Smart Medical Assistant System

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Abstract:Health is a crucial part of human lives. Nowadays, healthcare is becoming vital each day, as there are lots of diseases that emerge around us. Technology is transforming the medical sector by massively impacting almost all practices and processes of medical professionals. Despite this, many of the people and medical staff still dealing with paper-based medical records and prescriptions while conducting treatment. When a patient wants to appoint any hospital or clinic, to carry previous medical reports or past prescriptions is becoming essential for them. It is necessary because the doctor gets an idea about the patient's health status by referring to their previous medical histories, helping for better treatments and medications. However, patients cannot maintain every medical documentary for years. Conventionally, the doctor asks patients about their previous diseases, prescription, or medicine details orally, nevertheless it becomes difficult to get exact information from the patient. Sometimes, it becomes more important for the doctor to know about the medical history of a person so that they can provide suitable treatment with better clarity of that person's health. Focussing on this, a smart medical assistant system is designed where doctors can record all prescriptions, treatment, or medical details of the patient on software instead of writing on a paper. All these records are stored in the central cloud and made visible to doctors as well as patients. Each patient has assigned a unique authentication card for maintaining the privacy of their medical history account. Doctors can access and update a patient's medical history anytime and anywhere by logging into their account through a smartcard swipe. The system can avoid overdue to treatment decisions. Likewise, the system helps to keep transparency about medicines and treatment.

Keywords: Medical Records, Prescriptions,Doctor,Authentication, Patient, Treatment etc.

I. INTRODUCTION

Health is the primary factor that is indispensable for each and everyone in the world. Without health, neither success nor attainment emanates in one's way. Everyone is suffering from some of the other sicknesses, so appointing clinics or hospitals for check-ups. Sometimes, there will be situations where the doctors may not be available in the hospitals. What if there is an application that will allow the user to consult with the doctor through the online mode? With the technological developments in the medical sector, more applications are being operatable through smart and mobile devices. Then yes, it is possible to connect your doctor through online mode using smart health consulting android system applications. The system offers a complete solution for patient's health monitoring and treating them in a better way.

In today's world, everyday several lives are seriously getting affected just because the patients are not well-timed and properly operated. Although, some real-time health parameters may not efficiently be measured or reported properly in the clinic as well as in hospitals. Additionally, it is very challenging for hospitals to frequently check a patient's basic health parameters to predict their health conditions. To deal with these types of circumstances, a smart medical assistant system is beneficial. The system is designed to be used in hospitals and pathologies to monitor and predict the patient's health condition by referring to their medical history.

In this paper, we will discuss a smart medical assistant system comprising of different options of hardware and software.

We are using smart RFID swipe-cards for patient's authentication purpose that supports the Raspberry-Pi embedded module. By swiping an RFID card, the doctor can able to access a particular patient's online medical history account, where previous records have been stored. Doctors have authorized to add new treatment details to that account. The system is accessible for pathology, where pathology assistants can get idea about tests that the doctor has recommended to patients. Likewise, a pathology person can access the patient's medical account, and authorize to add pathology test results to that account. The system had made transparent for patients as well, through suitable login ID and password, patients will also get access to their medical account. While entering their personal medical accounts, patients can able to see their entire medical and pathology history anytime and anywhere.

So, through our dynamic system, we are developing a unique platform for doctors, patients, and pathology, that collaborate all details together and made treatment transparent with better clarity.

The main objectives of this project are:

1. To maintain a person's entire medical details into unique dedicated platform.
2. To made medical field and treatment process transparent and easier to deal
3. To save the doctor's time while treating emergency cases.

II. LITERATURE REVIEW

[1] The authorshave suggested five practices that help to deal with the problem of data missing in the case-based reasoning (CBR) system. Data pre-processing steps including data transformation, data cleaning, handling missing values, and feature selection can able to be applied in any directive. For transforming database structure to case base structure and renovating electronic health records (HER) generic data to specified case base these pre-processing steps are applied to the EHR.

