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# Digital Prescription for Hospital Database Management using ASR

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**Abstract:** According to American Medical Association (AMA), handwritten prescriptions are associated with larger risk of pharmaceutical errors when compared to electronic prescriptions. The solution to this problem is to create a digital prescription. This application leverages the usage of automated speech recognition (ASR) technology with digital prescription to make flawless and legible prescriptions. Automatic speech recognition reduces transcribing errors and speeds up prescription processing as well as ensures smooth interface with hospital database management by translating spoken instructions into text in real-time. This innovation not only simplifies clinical workflows but also improves patient safety and database management by providing a reliable and automated method for prescription documentation. This paper presents a digital prescription system for hospital database management using automatic speech recognition (ASR) technology, integrated with MySQL for database management and Java Script for application development. This approach aims to streamline the prescription process, minimize pharmaceutical errors and improve the overall patient care.

**Keywords:** Digital prescription, ASR (Automatic speech recognition), Google Cloud Speech-to-Text, Java Script, MySQL

## 1. Introduction

A significant concern prevalent in India and other nations is that prescriptions are often handwritten and making them decipherable only by pharmacists. As a result, patients who receive these prescriptions often struggle to read and comprehend the medications prescribed [1]. But in some cases, pharmacists may also misinterpret handwritten prescription which could lead to dangerous side effects and in severe loss of life [2].

Technology is vital to our daily lives and to every industry among the most significant is the healthcare sector. Around the world, this unification has improved conditions and saved

innumerable lives [3]. In this digitalized era where computerization dominates the concept of a voice-based prescription system utilizing Automatic speech recognition technology emerges as a solution [4]. This invention addresses various challenges by enabling doctors to dictate prescriptions verbally. The system converts these voice recordings into text, extracting crucial medical details like medication names and their dosages. The prescriptions are then seamlessly forwarded via email and archived in Excel for streamlined hospital database management [5].

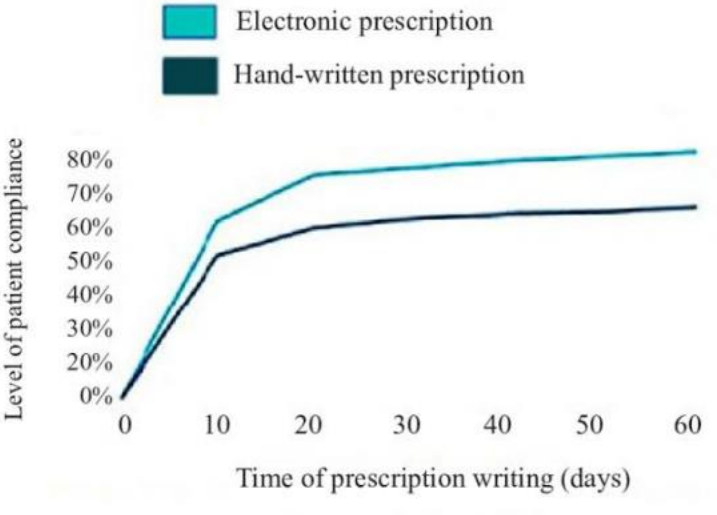


**Figure 1.** Electronic Vs Handwritten prescription

Figure 1 represents the level of patient compliance between the Electronic Prescribing System and Prescribing System using prescription paper. This transition allows doctors to accommodate more patients, simplifies prescription reading for pharmacists, and empowers patients to confirm the accuracy of their medications. The core objective of this initiative is to devise a system that generates voice-based prescriptions, delivering them to patients in PDF format via email.[6] This approach mitigates the risks associated with misplacing or damaging prescriptions. Integration of this solution into hospital systems would notably streamline prescription writing for doctors and facilitate patient's access to their medical records.

