

## Electronic Health Records System Using IOT

Yaramala Sri Sarayu<sup>1</sup>, Maramreddy Satish Reddy<sup>2</sup>, Venkata Bhanu Manoj Meda<sup>3</sup>, Sunil D M<sup>4</sup>

<sup>1</sup>School of Electronics and Communications Engineering, REVA University, India

<sup>2</sup>School of Electronics and Communications Engineering, REVA University, India

<sup>3</sup>School of Electronics and Communications Engineering, REVA University, India

<sup>4</sup>School of Electronics and Communications Engineering, REVA University, India

**Article History:** Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 23 May 2021

**Abstract:** Healthcare system is one of the important sectors in any country for its national income. Growing use of communication technology many countries have implemented e-health card system. At present there is no existing electronic health care system in India. It is essential to keep every patient's history records. The point of this proposed e-Health card framework is to improve effectiveness, access of medicinal services administrations. Using the e-Health card all patient's data, doctor's prescription, patients present and previous health history which is stored using API can be accessed through a web page by the authorized parties using IOT. Our proposed thought conveys the benefits of secure medicinal services in India utilizing data and correspondence advancements. Digital records leave better tracking and more standardized documentation of patient interactions, which has the potential to scale back error. A patient may visit a hospital for treatment of a particular disease or illness and sometimes may have to be promoted to a hospital with better facilities and technological advancements, in such case a database which be accessed by every hospital is necessary, therefore our project aims on providing database and a web page which can accessed by all the hospitals.

**Keywords:** e-Healthcard(Electronic health card), IOT(Internet of things), Database, API(Application program interface), cloud, Web page.

### 1. Introduction

Association among patients and specialists using electronic apparatuses for wellbeing related reasons for existing is extensively characterized as eHealth. Territories like biotechnology, pharmaceuticals, data innovation, the advancement of therapeutic gadgets and hardware and more have all made noteworthy commitments to improving the strength surprisingly all over the globe. In recent years, health care sector has been appointed with significant financial resources in almost every country in the world.

Mechanical advancement in this division is the most starting elements of all. The major concern of health care centers is to provide patients with proper diagnosis and treatment. This process is still dependent on documentation. Technology has been adopted by health care industry since long, but however, it retains a secondary role as far as patient data management and connectivity cares. The true benefits of health cannot be gauged in pure economic terms.

In this project "e-Health card using IoT", A card is provided to infrastructure the hospital's, which will contain all the records of patient data. This is an efficient framework to manage health care system. Regardless of the area of the patient or the social insurance supplier, accessibility of the information is vital for both patient fulfilment and improved clinical results. In this project RFID technology and cloudComputing is used in the design. It meets the requirements of identification and tracking in healthcare environment. It has the potential to speed up and increase the reliability of the process. The card contains all the information. We are going to store all the history of a patient onto the cloud. It works through an electronic API (Application Programming Interface) that is remotely executed through its communication with the customer applications.

The data that is accessed is stored on the cloud with the help of a Personal Computer. So once the RFID card is being swiped by the patient when he comes to visit the doctor, all the previous medical history is displayed to the doctor chronologically. This not only avoids confusion and forgetfulness but also saves time of the doctor as he does not have to ask the patient orally.

All diagnosis, scans and surgeries undergone will be stored and the doctor can easily prescribe the course of medicines based on the history of the patient. A person does not have to remember the names of all medicines and does not necessarily keep the hardcopy of the prescription given by doctors. All data is stored within the cloud and may be accessed anywhere all-round the globe at any point of your time.

Through this project, it will be possible to differentiate patient's healthcare information that can be accessed only by government organizations and by other registered private organizations as well. It will also protect the corruption from different fields of healthcare sectors. Implementation of this project needs huge efforts. But the benefit of this project is long term and wide on national health care systems.