[2] The paper has recommended an agenda for formulating a case-base for case-based reasoning (CBR) systems. CBR systems are well-thought-out the most appropriate systems for making efficient decisions.

[3] The authorshave represented the EHR system implemented on cloud networks. The recommended application uses a two-level approach that accomplished semantic interoperability; these approaches are the archetype model and reference model. The data integration engine is used by the proposed application to collect data from distant data sources and to provision progressive security features.

[4] The authors have publicized an analysis and survey of several electronic health record applications in the e-Health system. The numerous EHR applications have been studied and compared into the paper including EHRs for monitoring diseases, diagnosing, and EHR for selecting the most effective ways for treatments. Additionally, paper has elaborated on the usage of EHR systems as a base for constructing a database for clinical decision support systems (CDSS). Besides, the paper has highlighted challenges while implementing the EHR system in the healthcare environment.

III. WORKING OF PROPOSED SYSTEM

The represented system undergoesthrough total five operational stages. The detailed elaboration for
each working stage is defined below:

1. Information Gathering and Planning :

This is the initial stages of working where we have decided to set the goals for our proposed application. We decided our website actors / panels that included administrator, doctor, pathology and patient. We created a sitemap sketch and decided technology stack by focusing to our project outcomes. We planned the aim of each website actor and rough data flow as outlined below:

Administrator Panel: It can control and manage the variety of field's information and authentication.

It administrates each new data entry including patient's registration, doctor'sregistration, pathology person's registration, doctor's prescriptions and pathology test results as well.

Doctor Panel: The field is specifically designed for doctor by using embedded-based GUI. First doctor need to login into his/her own account which was created by the administrator.
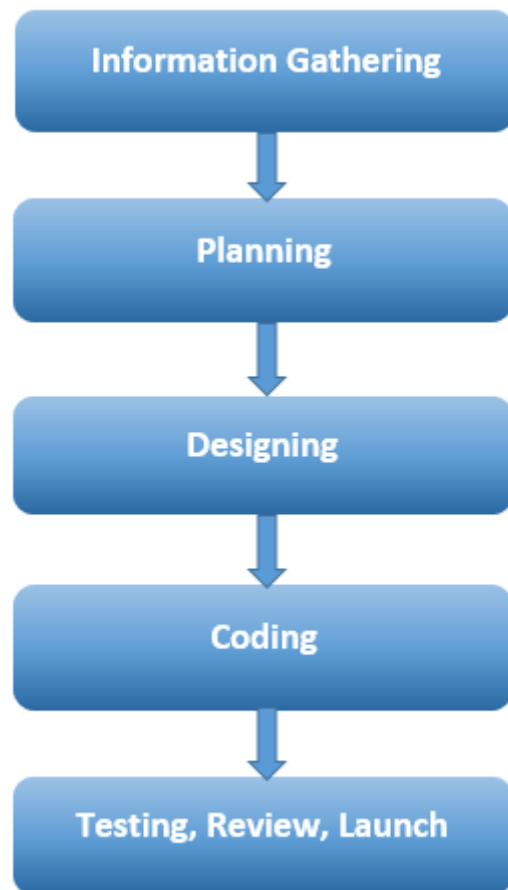
IV. PROPOSED SYSTEM

Figure 1.WorkflowofProposed System

Once logged in, doctor has been allowed to swipe the patient's unique identity card using embedded platform. Once, authentication will be successful, doctor will be automatically enter to the patient'smedical account. Theseaccount will display patient's prerecorded medical history, doctor can able to edit or update the authorized field data, which then will be stored to the central storage unit by using submit button.

Pathology Panel: This panelisaimed to record patient's laboratory test results. We have tried to put each actor and data field dynamically and precisely. If any patient has recommended any physical test, then that recommendation will be visible for pathology person.
Again, pathology person is also has their own authenticated identity created by the administrator. After successfully logged into the account, pathology person can conduct tests and update the test results to the authenticated data fields. After submitting data, it will again added to the patient's medical history account.

