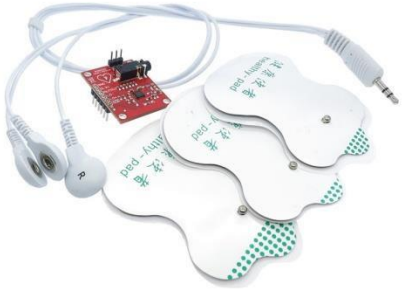

Figure 4: ECG sensor

5. RFID Reader & Tag:

It stands for Radio-frequency identification which uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Twoway radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response. Signaling between the reader and the tag is done in several different incompatible ways, depending on the frequency band used by the tag. In our project we use RFID to give first preferences for body sensors when the RFID reader to read the RFID tag it automatically active the sensor to sense the patient health data. RFID tags having specific key. The patient data store in cloud varies field when the reader read varies accessible tags.

Figure 5: RFID Reader & Tag

6. Body Temperature sensor:

Amplifier and Filter Circuit arrangement For measuring body temperature, the left pin of LM35 is This unit consists of a temperature sensor to measure the connected to the power (5V) and the right pin is connected temperature of a patient which is connected directly to the to the ground. The middle pin will give us an analog microcontroller. The temperature sensor used in this voltage that is directly proportional (linear) to the project is LM35, which is an analog sensor. The LM35 temperature as shown in Fig. 6.

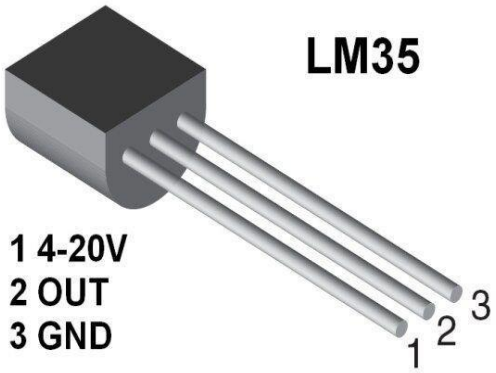

Figure 6: LM35 temperature sensor

7. Temperature and Humidity Sensor*:*

DHT11digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity.
Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and an NTC temperature measurement device, and connected with a high-performance 8-bit microcontroller.

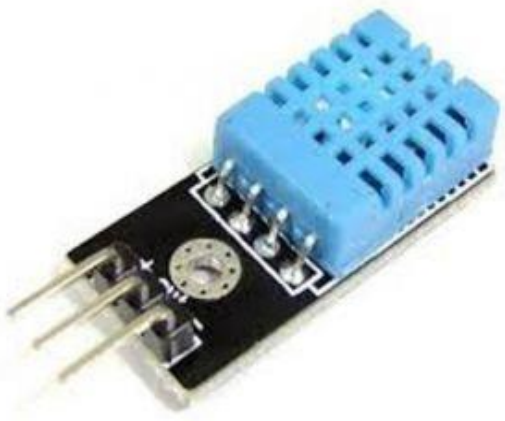

Figure 7: DHT11 sensor

V. Encryption and Decryption:

The design and strength of all key lengths of the AES algorithm (i.e., 128, 192 and 256) are sufficient to protect classified information up to the SECRET level. TOP SECRET information will require use of either the 192 or 256 key lengths. The implementation of AES in products intended to protect national security systems and/or information must be reviewed and certified by NSA prior to their acquisition and use.

- 10 cycles of repetition for 128-bit keys.
- 12 cycles of repetition for 192-bit keys.
- 14 cycles of repetition for 256-bit keys.

VI. Conclusion & Future Scope:

Health is most important in human life. But they are facing so many issues in real-time world. We develop a smart healthcare to send a health data from accurate patient body to caretaker mobile application for very secure and privacy. Then mainly patient health data monitor at anytime at anywhere.

In our future work this IoT device changed into NB-IoT. So the communication range is high and less consuming power. This project using for RFID device. Many chance to available for this the RFID tag are broken and lost. So the future works to use for Bio-metric device. It is having more secure and privacy. Then notification will be receive to caretaker when patient health condition is abnormal.

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