Paper-less Prescription Using Voice

[1]Mohammed Abrar Ahmed, [2]Tirumala Shravika

[1]Student, [2]Student
[1]Computer Science Department,
[1]Matrusri Engineering College, Hyderabad, India

Abstract: Drug side effects are the leading problem of death in the world, and drug or prescription mistakes cause tens of thousands of mortality worldwide each year. Most of these mistakes are made by caregivers taking the incorrect medication or dosage due to obscure handwriting, drug interactions, confusing medicine names, etc. The introduction of speech perception mobile applications can reduce some of these mistakes, as prescription information can be obtained and heard through voice responses rather than medical script. This article explains the purpose and implementation of a prescription mobile app for developing healthcare services. You can dial the exact number and obtain the application from your phone. This method can save wealth and life in medical centers throughout the world, particularly in developing countries where the practice process is generally cumbersome and paper-based. In India, inadequate drugs kill thousands of people and normal illness causes severe disability. The script identifies your voice. It performs an essential role in effective human-computer intercommunication. Speech recognition scripts can be used as triggers for virtual application numbers. The two scenarios above are varied, but you can connect them to solve the problem of speech medicine. This document provides a framework for prescribing drugs using speech recognition technology. The system proposed in this paper is targeted to those doctors and clinics that are still using paper-based handwritten prescriptions and cannot afford the existing Electronic Health Record systems available. This system can be fully operated even through a single smartphone. The objective is to avoid taking the incorrect medication for general diseases. The purpose is to bypass the wrong medication for common diseases viz. fever, cough, cold, body pain, etc. by designing a virtual application on voice-based medicine prescription. By implementing a voice-based medical alert system we can deduce the problem of lost prescriptions at the time of review. And we can save paper by introducing digital prescriptions that can be viewed directly from the document file.

Index Terms - **Android studio, Google API, Java, Prescription, Application.**

I. INTRODUCTION

A major issue in India is that generally prescriptions are still written by hand and the readability of such handwritten prescriptions is very limited. Several cases have come to light, where an error in understanding the prescription by a chemist has led to the wrong medication, which caused severe health issues to the patient[1]. But usage of the traditional Electronic Health Record System(EHR) in generating an electronic prescription is tedious and a bit costly for a doctor in India. A proper infrastructure would be needed for setting up such a system. Also, the operating cost and time for the system would also add up. Either the doctor would operate the system on his own consuming time or an operator if employed would cost money. Furthermore, patient record addition and retrieval consume 49 percent of a doctor's time in using an EHR system[2].

The requirement to enhance healthcare and provide effective healthcare has exceedingly improved the use of technology solutions in the healthcare sector. The Internet has received significant attention in recent years, but the voice is still a common convenient and direct way to communicate person-to-person or person-to-computer. Google Speech API technology enables users to communicate with the Internet utilizing speech recognition technology simultaneously with voice commands. Google's API is a new standard for developing major voice and pitch control applications. This technique decreases the expenses and develops writing efficiency. Voice assist systems are incorporated in various fields, including data providers such as warehouses, air travel, financial institutions [3], customer service [4], e-learning [5], and various areas. Mobile voice technology enables doctors to instantly update and explore patient records anywhere on the phone network. Mobile Voice Prescribing is a medical delivery system that permits doctors to guide necessary medications through an app using their mobile phone anytime, and at anyplace by dialing the phone number that connects the user and the doctor. Another challenge is to enable patients to access hospital-based patient data without manual access to reduce the time doctors spend on EHR(Electronic health records). Security of the prescription and doctors notes by directly delivering the prescription to the user's phone and email. Having discovered some specifications and objectives for the system, in the following section we shall discuss the modeling and design of the voice-based prescription application.