## 2. Literature survey

RFID privacy issue and technical challenges" communication of the ACM,2005, M. Ohkubo, K. Suzuki and S. Kinoshitha. Radio Frequency identification technology (RFID) was first developed in 1948. Identification, Friend or Foe (IFF) for aircraft was one of the first implementation of RFID technology, it is used in automated identification of object. when reader sends the data, the tag receives energy provided by the capacitor.[1]

Cloud based secured smart card health care monitoring tracking system" 2017, Second International Conference on Electrical, Computer and Communication Technologies (ICECCT). In this model it helps physicians, chemists and hospitals by electronically managing all patient data and access is given only for authorized organization. This will provide the added layer of security.[2]

Global Med Info Smart Assistant (Cloud storage) 2017, International Conference on Innovations in Green Energy and Healthcare Technologies. Electronic Medicinal records are tested about patient security and issues with the consolidation of old records etc. Cloud storage is used to store the patient health records.[3]

Hillestad, R. et al. (2005): Can Electronic Medical Record Systems Transform Health Care? Potential Health Benefits, Savings, And Costs. Health Affairs 24, no.5 (2005).1103– 1117. It gives us a brief description potential savings (estimation) and cost of widespread adoption of electronic medical record systems.[5]

Barriers to Adoption of Consumer Health Informatics Applications for Health Self-management" Laxman, K., Krishnan and S.B., Dhillon, J.S. (2015) Health Science Journal, Vol. 9, No. 5:7. In this study, we investigate the barriers that hinder effective usage of CHI applications for health self-management.[6]

An Intelligent Webbased Healthcare Systems: The case of DY- MOS. Web-based applications in Healthcare and Medicine" Georgiadis et al. (2010), Annals of Information System, Vol. 7, Springer Science + Business Media LLC. This helps us in building web-based applications for health care.[7]

Wiecha, J. and Pollard, T. (2004): The Interdisciplinary eHealth Team: Chronic Care for the Future" J Med Internet Res 2004. 6(3): e22 This delivers the details about eHealth Care Team steps to be followed.[8]

## 3. Software and hardware requirement

### 3.1 Software:

Arduino IDE, Embedded C, Java Script

#### 3.1.1 Framework:

Spring net, Hibernate 5.0

#### 3.1.2 Database:

mysql

#### 3.1.3 Operating Systems:

Ubuntu/Windows, Linode cloud

### 3.2 Hardware:

#### 3.2.1 Components:

Arduino Microcontroller: ATmega328

Range: 28pin, 8k byte memory

RFID Reader: 125KHz frequency

Wi-Fi Modem: ESP8266

LCD: 16x2

Power supply: 12v Adapter

#### 3.2.2 Disk:

Minimum: 40 GB

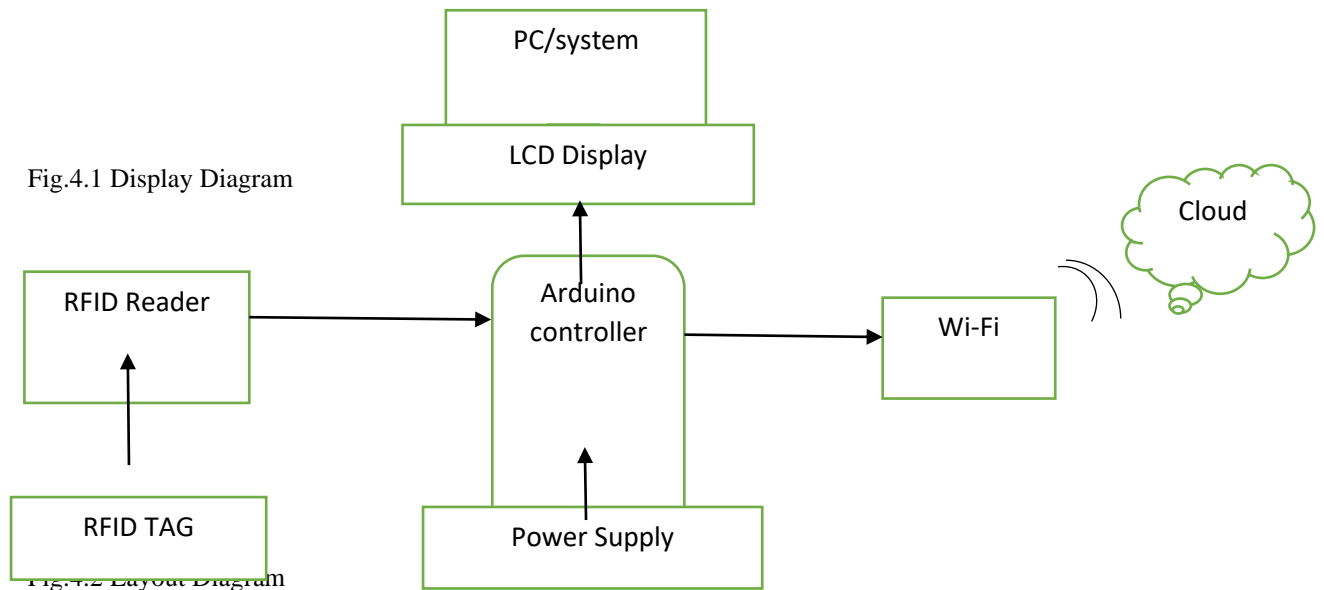
#### 3.2.3 RAM:

