Voice Based E-Prescription

A system for Appointment Booking, Prescribing and EHR.

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Abstract - We all know that we are going through tuff times due to COVID-19 and this has made the fact of meeting anyone in person difficult. People in remote areas have difficulty traveling to a clinic. But as of now, we all know that most of the consultations are done online / over the phone, which results in miscommunication of the medicines prescribed. Also if the patient forgets the medicine name, dosage, he /she has to keep contacting the doctor again and again.Our idea mainly focuses on eliminating these errors and helping the doctors generate prescriptions by voice commands and send the same to the patient as SMS/PDF.

I. INTRODUCTION

The outbreak of Novel Coronavirus disease is a grave menace to the entire world affecting millions of people. Massive annual conferences to small society meetings alike have moved to the online mode. The new format (online mode) poses numerous technical and organizational challenges, but it also offers opportunities. Our application helps in reaching out to patients virtually and consulting them. Also, adverse drug effects are a major cause of death in the world with tens of thousand deaths occurring across the world each year because of medication or prescription errors. Many of such errors involve the administration of the wrong drug or dosage by caregivers to patients due to indecipherable handwritings, drug interactions, confusing drug names etc. The adoption of voice-based e-prescription could eliminate some of these errors because they allow prescription information to be captured and heard through voice response rather than in the physician's handwriting. This project presents a design and implementation of a voice-based E-Prescription along with the ability to book appointments using the IVR system as the main idea. This application helps the doctors to generate patient prescriptions using voice commands and send the same as an SMS for people who do not have the facility of a smartphone or as a pdf to the patients over social media. Furthermore, the application has features wherein the doctors can access records of patients and send messages. Patients can book appointments based on doctors availability on our app or using the IVR system. They can also use the CHATBOT feature to book tests prescribed by the doctor and access their records as well independent of the type of phone they use.

II. METHODOLOGY

The existing systems offer consultation facilities but it limits its facilities to only high end devices like smartphone/PC users. We propose a system where all the users will have to go through a one time registration process, which helps the system maintain patients' profiles as well as classify smartphone and basic cell phone users.

Once the user is registered, he/she can,

1. Book appointments
2. View prescriptions
3. Hear the audio version of the prescription

The Method is to process an audio file of prescription and reach out to people with smartphones or those with basic cell phones.

The system has 2 major entities

2.1 Converting the audio file to Text format and sending it as PDF/SMS to the patient.

The idea is to use the prescription audio file, recorded by the doctor, feed it as input to Google speech-to-text api and further process the prescription to a proper format.

The API being used is Google's Speech-to-Text API, The Speech-to-Text API synchronous recognition request is a way of performing recognition on speech audiodata. After Speech-to-Text processes and recognizes all of the audio, it returns a response.

2.2 Storing the audio file of prescription in the database.

The audio file can be played either on the application or

through the IVR system.

The IVR system

IVR is a technology used by people to interact with an application through pre-recorded voice messages with Dual-tone multi-frequency signaling(DTMF) input using a keypad. IVR system interacts with callers, gathers some essential information, and routes call to the appropriate agents. In this use case, the IVR system helps users in booking appointments, playing recorded prescriptions in Database.

Other features of the application, like CHATBOT (to schedule tests) enhances user experience for smartphone users.

2.3 Resulting improvements

The proposed system not only helps a lot of people with basic cell phones, but also people with hearing aid. The people who have hearing aid might not have heard some important details during the consultation and those details wouldn't be appropriate in a prescription like, the diet prescribed by the doctor to the patient or an exercise etc.

III. MODEL

Fig.1, gives an overview of how the frontend process works and Fig.2 gives an overview of how the backend process works

In This model, there are 4 main components i.e

1) Patient
2) Doctor
3) Hospital
4) Lab

1) Patient

Patient participant object has the following attributes:

- Id
- Name
- Age
- Mobile
- Gender(optional)

2) Doctor

Doctor participant object has the following attributes:

- Id
- Name
- RegistrationNumber
- Mobile

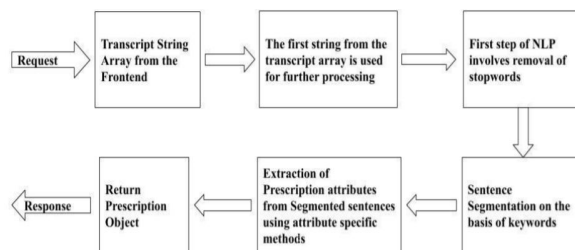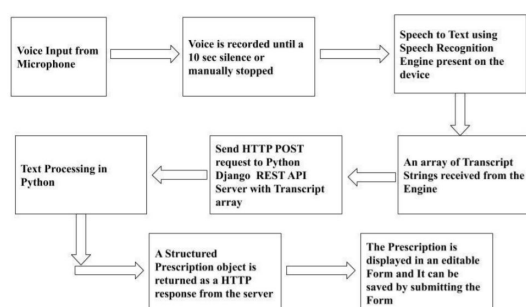Fig1: Voice Prescription Frontend Process

Fig2: Voice Prescription Backend Process

Tech Stack we plan to use

As illustrated in the above diagram, we plan on using react or angular for frontend, python django, node js for backend and for the database and cloud storage we plan on using sql, mongodb or firebase. The audio file size will depend on the length of the recording, it may take up a maximum file size of 10 MB. The SMS text message length will be 160 characters maximum.

A brief of the project idea

1. Doctors can create formatted prescriptions with voice commands.

2. Doctors can read prescriptions if their reference is present in the doctors array of prescription objects.

3. Doctors can update/edit prescriptions after they record the audio.

4. Patients can either book the appointment using the IVR module or the app itself.

5. A patient can access his audio prescriptions via the IVR module or the application itself.

6. A patient can read and access the prescriptions.As they are sent via PDF/SMS.

7. A patient can book lab tests via the app using the chatbot module.

8. Doctors can read and access all Lab reports of the patients.

Attributes	Tata health	E-sanjeevini	Proposed System (Voice Based E-Prescription)
E-Prescription generation (by Voice/system)	System	System	Voice
Appointments	Yes	Yes	Yes
IVR Service	No	No	Yes
Lab service(via chatbot/app)	In App	No	Chatbot
Access to E-prescriptions and audio prescriptions	E-prescription	E-prescription	E-prescription and audio prescription
Video Call	Yes	Yes	No
Prescription sending format	In App	Link	SMS / Social Media App

Fig3: Table of comparison with existing systems.

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