II. SYSTEM MODELLING AND DESIGN

Although Google API is easy to learn, building a successful voice recognizer application using Google API requires not only software development skills, but also other skills like understanding human factors for the telephone interface, linguistics, speech recognition and audio production. The application development life cycle [6] contains the steps for building voice applications. The Unified Modelling Language (UML) was used to capture and model some of the functionalities in the application. The UML is a visual language that provides a means to visualize, construct, and document the artifacts of software systems [7]. In the next section, we modeled a drug prescription scenario with a UML diagram.
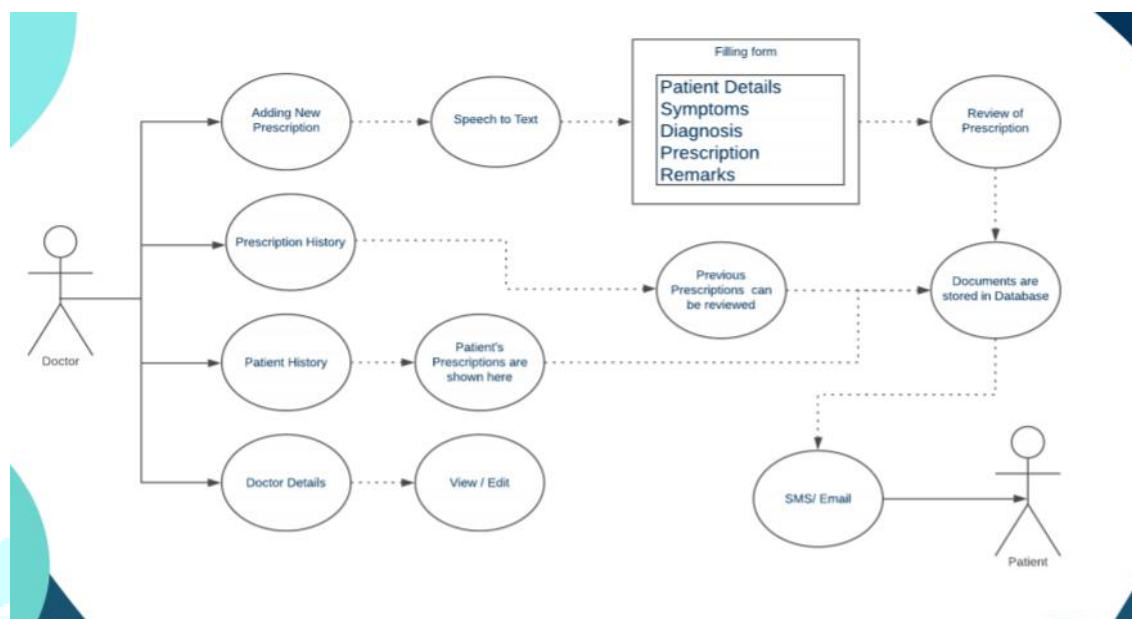

Fig.1 UML Diagram

III. TECHNOLOGY STACK

3.1 ANDROID STUDIO:

For ease in development and rendering of application. Android Studio is the official[7] integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development [8].

3.2 GOOGLE SPEECH API:

To convert speech to text. The Cloud Speech API lets you do speech to text transcription from audio files in over 80 languages [9].

3.3 JAVA:

Java is a popular programming language, created in 1995 [10].

It is used for:

- Mobile applications (especially Android apps)
- Desktop applications
- Web applications
- Web servers and application servers
- Games
- Database connection
- And much, much more!

3.4 XML:

User Interface Design. Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable [11].

3.5 ITEXT DEPENDENCY:

To generate PDF files. The Portable Document Format (PDF) is a file format that helps to present data in a manner that is independent of application software, hardware, and operating systems. Each PDF file holds a description of a fixed-layout flat document, including text, fonts, graphics, and other information needed to display it [12].

3.6 DATA BASE:

Firebase Services for secure and remote access. It stores information about a diagnosis, prescription, drugs, and drug administration.