## 2. Literature Survey

Digital prescriptions also known as electronic –prescriptions or e – prescriptions revolutionize the traditional paper-based prescription process by enabling healthcare providers to electronically transmit prescription for the hospital database management and to the pharmacies [7]. Nevertheless, the current circumstances of these systems confront several problems that limit their usefulness and have a negative impact on clinician satisfaction. Digital prescriptions have been uplifted as a method to overcome the impact of electronic documentation. Successful digital prescription technology requires interoperability and

integration with the existing computer systems. Illegible handwriting in medical prescriptions has been a significant issue leading to medication errors which causes patient harm. According to their study, poor handwriting contributes to thousands of patient deaths annually. A promising solution to this problem is the development of a voice prescription application that leverages speech-to-text technology. This application aims to produce clear and legible prescriptions thereby reducing errors. In addition to this, it can manage patient's medical records and facilitate appointment bookings. Integrating AIML (Artificial Intelligence and Machine Learning) allows the app to include an intelligent chatbot that can guide patients in identifying the appropriate medical specialist based on their symptoms and provide basic diagnoses for minor health concerns. This comprehensive approach not only improves prescription accuracy but also enhances overall medical record management and patient care [8]. Automated digital scribes are a good solution to avoid problems associated with scribe generation without direct human intervention making the patients feel comfortable as it eliminates the presence of an additional person. A digital scribe collects data from users using sensors enabling the recording of physical examinations and measurements. Thus, an automated scribe can help to record the target medical terms and provide both structured and unstructured notes. Handwritten prescriptions can cause misinterpretation risk, misreading, misunderstanding and increased medical errors [9]. Moreover, it consumes a lot of time, effort and attention. Clinicians are accustomed to writing quickly, since their assistants are capable of understanding prescriptions. However, with the help of e-prescription, a doctor may exchange the prescription information among the patient, prescriber, pharmacy and health insurance Company using electronic devices the main objectives of this research are to understand the user requirements for developing an intelligent prescription system and automated scribes for the doctors. The review on Automatic speech recognition stated that the field of signal processing particularly Automatic Speech Recognition (ASR) has seen substantial advancements in recent years [10]. Initially, ASR systems were limited to recognizing a small set of sounds but have now evolved to comprehend and respond to natural language fluently.

## 3. Materials and Method

The primary focus of the proposed method is on translating spoken speech into text. The Automated Speech Recognition (ASR) API, such as Google Cloud Speech-to-Text makes voice recognition easier [11]. Google's API performs this purpose via converting speech to text. Additionally, this speech API has the highest accuracy in detecting standard languages. Whereas multilingual speech-to-text conversion is also possible using Google's API. The main objective of such a model is to enable communication between computers as well as illiterate individuals for fundamental necessities [12].

The secondary focus is for storing the collected information for hospital database management system. Database management includes electronic prescribing, which allows

doctors and medical professionals to submit prescriptions electronically to participating pharmacies instead of handwritten. The security of patient data collected through MySQL databases is a critical aspect of hospital database management [13]. Digital prescriptions include confidential information concerning individual's medical conditions, treatments and related medications. The suggested model uses MySQL database for storing information like patient details, age, gender, medicine details and their dosage with HTML and CSS to perform most administration tasks, including creating a database, running queries and adding user accounts [14].

Table 1. Digital Prescription Parameters

| S.No | Parameter |
|---|---|
| 1 | Patient's name |
| 2 | Patient's age |
| 3 | Patient's gender |
| 4 | Patient's height |
| 5 | Patient's weight |
| 6 | Medicine name |
| 7 | Dosage |

### 3.1 Automatic Speech Recognition

Automated speech recognition or ASR is the process of training machines to recognize a human speech pattern. As the name implies, speech recognition is the automatic identification of spoken language. This module recognizes voice and converts it to text format using a variety of techniques and features. With the use of automated speech recognition (ASR) technology, a computer may recognize words spoken into a microphone or phone and translate them into printed text. The main motto of the ASR is using speech as a channel for communication between humans and machines [15]. The voice comparison procedure will initially receive input in the form of recorded files. Any spoken words will then be translated into a machine-readable format so that specific traits can be extracted. These attributes will be contrasted with databases that contain specific attributes identified [16]. The technology that converts speech signals into appropriate texts or commands is known as speech recognition.

