Smart Health Care Using Iot

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ABSTRACT

The system aims to digitalize the prescriptions and reports and reduce the burden of bringing the prescriptions each time a patient visits the hospital. Existing system measure only few parameter of the patient and security level is very poor. In case if they miss the medical report, then treatment pattern is not known. The prescriptions may get lost or torn. Proposed system aims to reduce the need for bringing the prescriptions and reports each and every time a patient visits the hospital by digitalizing the reports. Patient pulse rate, Systolic, diastolic and Heat temperature are monitored through the sensors. Provide High security to patient data that is stored in server by encrypting and decrypting the data. This system contain Arduino mega with systolic, diastolic and heat temperature monitoring sensors which is connected to Arduino mega. The sensor's monitors the patient health parameters and sends the data to the server through patient android application. Patients can also view their data on their android application. Data's stored in the server are secured by encrypting the data before storing in server and decrypted while retrieving from the server. Doctor can also prescribe the patient through the doctor's web portal, patient can view that prescription on their android application. Patient is given a unique RFID tag which has two way authentications. Each RFID has a unique username and password which is required for successfully login to view the patient medical history. This system contain centralized server so on scanning the RFID tag and on successful authentication, patient previous health parameters and their medical history can be viewed from any hospital.

Keywords- **PC (personal computer); ICU(intensive care unit); RFID(Radio Frequency Identification)**

I. INTRODUCTION

World is progressing very fast today. Every field of life is enhanced with respect to its past and transformed into more comfortable and sophisticated than before. Among all fields, medical field is also making rapid progress and becoming more innovative. Now in this field small sized and more accurate equipment is now available as compared to past. As Population and diseases are increasing day by day, Hospitals are not fully equipped to cater every disease and treatments given to patients are not satisfactory. Vital diseases are the one in which patient need continuous monitoring of its body health parameters like sugar level, heart disease etc. Sufficient doctors are not available to check each patient separately and with satisfaction. The system proposed in this paper basically help those patients and their health parameters can be monitored remotely. Large number of patients can be monitored from remote location at any time by a single doctor and the doctor can prescribe the medicine through the web portal.

The main focus of this paper is to describe the application of Arduino Mega as well as RFID in medical field. In this system, a specific gadget equipped with different sensors is given to patient. It will monitor the health parameters of the patient and update the values. The paper is organized is such a way that section II is focused on motivation. System components are diagnosed in the section III. Section IV reflects the system operational description. The paper is concluded with discussion on conclusions and future works.

II. MOTIVATION

2.1. Patient monitoring system

It is the system in which different body parameters of patient are monitored and observed. An existing example of such system is an ICU (intensive care unit), where sensors are attached to the patient body. The results are displayed on respective patient monitoring screen and are observed by the doctors.

There are situations where a patient losses their medical reports, this causes a major problem when dealing with the treatment of a patient. The previous medical records of a patient are not known in the above stated situations.

Thus this system developed in this paper provides the necessary solution for this problem.

III. SYSTEM COMPONENTS

The system components are divided into two section ie., hardware and software. These are elaborated as under:

3.1. Hardware Section

Arduino Mega: The Arduino kit is programmed in such a way that it interacts with the patient sensors and get values from them. Then the collected values are transmitted to the patient's mobile application. The one used in our system is shown in Figure 1.

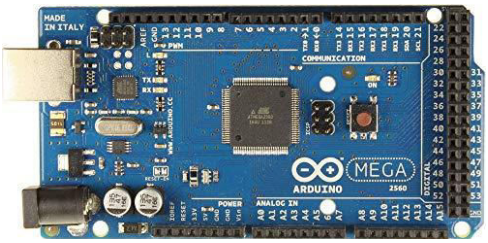

Figure 1: Arduino Mega.

Bluetooth module HC-05:HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. It transmits the data collected by the Arduino to the mobile application. The one used in our system is shown in Figure 2.

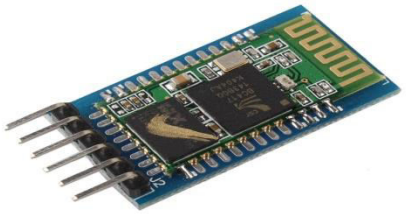

Figure 2: Bluetooth module HC-05.