3.7 ADOBE XD:

For ease in the design of UI. The fastest way for teams to create and share the world's richest experiences. Create designs for websites, mobile apps, voice, games, and much more. Interactive prototypes [13].
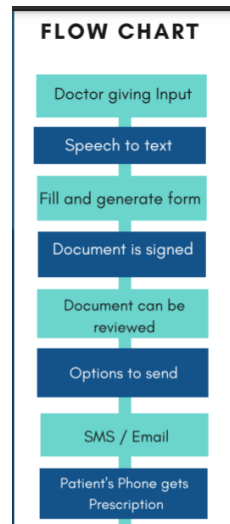
IV. PROPOSED SYSTEM

Fig.2 Steps involved in voice prescription

The doctor initiates the application by a button prompt or a trigger and starts dictating the prescription. The application records the speech with the help of Google Speech API as recognizer (Which can recognize all the disease names) and fills the form containing various categories such as Patient details, diagnosis, medication, etc. A PDF document of the EHR(Electronic health record) will be generated which is compliant as per HIPAA(Health Insurance Portability and Accountability Act) [14] using iText. The doctor has an option to share the prescription via Email(as a PDF) or via SMS with the patient. The PDF generated has a password that is assigned at the time of generation which will be the Date of Birth of the patient. A copy of Prescription is saved in the fire base which is secure and has copies of all the past prescriptions of the patient.

The given below are few of the screenshots taken from our APP. The first photo is of the Welcome page after opening the app, and it will ask what the doctor might like to do, whether to view the patient's history or provide a prescription to the patient. The next page displays the details of the patient to be entered using google voice recognition. Consequently, the doctor will have to opt for the mode of transmission of the prescriptions, that is through mail or message depending upon the internet availability, thereby prescription reaching to the phone of the patient without the use of paper.
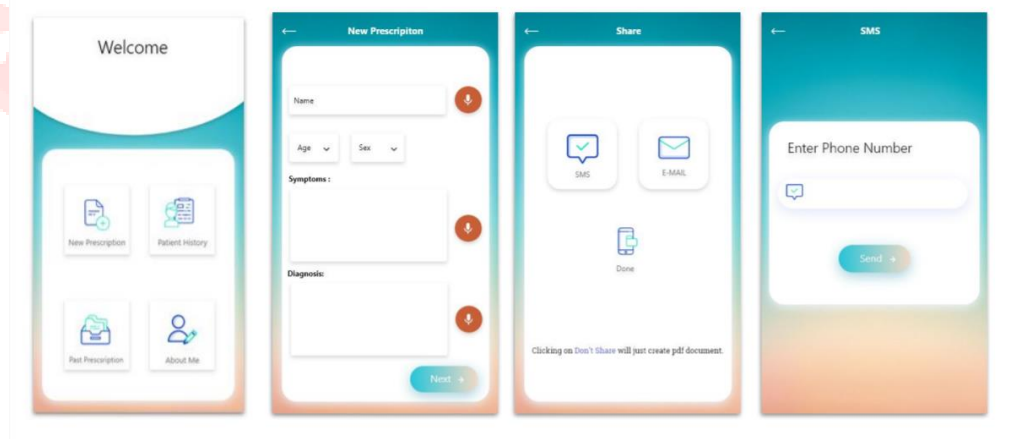

Fig.3 Screenshots of the Voice Prescription App

4.1 ADVANTAGES OF THE PROPOSED SYSTEM

- Saving of time and energy by just speaking to the application rather than writing the prescription on the paper.
- Saving paper by introducing a digital prescription that can be viewed directly from the document file.
- Security of the prescription and doctors' notes by directly delivering the prescription to the user's phone and email.
- No problem with handwriting now.
- Enhanced patient safety Increased access to patient's prescription records
- Decreased medication errors
- Improved pharmacy workflow multi optional (i.e) either mail/SMS

V. CONCLUSION AND FUTURE WORK

The proposed and implemented system aims to reduce the amount of time consumed in creating and accessing patient records. This system is available to all the doctors of India through their smartphones. The authors implemented an innovative solution to solve the problem of illegible handwritten prescriptions. Voice-based e-prescription needs a minimal change in the workflow of a doctor but in the long run, it will create a huge impact in developing a digital ecosystem for patients. The implemented system will reduce the patient record access time and maintain high security and privacy of patient data. In the near future, the Authors are planning to integrate and use the system in the real hospital ecosystem to test and validate the implementation and to analyze the impact it will create in the healthcare domain.

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