Patient's Panel: The panel has been created to make all the information of medical records transparent to patient as well. Patient can logged in into their own account by using login credentials given by administrator. After successful authentication, patient can able to see all the data recorded by doctor and pathology at anywhere and anytime. However, patient can only read the pre-recorded information, they have not given any data written rights.

2. Designing:

As web application development is project core, we select HTML (Hyper Terminal Markup Language) and CSS (Cascaded Spread Sheet) for design. By using appropriate commands and instructions, page layout, layout designs, and data fields has been generated and precisely organized.

3. Coding:

Dynamic web application is aimed to save, update and retrieve the information filled by various user interfaces. Thus, it is necessary to precisely create, add, access, and manage the database at local host network first. This work can be carried out by relational database management system(RDBMS). The system has used heidiSQL software, for MySQL database creation where, C# scripted language has been used for MySQLcoding. ASP.net is used as scripting language to develop html code.
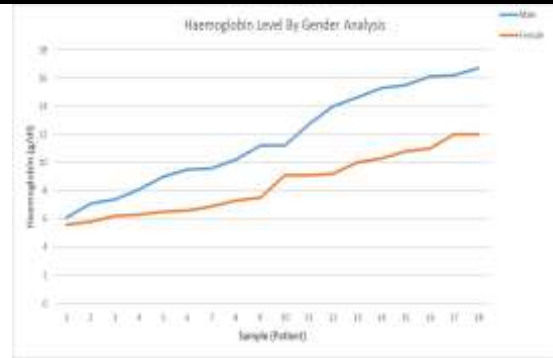
4. Test, Review, Launch:

Once, web application and database generation is done, it is needed to test the working of created web application. These stage include testing for functionalities like data entry, data storage, data access, data retrieve and management as per expectations. Then, all the tested system work files including html, css, .net, and other necessary files will be uploaded to the cloud. UsingGodaddy web hosting service,data would be stored at cloud and website will be launched online.

V. HEALTH PARAMETER ANALYSIS

The proposed system generates and collaborates numerous amount of database through input health parameters.

> This collected database can be used for achieving valuable insights which can be useful for medical sector. The graph givenbelow is a sample database analysis result:

> We have included numerous health parameters that can together generate a valuable medical database.These database can be use these database for concluding any health parameter analysis using graphical representation.

The figure represents graphical analysis of haemoglobin results of 36 patients (samples). Out of 36, 18 was haemoglobin results of male candidates and remaining 18 are of females. The data has been arranged in an ascending order for precise analysis. The graph characterizes haemoglobin range difference by gender.

VI. CONCLUSION:

The graphical insights conclude that, male are having high haemoglobin range as compared to females.

Hardware Used:

Raspberry Pi (MCU):

- Raspberry Pi 3 B+ is the latest embedded platform that has been used which has many in-built features. The platform is well-known due to its low cost and robust performance. It is a called credit-card sized computer that can be plugged into a TV or computer screen and uses standard mouse and keyboard.
- The latest module has a 64-bit quad-core processor along with 1.4GHz operating frequency and dual-band 2.4GHz. It also offers other key features including Bluetooth (BLE) 4.2, faster Ethernet, PoE capability, and wireless 5GHz LAN

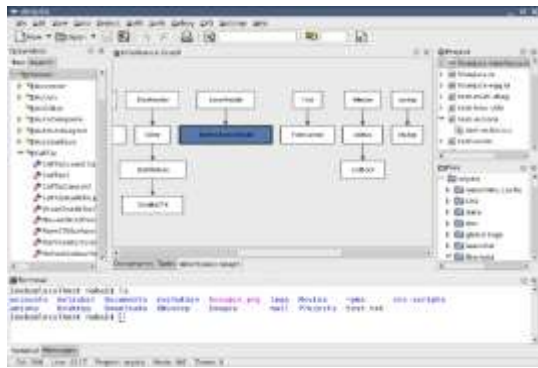*RFID: RC522 (Authentication Module):*

- The MFRC522 of RC522 family is nothing but an integrated reader and writer IC which is used for contactless communication at the frequency of 13.56 MHz. The MFRC522 IC supports NTAG, IEC /ISO 14443 and, A/MIFARE for communicating in both directions at 848 kBd.