RFID Tag:RFID tag includes microchip with radio antenna mounted on substrate which carries 12 Byte unique Identification number. This number is used as unique identification for each patient. It is scanned by the RFID EM-18 reader module. The one used in our system is shown in Figure 3.

Figure 3: RFID Tag.

RFID EM-18 module:Radio frequency Identification (RFID) is a wireless identification technology that uses radio waves to identify the presence of RFID tags. It is used to read unique ID from RFID tags. Whenever RFID tags comes in range, RFID reader reads its unique ID and transmits it serially to the Arduino. RFID reader has transceiver and an antenna mounted on it. It is mostly fixed in stationary position. The one used in our system is shown in Figure 4.

Figure 4: *RFID EM-18 module.*

Sphygmomanometer: Sphygmomanometer is also known as blood pressure meter. It is used to measure the systolic, diastolic and pulse rate of the patient. These values are given as input values to the Arduino mega. These are then transmitted through the Bluetooth module. The one used in our system is shown in Figure 5.

Figure 5: Sphygmomanometer.

Temperature sensor: Basically it is a diode whose voltage changes with respect to the temperature. As we connect this sensor to the body of a patient. As the temperature of the body increases, the output voltage of that IC also increases with accordance to that temperature. So in this way our sensor measures the temperature. . The one used in our system is shown in Figure 6.

Figure 6: Temperature Sensor.

3.2. *Software Section:*

Patient mobile application: The Patient's mobile application is an Android application developed by using Android studio. It has functionalities to sign up new patients to the app and login facilities with user credentials for existing users. This app shows the health parameters of the patient and the medicines prescribed by the doctor. The snapshot of our system is shown in Figure 7.

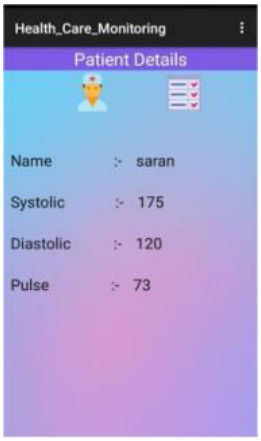

Figure 7: Patient mobile Application.

Patient web portal:The patients who do not have access to the mobile devices can also login or register using the online web portal. The patients can view their previous medical records through the web portal. They can also view the prescribed medicines. The snapshot of our system is shown in Figure 8.

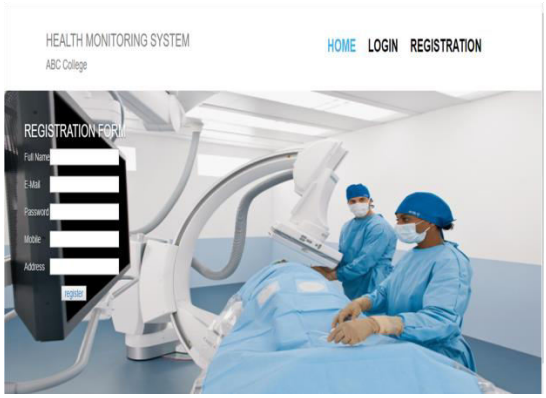

Figure 8: Patient web portal.

Doctor's web portal: The doctor can login into the web portal using the credentials provided to the doctor. On successful login the doctor can view all the patient records. The doctor can view the records of the particular patient and able to prescribe medicines through the web portal. The prescribed medicines can also be viewed by the patient on their mobile application as well as the patient web portal. The snapshot of records of all patients is shown in Figure 9. Figure 10 shows the snapshot of prescribing medicine.

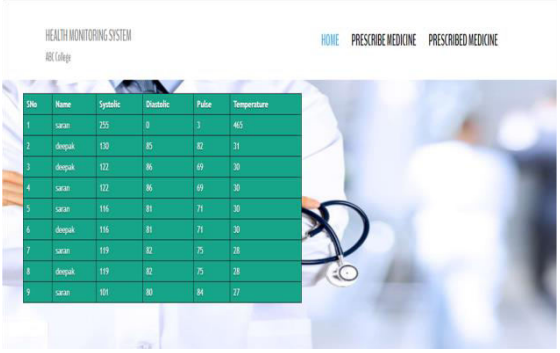

Figure 9: Doctor's web portal.

