



Journal Homepage: -[www.journalijar.com](http://www.journalijar.com)

## INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/16881  
DOI URL: <http://dx.doi.org/10.21474/IJAR01/16881>



### RESEARCH ARTICLE

#### SMART DOCTOR'S ASSISTANT- AN ADVANCED APPOINTMENT BOOKING SYSTEM FOR HOSPITALS

**Dr. Sunil Bhutada<sup>1</sup>, Hanshitha Mahankali<sup>2</sup>, Vaishnavi Chandupatla<sup>3</sup> and Sanjay Kumar Narasimsetti<sup>4</sup>**

1. Professor, Department of Information Technology, Sreenidhi Institute of Science and Technology, Hyderabad.
2. Student, Department of Information Technology, Sreenidhi Institute of Science and Technology, Hyderabad.
3. Student, Department of Information Technology, Sreenidhi Institute of Science and Technology, Hyderabad.
4. Student, Department of Information Technology, Sreenidhi Institute of Science and Technology, Hyderabad.

#### Manuscript Info

##### Manuscript History

Received: 10 March 2023  
Final Accepted: 14 April 2023  
Published: May 2023

##### Keywords:-

Face Recognition, Voice Commands,  
Haar-Cascade Classifier, Appointment

#### Abstract

Smart Doctor's Assistant System is an advanced and contactless method especially built to avoid long wait-time in hospitals to book an appointment with the doctor. It aims to make the process of booking an appointment swift and hassle-free. Patients struggled a lot during the COVID-19 pandemic as they had to physically fill out the forms in the hospitals to schedule an appointment and then consult the doctor. This increased the chances of them being exposed to the virus. Patients who cannot fill out forms alone can do it without assistance using our system. Our proposed system uses face recognition and voice commands, thus making it effortless even for illiterates to schedule an appointment with the doctor. A time slot is allocated to the patient which is sent to his/her registered email address. The registered user can log in to our system at the scheduled time and directly consult the doctor.

Copy Right, IJAR, 2023. All rights reserved.

#### Introduction:-

In the contemporary era, the world is upgrading and moving away from old, legacy, and consolidating systems and workflows with more automated, innovative solutions primarily offered by the technologies. The integration of digital technology into all sectors of the economy is evident. In a recent survey, it was analyzed that people are not skipping doctor visits because they are confused about test results or worried about medications. This is because the appointment-booking process is confusing and takes far too much time and effort. Everyone is looking for convenience in every aspect of living, likewise, patients are no longer willing to fill out long appointment forms manually to consult doctors. This was indeed solved to an extent by introducing telephone calls to schedule.

Thus, Smart Doctor's Assistant is obliged to make doctor consultations facile and uncomplicated. The user can register for our services at the hospital desk. It requires the user to answer simple questions like the patient's name, age, and phone number after the system asks for them. Our application includes voice assistant and face recognition technology making the application user-friendly. Voice assistants enable people to easily interact with the interface and make the whole experience contactless. Patients can enter their details through the voice assistant. Face recognition is used to enhance the security of the application. This helps in keeping patients' information secure and confidential. A secured healthcare system helps in building trust and strengthening the healthcare system.

**Corresponding Author:- Dr. Sunil Bhutada**

Address:- Professor, Department of Information Technology, Sreenidhi Institute of Science and Technology, Hyderabad.

Overall, our Smart Doctors Assistant not only benefits patients by providing a convenient and secure way to book appointments but also benefits the healthcare system by improving the efficiency of the booking process. We tried to achieve a touchless interface that can revolutionize the traditional appointment booking process by digitizing appointment scheduling systems. Modernization in such areas improves customer experience and enhances healthcare systems.