### 3.2 Block Diagram

The digital prescription system block diagram is shown in figure 2. Firstly, to be authenticated, a doctor needs to log in. If the physician couldn't be able to log in, then they must

register it. Followed by a successful login, prescription details can be recorded by selecting a webpage's "START" button.

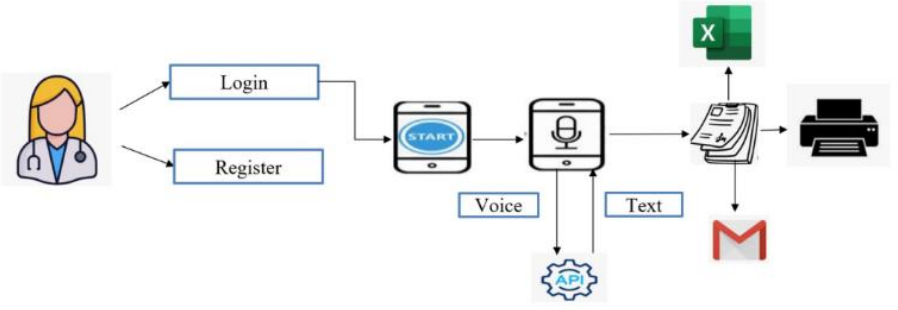


Figure 2. Block Diagram

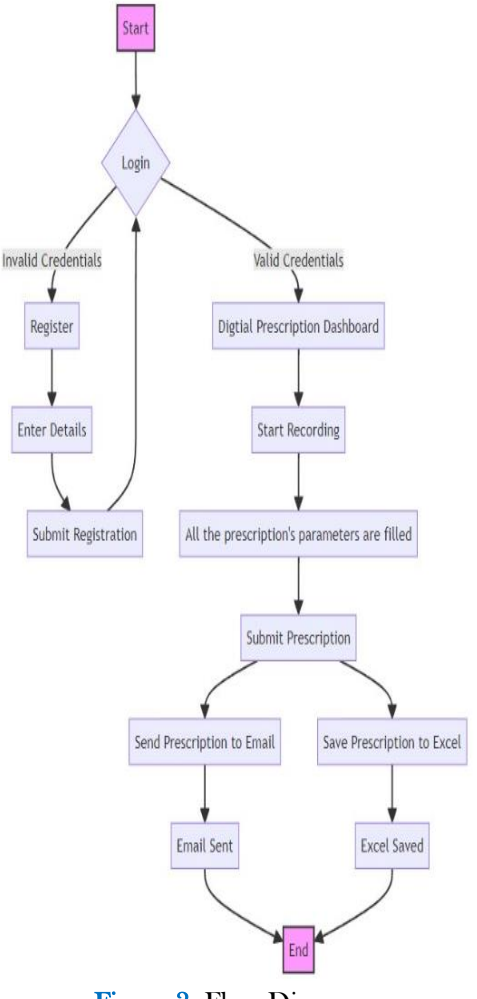


Figure 3. Flow Diagram

This voice recording is transmitted over the Google Speech Recognition API by turning speech into text. Furthermore, this speech API detects standard languages with the maximum accuracy. On the other hand, Google's API also makes multilingual speech-to-text conversion feasible [17]. The parameters used by physicians for the digital prescription are patient name, age, gender, medicine name and its dosage. Once the above parameters are converted from speech to text conversion by the doctor, they are stored in the database of the hospital by means of Excel. In addition to which the digital prescription is also sent to patient's mail along with it, it can also be printed for the use of pharmacies [18].

### 3.3 Authentication

Authentication is the essential step that a doctor must take in the system. Security of patient is the foremost concern for that purpose authentication is a way to give authority to doctor with a username and password to prescribe a prescription [19]. Figure 2 represents the login page for the digital prescription. First, the doctors need to login with the help of their username and password for their authentication. Followed by which they can login and end up in the digital prescription dashboard.