Software requirement:

A. IDE Python 3.5:

- An integrated development environment which is abbreviated as IDE is a software application that offersinclusiveamenities to the computer programmers for software development.
- An IDE usually comprising of as a minimum a debugger, source code editor, and build automation tools. Some IDEs, like Eclipse and NetBeans, encompass the essential interpreter,compiler, or both.
- In this project we have used the tool to configure a RFID authentication module and MySQL database. A various tools including version control system are integrated into the system which can be used to streamline the build of a graphical user interface (GUI)

B. HeidiSQL:

- For the management of the users, logs, and tables of a MySQL database,Microsoft SQL Server and PostgreSQL,HeidiSQL offers a dominant graphical interface.
- HeidiSQL can only support to the windows platforms. The tool is open-source and available for free to the clients.

C. VS Professional:

- Microsoft Visual Studio is popular IDE tool powered by the Microsoft Corporation. This dynamic tool has been developed into numerous editions and versions demonstrating various advantageous features.
- The tool is used to develop a computer programs for Mobile applications, Web applications, Web services, Websites.
- Here we have used Visual Studio Professional 2015 edition to develop web application using different programing and mark-up languages including HTML, CSS, JavaScript, C++, and ASP.net.
- Also it configures all the database from SQL server to cloud like Microsoft Azure.

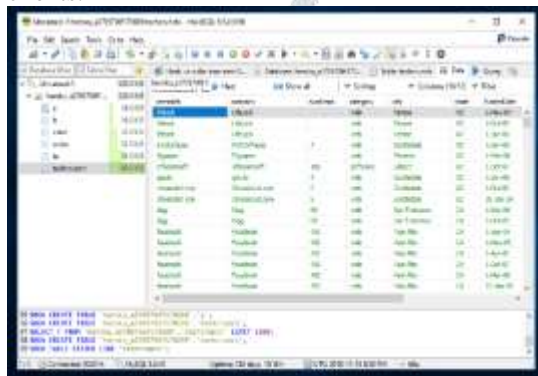## VII.   ADVANTAGES AND DISADVANTAGES

Advantages:
- The system offers unique, robust, flexible software platform to simplify and collaborate medical system together.
- Prevent people from medical frauds
- Save the time of doctors as well as patient, avoid delay for treatment.
- Low cost

Disadvantages:
- Complexity
- Security issues while dealing with cloud

VIII.   SYSTEM PROTOTYPE

Figure: Patient'sAuthentication

Figure: Web Application Homepage

Figure: Admin Panel

Figure: Doctor Panel

Figure: Pathology Panel

IX. CONCLUSION

From this project, we can develop unique, dynamic, and flexible software platforms, which collaborate all medical system parameters together. The platforms made all health parameter results stored together into the database in well-organized manner. This database can be used by doctors for analysis and generating valuable insights for better decision making.

Authentication by central administrative systemhelp to avoid medical frauds and make medical system transparent. Authentication will safeguard vital information. The system can be developed at a global level, build a flexible environment for both doctors as well as patients.

X. FUTURE SCOPE

In many countries, the system has been started deploying. As the system relies on the tremendous amount of database collections it can be used in the future for medical big data collection and medical analytics purposes. The system can be connected with medical equipment to automate the process of data filling. Authentication can be replaced by any other authentication system like the fingerprint module. By connecting to payment gateway and chemists with the web application, fees transaction and medicines purchasing also added to the system. The system can be developing in numerous ways in the future.

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