Minimum: 2 GB

Recommended: 4 GB



4. Block diagram:



The RFID Tag contains all the previous history of the patient. Each RFID tag has unique ID. When doctor swipes the tag with RFID reader. The RFID Reader is connected to the microcontroller. The patient ID recovered from the reader is sent to the Arduino controller. The controller will process the ID and sent it to the cloud via Wi-Fi modem. The cloud will access the respective patient details and display it on the LCD. The controller acts as a interface between RFID Reader and Wi-fi modem.

5. Proposed methodology

In this project RFID technology and cloud computing are used for the implementation of this project. Radio Frequency Identification is a innovation where electromagnetic fields appended to a tag is utilized to recognize objects. The card maintains the data respiratory and a software system. It provides a secure service to an organization to support identity-based applications such as sign-in and authorization management.

The hardware part of the project contains a Atmega328 Micro controller, LCD, Wi-Fi module, Radio Frequency Identification (RFID) Module. All the components are connected to Microcontroller. The ID recovered from the tag is further sent to the microcontroller. Arduino microcontroller is a minimal coordinated circuit intended to oversee a particular task in an installed framework. The microcontroller has focal handling unit and a RAM. It is used to store executing programs and data temporarily. It has a ROM which is used to store the OS, fixed data and standard routines.

Microcontroller provides an interface between RFID reader and a wi-fi modem. An LCD is connected at the output of thecontroller to display the name of the patient. The engineering depends on a safe cloud framework as backend, utilizing RFID cards as authenticators. Cloud computing (with the help of IoT), the long held of “computing as utility”, has opened up a new era of future computing and transformed a large part of technology industry, reshaped the purchase and use of information technology software and hardware and received considerable attention from global and local technology players. We are going to store all the history of a patient onto the cloud.

Distributed storage is a distributed computing model in which information is put away on remote servers got to from the web. It is kept up, worked and overseen by a distributed storage specialist organization on capacity servers that are based on virtualization methods. Distributed storage works through server farm virtualization, furnishing end clients and applications with a virtual stockpiling engineering that is adaptable as per application necessities.

It works through an electronic API (Application Programming Interface) that is remotely executed through its communication with the customer applications. Private distributed storage gives same versatility, adaptability

and capacity system with limited or non-free. The data that is accessed is stored on the cloud with the help of a Personal Computer.

### 6. Results

When Patient visit the office, they should carry the Ehealth card, doctors will scan patients card using RFID reader. Reader Will send the patient ID to controller. Then it will process the ID and send to cloud via Wi-Fi module. Once cloud receives patient ID it will match with the database and it shows all the history of records. So that doctors can verify old health diseases. Doctors can upload Patients Health records easily by putting patient Id using the Computer for all the patients. Smart E-health card will be provided to all the patients so that he/she can show E-Health Card to doctors or hospitals whenever its needed.

Below Fig.6.2 shows the database authorization page where the doctors will enter their respective credentials. Fig.6.3 and Fig.6.4 gives us the information about patient 1 previous medical history. Fig.6.5 and Fig.6.5 are the medical information about patient 2.