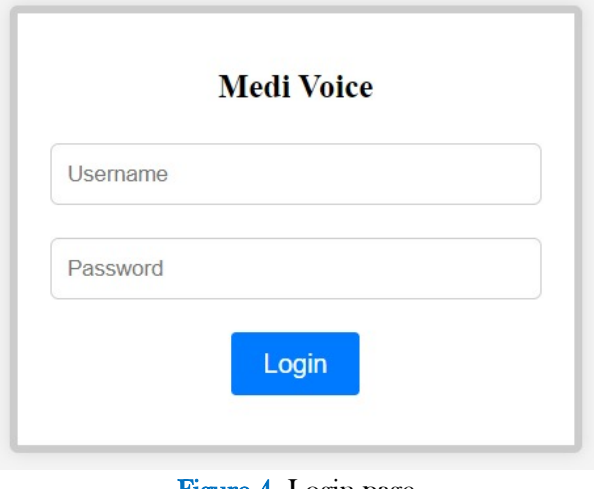


**Figure 4.** Login page

### 3.4 Voice input for the prescription

Once login is successfully done, the doctor is ready to prescribe a prescription. There is an option available for starting the voice recording. Google's speech recognition API is being used. Google speech recognition recognizes every word and converts it into text [20]. Figure 3 represents the page to start record the doctor's voice and fill the prescription's parameters.

### 3.5 Digtial Prescription Dashboard

The digital prescription dashboard is being created with the help of HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets). The digital prescription dashboard consists of a start and stop recording option which is required for the initialization for the speech to text conversion. Once the start recording is given, the doctor's voice is being recorded and the parameters of the digital prescription are updated.

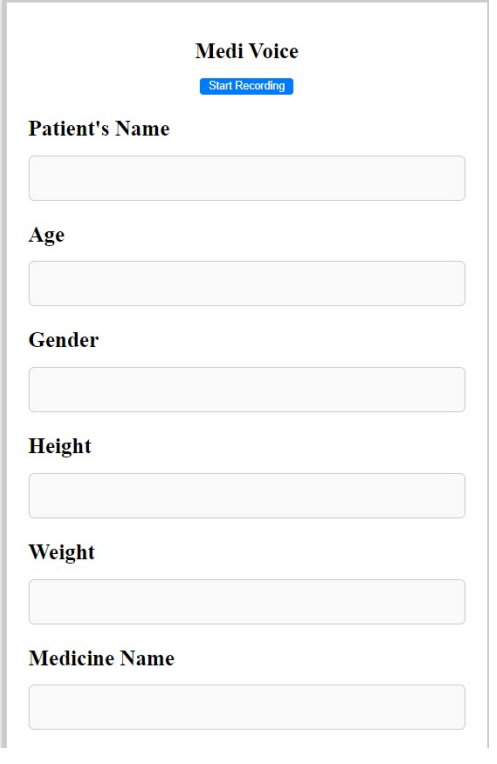


Figure 5. Medi Voice dashboard

### 3.6 Digital prescription sent to mail

Mail can be sent to any Internet-connected device that has an SMTP or ESMTP listener daemon by using the smtp lib module, which specifies an SMTP client session object.

We are able to email the prepared prescription to the patient with the aid of this module [21]. It has seven columns to show prescription in readable form patient name, age, gender, height, weight, medicine and its dosage. Nearly patient details of 25-30 people were done by this application. Besides this the digital prescription is also saved in an excel sheet for the database management system of the hospital.

