IoT Based Smart Health Card

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Abstract

The wealth of a nation is defined by the health of the people residing in the nation. The health is defined as a living strategy by most of the wise men[1]–[3]. Maintaining a good health is a mandatory one. The earth we live in, the air we breathe, the water we breathe plays major role[4]–[6]. Still, taking care of ourselves stands prior. Medicating is of different types and is an necessary one for every individual. The technology has developed a lot. There are lots of debates running stating the technology development will be a bane to human health. There are some benefits that technology could provide in the field of Health. Lots of hackathons are being conducted online as well as offline on Health care domain[7], [8]. Most of the innovative solutions focuses purely on the chemicals used in the drugs. The solution that depends on the technologies are welcoming in these days.

Keywords: Health care, card system, health card, Database Management, IoMT (Internet of Medical Things).

1. Introduction

The Health of an individual is taken care some or the other way. The way to combine all the health record of the individual on an online site and could check it out will be an ever-dreaming technology [9], [10]. IoT and Cybersecurity will lead us in its way and builds a system much secure and safe to hold the health data [11]–[13]. Health data of an individual is a precious document that has to be protected and to be taken to all the places he travels. Taking the one all the places will be really hard. Combining all the records in a single virtual file will be a cool invention [14], [15]. The system is decided and built in such a way to serve the purposes.

Medical devices equipped with Wi-Fi allow the machine-to-machine communication that is the basis of IoMT. IoMT devices link to cloud platforms such as Amazon Web Services, on which captured data can be stored and analyzed.

The idea which is proposed has a unique characteristic like an Aadhaar card that holds all the individual’s data. The card must be carried by the individual to all the places. The novelty is the unity or collection of data into a single place. The collection of data gives a better vision to the doctor. The patients, doctors, pharmacy and the lab technician must submit proof online to get approval for having an account on the site. This approval is to check the frauds who are there to misuse the user’s data.
The systems available in the market either have the card to hold the data or has a local system that connects the hospital and the medical system. But, ours is a combination of both serving the nation.

Registration may take a day or two to provide a unique and safe environment to the user. Card taken once can be used for lifetime.

Why carry file full of reports when we have it all only in one single card that easily fits in our pockets and wallets, and this factor is the major advantage of our health card[9], [10]. In business point of view, we can manually contact all the hospitals, labs and pharmacies and suggest them using it. Marketing the product requires a lot of time but brings a unique product in the market to serve the purpose[11]–[13]. Also, we can suggest the government to link our site with the Aadhaar card, which simplifies the system and enhances the security of the system or could make a separate card for Health.

2. Materials and Methods

Everything now-a-days is becoming handy day by day. But even today we carry our file of health reports everywhere we go[16], [17]. What would be the best solution to it? Also, when you shift to a new place and visit a new hospital, you have to describe your whole health condition again and again. What could be done to avoid it?

Smart Card based Smart Health data collection, monitoring and storing system for improving the lifestyle and management of Health data. With the size of a regular ATM card, it can easily fit in the pockets and is handy to carry anywhere.

A card is made with a unique identification number and a built-in E-Chip with Bar code. This unique card is given to the patient. It comes with a predefined application (mobile as well as desktop), which can be used by four professionals. One is the person himself/herself, doctor, Pharmacist and Medical Laboratory Technician. It can be accessed in three different ways. Reading the card using the electric chip or through Barcode on the card or manually entering the Unique Id of the patient. The patient could get access to view the prescribed medicine, lab reports and the medicines bought from the pharmacy along with their price. The doctor could view the lab results and write the prescription data and the problem or disease of the patient into the card. The medical laboratory technician can only write the results of the patient into the card. On the other hand, a Pharmacist could only read the prescribed medicine and the issued medicines with the price.

The system helps the doctor to understand the situation easily, if the patient moves to a new location. The detailed medical report is handled in a single place that is accessed from any part of the world.

The components list mentioned in the list is supposed to be used. Based on the feasibility the best component will be finalized during the development of the system by hidden trail method. The components include both hardware and software and that makes the system complete.

Hardware components include
- Customized Controller – Controller designed to serve the purpose
- RFID Card – holds three kinds of Unique identification number
- RFID Card Reader – used to read the card.
- QR code reader (mobile or external device) – Used for accessing

Software components include
- The local computer is used as a database which can be accessed worldwide.
- Software IFTTT.
- Operating system: Windows 7 and higher
- Platform: Arduino IDE, App development software, interfacing software.
• Database: IFTTT linking to local computers database.

3. Working

The Technologies used in the building of the system includes IoT, Cyber Security, Data science and basic Physics. The agronomics will be taken care in designing of the website. The system is built user friendly to provide an easy and addicting environment to the user. The system is focused to provide a worldwide service to patients where all the health data is stored on a single site. The application for converting the image to pdf and sent to different place in local server is the basic principle in the working of the system.