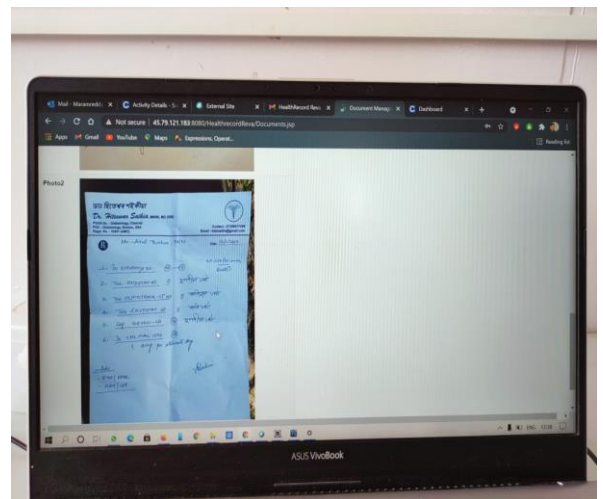
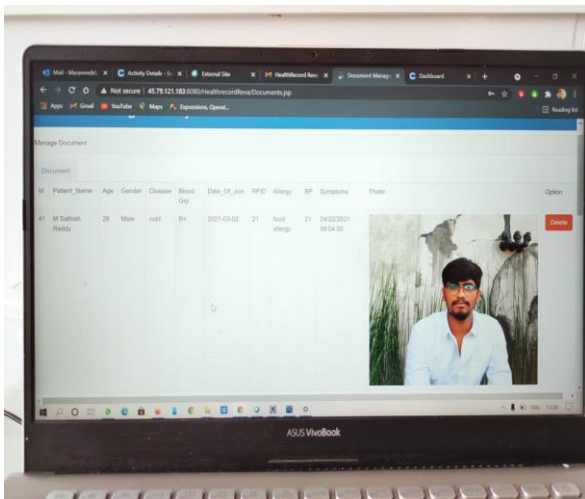
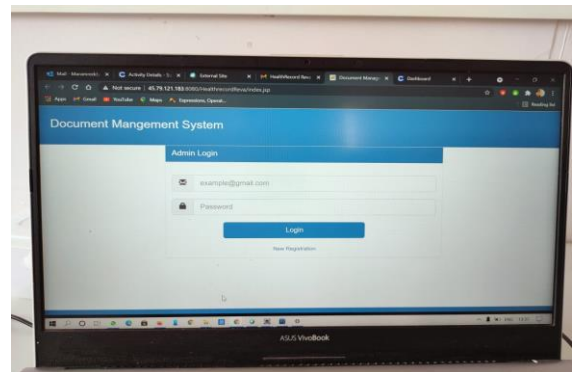
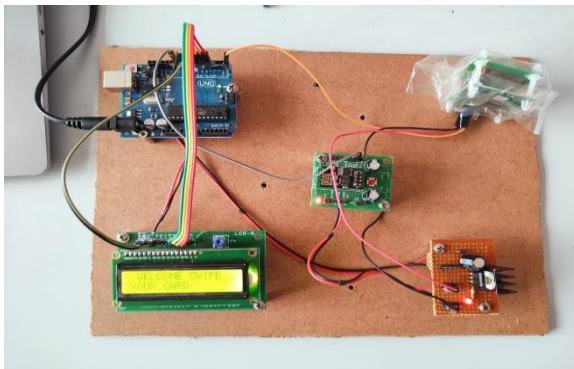