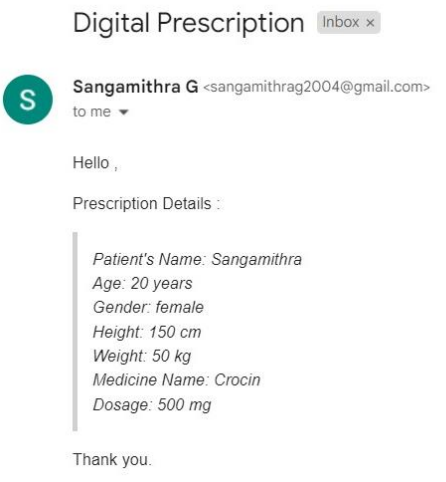


Figure 6. Digital prescription sent to mail

### 3.7 Database Management in Hospitals

Accurate analysis and significant results can only be achieved through a multistep process of data management, which includes gathering, purifying, and storing data. Clinical research uses the word "data management" in relation to clinical trials, despite the fact that the term has broad applications across numerous professions and sectors. With regard to all kinds of clinical research projects, these editorial aims to familiarize aspiring researchers with general data management procedures. It is crucial to draw out a data management plan before starting a research project to make sure that legal criteria are fulfilled and scientific integrity is maintained (i.e., the data gathered can reliably verify the hypotheses put forth). Three steps make up data management: gathering data, cleaning and transforming data, and storing data. These actions frequently take place at the same time and are not always sequential. The Health Information Technology for Economic and Clinical Health (HITECH) Act's requirement for electronic health records has led to the apparent widespread use of healthcare information systems in contemporary healthcare. They are essential for population health, healthcare administration, quality control, cost management, patient care, and research, among other things [22]. As such, the information's timeliness, correctness, relevance, authenticity, and integrity are crucial. Consequently, there has been a growing emphasis on health information technology in the responsibilities of health informatics (HI) and health information management (HIM) experts.

### 3.8 Digital prescription saved in Excel

A crucial first step in the data management process is data collection, which can be broadly categorized into two categories: "secondary use of data" and "primary data collection". Although the words prospective and retrospective data collection are sometimes used, they are

more relevant to the uses of the data than to their acquisition. Database management can be of many forms. In this project for Digital Prescription all the parameters of the patient are stored in the Excel sheet automatically. These parameters are stored in Hospital's database management and used for future purposes.

## 4. Results and Discussions

One of the main problems in India is that most prescriptions are still written by hand, and these prescriptions are rarely readable. Patient care may be delivered more effectively and efficiently if voice-based applications were to replace needless paperwork. This digital prescription plays a major role in the hospitals for its easy access as well as data privacy than the normal handwritten prescriptions. The proposed system is an application that runs on the web and doesn't require any infrastructure to operate. There are two significant benefits that the adopted system has over the current healthcare system. Firstly, by eliminating the need for paper prescriptions, this system saves doctors time and then makes it simple to understand medical notes. The initial step of this application is with the authentication. The doctor has to log in with their username and password. Followed by which the digital prescription dashboard appears to them. The digital prescription dashboard consists of parameters like Patient's name, age, gender, height, weight, prescribing medicine and its dosage. The parameters of the Medi Voice are manually spoken by the doctors. The process of teaching machines to identify a human speech pattern is known as automated speech recognition, or ASR. The automatic identification of spoken language is what speech recognition is all about, as the name suggests. With a range of methods and capabilities, this module can identify speech and convert it to text format. A computer may translate spoken words into written text by using automatic speech recognition (ASR) technology to identify words spoken into a phone or microphone. After that, any spoken words will be converted into a machine-readable format so that particular characteristics can be identified. Speech recognition is the technology that translates speech signals into relevant messages or commands. Google's Speech to Text converter is being used for automatic speech recognition. This Google Speech to Text conversion API converts the doctors voice into a prescription. The advantage of this proposed method is that patient's details and the medications can be stored ever lastingly by this application with its presence of authentication for the doctor's. The prescription will then be emailed to the patient, the smtp lib module will enable this to happen.

## 5. Conclusion

Digital prescription helps us to generate legible prescriptions for patients. So that we can get rid of deaths of people occurring due to doctor's sloppy handwriting. The voice prescription system will have a significant impact on the development of a digital Electronic Health Record system for patients and physicians while also requiring very little modification to the workflow of

doctors.

A voice prescription system preserves patient privacy while facilitating real-time electronic health record management. With this digital system, patient record access times will be shortened while patient data security and privacy are upheld to the highest standards. Speech to text conversion in the digital prescription can provide a huge impact in the doctor's workflow. In addition to this the details of 25 to 30 patients were done by this application. The digitalized automatic speech recognition prescriptions help in maintaining the database management of hospitals. This digitalized system will also reduce the patient's record access time and maintain high security and privacy of patient data due to the presence of the authentication

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## Conflict of interest

The Author's have no conflicts of interest to declare that they are relevant to the content of this article.

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