4 interfaces are created for a single user. The interfaces are normal sites that a card holds. Each interface serves a specific profession. The four interfaces are as follows

• Interface 1 – For Doctors
• Interface 2 – For Drug store (Medical Shop)
• Interface 3- For Medical Lab
• Interface 4- For Patient (Client)

The four interfaces hold a limited capability and are accessible by the verified customers or clients. All the workers and patients have to get registered with the site when they are entering to this environment. The verification takes around 12 hours only then the user can access the services. The interfaces are accessible only after the successful registration and are limited with the functionalities.

Interface 1 – For Doctors
The doctors have to get registered themselves as a graduated doctor with the degree certificate and the clinic details. The interface is accessible to write the symptoms faced by the patient, the disease affected with, height, weight and the medicine prescribed. The doctor has access to read the data uploaded from the labs too.

Interface 2 – For Drug Store
The interface is accessible to view the prescribed medicine and able to write the medicines bought at that store. No other detail is viewable to the person at drug store. The drug store has to register themselves with the shop details and the resource person at the store. This limits the unauthorized stores.

Interface 3 For Medical Lab
This interface is applicable only by the people who belong to the medical labs. They have the accessibility of reading the tests that a doctor prescribes. The authorization of lab is same as that of a drug store.

Interface 4 – For Patients
Patients could get all the details that is stored in the card. Authorization has to be done with the Aadhar card to serve each person of the nation with a single and unique health card. The patient could see the treatment based on the symptoms they are diagnosed with. The test results, prescribed medicines, the medicines bought, the detailed health report, and the health status is viewed on the interface.

The system is to be built in an application form. The application or website is developed with a login credential. The password is set while creating an account. The front page shows the sign in or login option. The fresh user has to create an account based on the profession or as a patient. The existing user can just login to the account. The option for resetting the password and to recover an account is done through OTP verification of either mobile number or mail id given. The login or signup comes with the verification of the user.

The signed in User lands on the interface page which the user belongs to. The app is created with the study of agronomics. The Agronomic study will help in making the interface look good and ease to access. The system stores all the data in a single database. The requests are accepted and
treated based on the algorithms. The algorithms are selected based on the hidden trail method based on the customer usage.

The system comes with both hardware and software devices interconnected leading to the valuable service to the user. The hardware component would be a card and the database system. The database is a hardware that is protected in the safe and secured position of the owner (us). The card is handled to the user in less than a week from the time of registration of the patient. The card is a hardware that is not a mandatory one to access the database.

The card comes with 3 types of accessing modes. The card is made unique for each customer or patient. The card has 3 types of unique identification system. The identification system includes

- 16-digit secure number
- Magnetic card
- QR code

The card and the application developed makes the complete system and would serve the people with better resources.

The system is set to have a touch display that is given to all the doctors. The doctors can prescribe the medicines by writing them on the touch display. That will be saved as an image and converted into PDF. The converted PDF is sent to the concern medical store. The patient can reach the medical store and get the medicines without carrying the prescription. The system is the combination of two major deals that comes under a single roof.
Flow Chart

System On

Yes

Account Created

Login the Account with the details provided during Sign Up

Reach the Interface (doctor, patient, drug store, medical lab)

Read from the interface or write to the interface based on the user type

Log Out after using the Services

No

Sign Up for a new Account

Upload the Documents

Wait for Verification

Payment to be done online

Card will be reaching you in less than a week.

Continue using the system by logging in

Block Diagram

Card with three types of access Techniques

Interface that links the external hardware (Optional) used when the card is accessed by QR Code or magnetic reader

Mobile application and Web services

Database

QR Code reader

Magnetic Card Reader

16-Digit number

Writing the data to the card

Reading data from the interface

User Login and other settings

Analyzing the data
4. Result and Conclusion

The system would reduce the usage of paper. It would be a virtual place to store the records of patients. The security of the system is taken care for protecting the data. The system developed will be a combination of Hardware and software that will be helping to build an better nation. If this is made compulsory like an Aadhar, then the prediction of diseases can be done. The dataset of the nation can be created. Could easily take the census results of each disease. The effect of nature on the specific places could be visually seen. The commonly affected disease can be easily diagnosed. The system will work unique storing the data uniquely. The system will be a low cost and could be easily affordable by public. Frauds in the field of medical can be easily recognized and neglected. This would be a welcoming feature in the nation as it clearly visualizes the things. For example. If a factory is built in an area A, the people belonging to the area A is diagnosed with Waterborne diseases. This will clearly give us a possibility to check the water pollution in that area by the industry. This solution is modern and could solve the ancient problems too. The system could directly help to store the record of the individual. It indirectly helps in visualizing the reality in the drowning areas. There will be lots of issues in bringing this technology in market, but still it would be a welcoming one and be serving the people better.

5. References