Fig.6.1 Hardware circuit

Fig.6.2 Database Authorization Page

Fig.6.3 Patient Information Fig.6.4 Patient Prescription Details

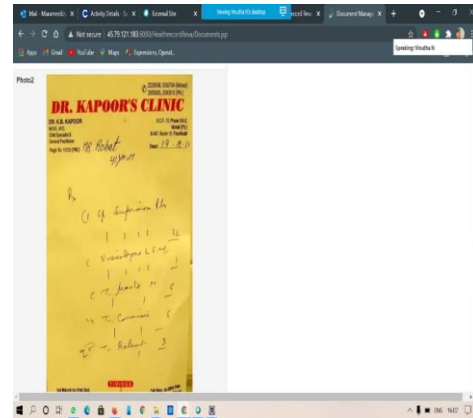
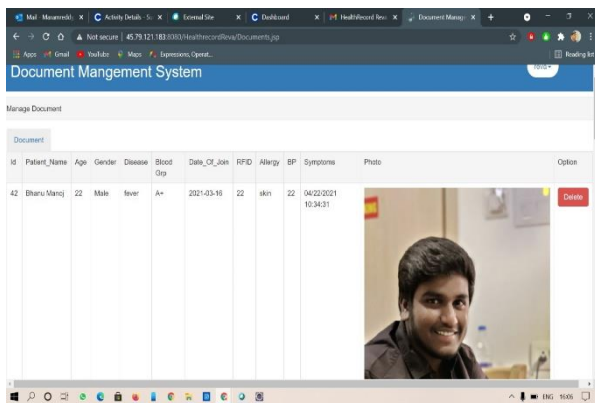


Fig.6.5 Patient 2 Information Fig.6.6 Patient 2 Prescription Details

## 7. Conclusion

The e-Health card has been successfully implemented in developed countries and most citizens are getting benefit by using this card for their health security, and thus they are saving time and money. The proposed e-health card system would be successful in India when people will understand the actual benefits of e-health card system and about the necessity of this technology for upgrading the current healthcare situation. The social insurance administration for the resident of a nation like India should be financially savvy for legitimate human service offices.

## 8. Future scope

The e-Health card has been effectively executed numerous nations and natives are getting advantage by utilizing this card. It spares time and cash. The current project includes only saving of medical prescriptions in the database. The mechanism to store scanned images and other records in image form are all add to the feature enhancement.

At whatever point required, it very well may be downloaded from the database and can be alluded for further solutions of drugs and courses. Also, security can be enhanced by designing a password secured reader which enables the user to add a password by himself in case he does not want to share his personal data or has any instabilities with respect to his medical history and furthermore improve this framework by including more offices like isolating the divisions present in the emergency clinics and distributing the patients as needs be in the framework itself. The scanned copies of medical bills and attach them to their respective diagnosis and treatments undergone by a patient are also add to the feature enhancement. After this system is implemented worldwide the database of all systems can be united and a person may access his medical history anywhere from the world.

## References

1. M. Ohkubo, K. Suzuki and S. kinoshitha, "RFID privacy issue and technical challenges", communication of ACM,2005.
2. KarthikMoudgil, Ria Maheshwari, HarshalBharatKumar Parekh, kailasDeavadkar, "Cloud based secured smart card health care monitoring tracking system", In second international Conference on Electrical, Computer and communication Technologies(ICECCT).
3. R.Dinesh, L.meena,T.Sathya, E.Selton, C.Ram Kumar, "Global Med Info Smart Assistant", In International conference on Innovations in Green Energy and Health care Technologies, 2017.
4. Digilocker and Mparivan digital apps.
5. CAUSES OF DATA LEAKAGES AND ITS PREVENTIVE MEASURES, Mohammed Inuwa Ali, Adzapeni Eric Agbeko Kofi , International Journal Of Advance Research In Science And Engineering <http://www.ijarse.com> IJARSE, Volume No. 10, Issue No. 03, March 2021 ISSN-2319-8354(E).
6. Hillestad, R, "Can Electronic Medical Record Systems Transform Health Care? Potential Health Benefits, Savings, And Costs", Health Affairs 24, no.5 (2005).1103– 1117.

7. Informatics Applications for Health Self-management”, (2015)Health Science Journal, Vol. 9, No. 5:7. 1.
8. Georgiadis et al, “An Intelligent Web-based Healthcare Systems: The case of DY- MOS. Webbased applications in Healthcare and Medicine”, (A. Lazadikou (ed.)) Annals of Information System, Vol.7, Springer Science + Business Media LLC.
9. Wiecha, J. and Pollard, T. (2004): The Interdisciplinary eHealth Team: Chronic Care for the Future. J Med Internet Res 2004. 6(3): e22.