### **Related Work**

Some authors tried to fix up the problem with existing appointment methods. In [1], D. Ch. Bhavya Sri et.al proposed a system where patients must manually fill out the form and are asked to choose the doctor they wish to consult. The patient will enter this page by clicking on the “modify personal details” button. The patient must enter new details to modify old details. The previously filled details are visible to the user, and if the user wants to edit the details, it can be done by clicking on the “modify” button. Usha Chauhan et. al [2] developed a Django framework web application. It marks a record on the calendar so that, that time is not available for other patients to book. The same entire system that is already functional still has some drawbacks. To overcome these drawbacks, Smart Doctor’s Assistant uses a voice feature for easy registration. Vijay Ingawale et.al [3] The proposed Medical Chatbot can interact with users, giving them a realistic experience of chatting with a Medical Professional. Their motive is to show that the proposed medical chatbot could be a better alternative to many existing chatbots in the domain of medicine. Ivica Lukić et.al [4] enabled users to register, search for services matching their parameters, and schedule an appointment for the requested service. The presented technique generates available appointments. The algorithm searches the database and returns possible appointments. If the patient has more than one appointment, possible appointments can be before the existing appointment, between two, or at the end of the last appointment. Thus, the web application enables the patient to reserve the desired appointment time.

Andres Meza et.al used [5] Amazon Echo, which has the potential for advanced voice interactions and as a tool for conducting complex tasks. Developers are not fully exploiting the Amazon Echo's potential for scheduling appointments. A flexible architecture was put forth for creating appointment scheduling applications for the Amazon Echo. The architecture reduces development time by abstracting the complexity of speech interactions and acts as a guide for developers without prior experience working with voice user interfaces. Following the architecture principles, a set of users created and evaluated a prototype skill. The skill successfully outlines the ideal characteristics of an appointment-making talent. The skill rightfully defines how an appointment booking skill should be. H Karthikraj et.al [6] made patients sign up and log in to book a doctor basing the category and the type of problem the patient is facing and the location. The search results will show the list of doctors matching the patients’ required criteria and he can select one and send a request to a doctor if he is available, he will send the confirmation booking request and say confirmed to the patient. The patient can view the appointment, and he will get an SMS saying the appointment scheduling is confirmed.

A. Shukla et.al leveraged a feature launch on a major doctor appointment booking platform [7] to study the impacts of online WOM on three dimensions of a consumer’s choice process: firstly, the consideration set size, secondly, the time taken to consider alternatives (web session duration), lastly, the geographic dispersion among the choices considered. They further investigated the effects of online WOM on demand. A. Chaudhari et.al [8] mentioned in their work that the patient can book an appointment through his/her mobile phone. The doctor will come to know the number of patients he has to attend to in a day. The system will save patients’ and doctors’ time. It will save the paperwork of both doctor and the patient. The system will inevitably be useful to doctors as they can his appointments whenever and wherever from their smartphones.

Ruchit et. Al’s ‘An Automated Model for Booking Appointments in Health Care Sector’ model [9] provides the facilities like instant appointment booking with the generation of unique patient IDs which will identify any patient worldwide. Thus, it helps in tracking any patient’s medical reports with the option of online payment, reducing the use of paper and this will be a big step in saving the trees and the environment. Their model also gives a comparison feature, enabling the users to get a glance at various prices, and ratings of hospitals and doctors. Another important feature that their model provides is locating the nearest hospitals to the patient’s location. Siddheshwar Patil et. Al, in their work, a smart-appointment booking system [10] for patients to book appointments with storage facilities for medical reports and emergency services is proposed. Patients can log in without dealing with staff using a Health-Buddy BooknMeet system with online taking appointments to a certain hospital.

## Proposed Methodology: -

### A. Proposed System

Smart Doctors Assistant is an application that allows patients to book appointments with doctors in hospitals. The major aim of this application is to make the registration process contactless. It helps patients to fill out the appointment form without any help. The patients just need to answer simple questions asked by the system. During the COVID-19 pandemic, patients were at risk of getting exposed to the virus while registering for doctor consultations at the registration desk. It helps patients who are unable to fill out the appointment forms themselves. Also, a patient does not have to touch any pen or paper to fill it out manually.