Figure 10: Prescribe medicine.

IV. PROPOSED SYSTEM

The system aims to reduce the burden of carrying the prescriptions and reports each and every time a patient visits the hospital. Patient's health parameters such as systolic, diastolic, pulse rate and body temperature are measured through temperature sensor and sphygmomanometer. The patient is given a unique RFID tag with a unique identification number, by scanning in RFID scanner along with entering the patient credentials. On successful login the patient details can be viewed. Patient details are stored securely in a centralized server through patient Android application. The data is encrypted and decrypted in the server. The doctor can scan the patient RFID tag to retrieve the whole medical history of patient. The data is fetched from a centralized server and any hospital can view any patient data using a universal portal by scanning the patient's RFID tag and their credentials.

V. SECURITY SYSTEM USED

The Advanced Encryption Standard (AES) is a symmetric-key block cipher algorithm and U.S. government standard for secure and classified data encryption and decryption. The AES has three fixed 128-bit block ciphers with cryptographic key sizes of 128, 192 and 256 bits. Key size is unlimited, whereas the block size maximum is 256 bits. The AES design is based on a substitution-permutation network (SPN) and does not use the Data Encryption Standard (DES) Feistel network. The AES replaced the DES with new and updated features. Block encryption implementation. It uses 128-bit group encryption with 128, 192 and 256-bit key lengths. Symmetric algorithm requires only one encryption and decryption key.

VI. SYSTEM OPERATIONAL DESCRIPTION

Our system is depicted in Figure 11.

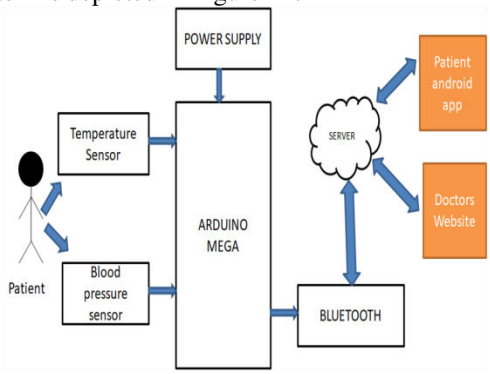

Figure 11: Block Diagram.

The system consists of several sensors such as Bluetooth sensor, RFID reader, Sphygmomanometer. All these sensors are connected to the Arduino Mega. In this system Arduino mega works on 5v power supply, gets input values from temperature sensor and Sphygmomanometer. The values are stored in centralized server sent through the android application in which the data is encrypted. The patient uses the RFID Tag for verification and the android application (shown in figure 7) to view the medical records and also the prescribed medicine. The doctor logs into the web portal to view all the patient's records, also the doctor can view individual patient's record (shown in figure 9). The doctor can prescribe the medicines to the patient through the web portal (shown in figure 10) and the prescribed medicines are also stored in the server, it is also notified in the patient's android application. The patient can also use the web portal to log in and view their medical records and also the prescribed medicines (shown in figure 8). Using RFID tags patient details can be viewed in different hospitals through the universal portal with the help of RFID tag along with patient's credentials. All the data's are secured while transferring and receiving as well as on storing in the server through the AES encryption and decryption technique.

VII. CONCLUSION & FUTURE WORK

Smart health care system is useful for patient by reducing to carry medical reports by digitalizing all the reports and health related parameter values. Patient can monitor their health from home and can store the data in the server. They can visit any hospital just with their RFID tag and without any medical reports. Physician can prescribe the patients through the web portal, which is viewed in the patient mobile application. It will be much useful for patient, caretaker and physician. Our future works includes Implementing artificial intelligence and machine learning capabilities to analyze and predict heart attacks and diabetes. Developing the user interface with more functionalities

VIII. ACKNOWLEDGEMENT

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