### B. Architectural diagram:

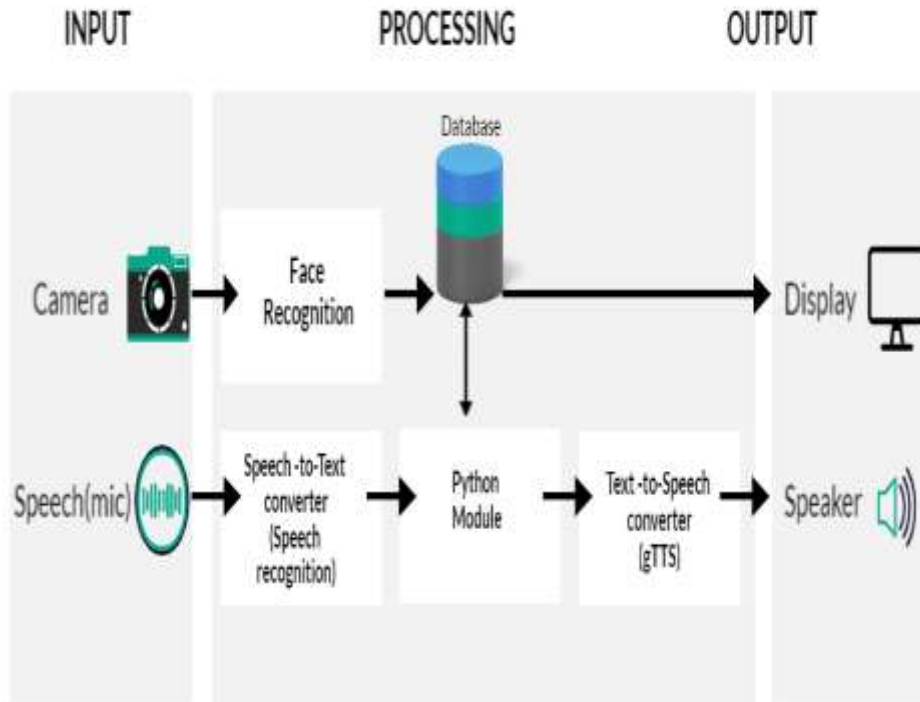


Fig 3.2.1:- Architectural diagram.

When a patient uses our application for the first time, The patient must register. The application gives voice commands to the users during the registration process. At the end of registration, a picture of the user is taken. It acts as a face id to authenticate the users.

Based on the problem statement, the working of the application can be divided into three modules:

#### Voice Assistant:

Our application includes a voice assistant feature to get information from the user. We used gTTS to convert the text instructions to speech. gTTS (Google Text-to-Speech) is a Python library and a CLI (Command Line Interface) tool to interface with Google Translate text-to-speech API. The main feature of gTTS is that it can convert any length of text to speech. The gTTS API receives a .txt format text as input and converts the text into a .mp3 audio file. This audio file is triggered to give voice commands to the user.

#### Speech Recognition:

Speech recognition is used to convert spoken words to text. Speech recognition internally uses acoustic and Linguistic modeling to convert speech to text. Input is the electrical signals generated by the mic. These electric signals are converted into analog signals and finally to text. Speech recognition makes use of NLP-Natural Language Processing and Neural Networks to recognize significant words from the audio.

**Face Recognition:**

The Haar cascade algorithm is used for face recognition in our application. Haar cascade is an Object detection algorithm that detects images in real-time. This algorithm uses edge or line detection features for object detection.

**C. Pseudocode**

Input: Speech S, Text T, Name N, Password P, Token t

Output: Appointment booked

Procedure

```

Start
While number_of_fields==0
    S=text_to_speech(voice_assistant, questions)
    T=speech_to_text(voice_assistant, answers)
End while
Submit=book_time and face_capture
Enter N, P
If(login_time==book_time)
    Enter t
    If(t==token_mail)
    If (face_detect==face_capture)
        Consult Doctor
    Else
        Face Recognition unsuccessful
    Else
    Wait until login_time==book_time
End
    
```

**Experimental Setup**

Smart Doctor’s Assistant will need a system with a camera and microphone to perform effectively. The camera is used to capture and detect the face of the patient, while the microphone is used for the patient to avoid entering the details manually. A working keyboard is also needed to enter tokens and other fields in scenarios where the user is inarticulate or incoherent.

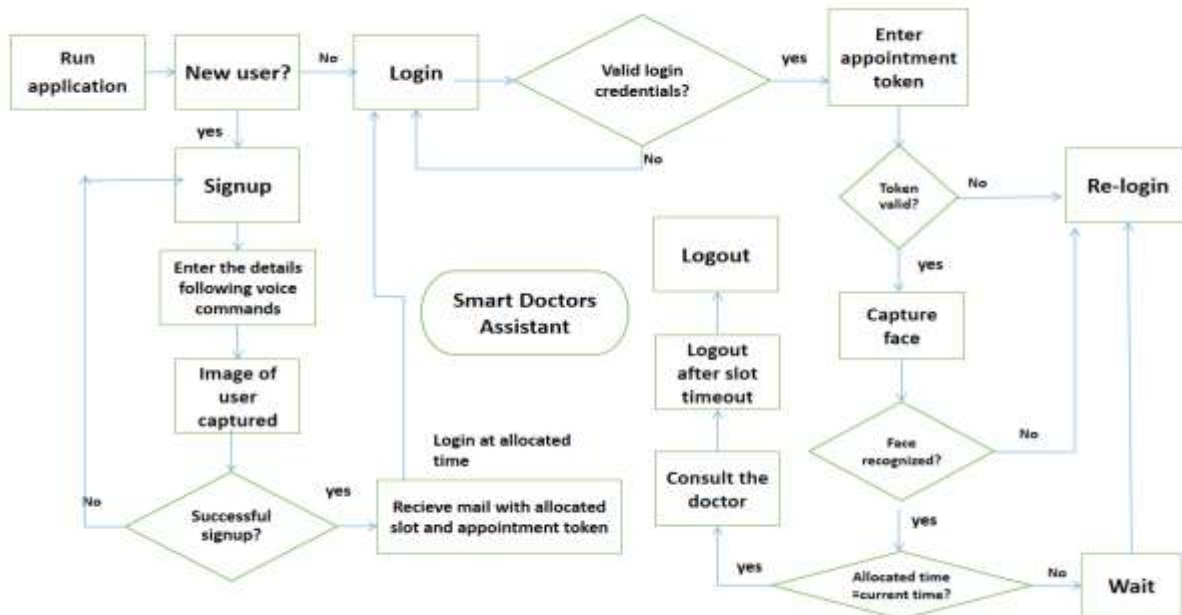


Fig 4.1:- Working.

**A. Text-to-Speech Conversion**

This application uses gTTS module for text-to-speech conversion. The user must register to book an appointment. During registration, the user will receive instructions from the voice commands. The user must follow the

instructions during which the user will be asked various questions. The user must hit the start button to start the registration process. The voice commands will guide the user with instructions to fill out the form.

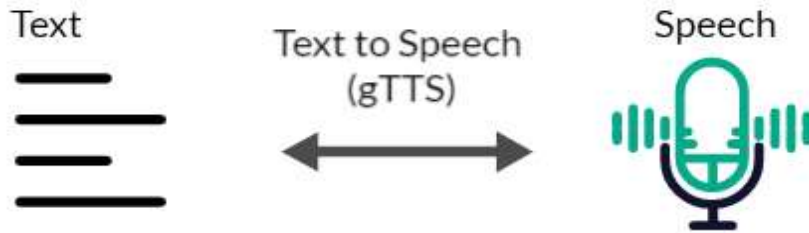


Fig 4.1.1: - Text to Speech.

**B. Speech Recognition**

Speech Recognition is used to convert voice or speech into text format. The patient will be asked to answer their name, phone number, age, and other required details. These details are converted to text in real-time and text is filled simultaneously. Form details are stored in the database. The speech-to-text conversion requires an active internet connection.

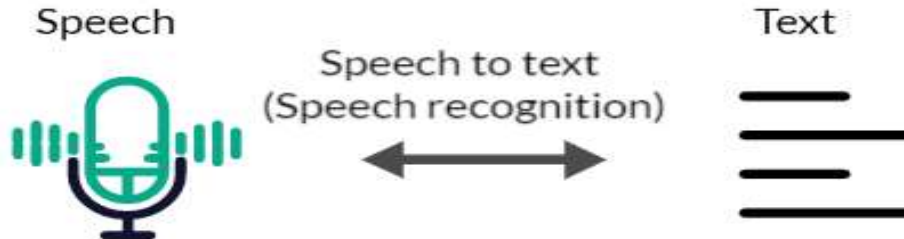
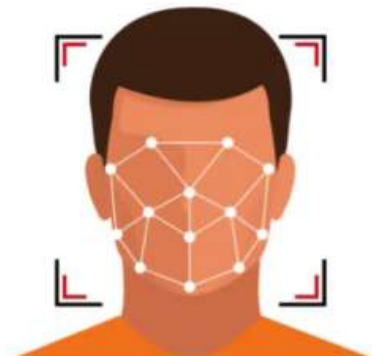


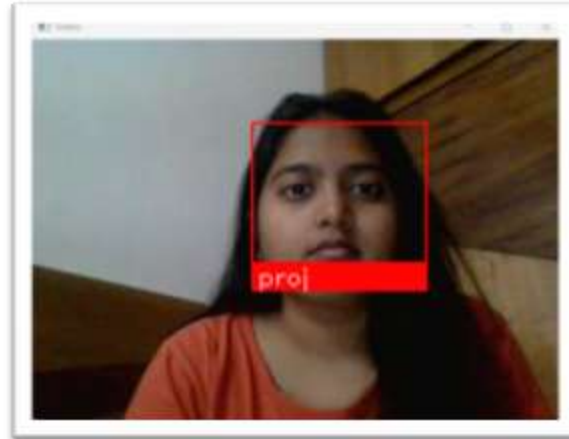
Fig 4.2.1:- Speech Recognition.

**C. Face Detection**

The user's face is captured on submission of the sign-up form. The captured face is associated with user-id of the user and stored in the database. This is done using Haar Cascade Algorithm which is a popular algorithm used for face detection as it is computationally less expensive, a fast algorithm, and gives high accuracy.

On successful registration, the user will receive a confirmation mail. The mail consists of the allocated appointment slot and Appointment token. The user must log in at the Allocated time to consult the doctor.





**Fig 4.3.1:-** Face Recognition.

While logging in, the user enters a username and password through voice commands. If the credentials are correct, and if the user logs in during the allocated time, then the user will be asked to enter the appointment token. If the token is valid then the current user face will be captured. If the current user and the registered user face match then the user will be successfully logged in to consult the doctor.

While logging in if the user tries to log in before the allocated time, he will be asked to wait for his slot time. If the current user and allocated user faces differ, then the application will log out. After the time slot duration is completed, the user will be logged out of the system.

### **Results:-**

After the user has successfully registered to our system, he can log in at the slot time sent to his email address. At the time of log-in, the model will automatically detect the face of the patient if he is the same user who registered for our services. If face detection is successful, he will be redirected to his dashboard where he will connect to the doctor directly.

**REGISTER FOR APPOINTMENT**

Start filling the Form

UserName:

Age:

Mobile Number:

Mail id:

Password:

Confirm Password:

**Fig 5.1:-** Register.



**Fig 5.2:-** Appointment mail.



**Fig 5.3:-** Login.



**Fig 5.4:-** Appointment Token.



**Fig 5.5:-** Successful login.

Above are the screenshots of the application in which Fig. 5.1 illustrates the registration page. Fig. 5.2 depicts confirmation mail sent to the registered email along with a unique appointment token. The user is required to log in at the scheduled time slot (fig 5.3), after which he is asked to enter the appointment token (fig 5.4). After successful face detection, the user is allowed to consult the doctor.

### **Conclusion And Future Scope:-**

Smart Doctor's Assistant is one of the best and easiest ways to book an appointment with a doctor. Its face recognition and voice commands make it peculiar and exceptional. This application intends to reduce the burden on both patients and doctors. This model can further be implemented by adding a few extra functionalities like storing

doctors' prescriptions in the database, and the patient can choose which doctor he wants to consult. If the same user books an appointment more than once, a history of his previous consultations can be shown on his/her dashboard. We can also add a doctor login and create a dashboard for him depicting the information about what appointments he has at what time. A mail or SMS can be sent to the doctor immediately after a patient register for their service and half an hour before the scheduled time slot. This helps doctors to keep track of their daily work schedule.

### References:-

- [1] D. Ch. Bhavya Sri, G. Aswani, G. Sushma, Ch. Prabhu Kiran, "A Doctor Appointment Booking System", International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), 28 November 2022. Available: <https://ijarsct.co.in/Paper7601.pdf>
- [2] Usha Chauhan, Hritik Jha, Deepak Singh, S.P.S Chauhan, "Doctor Finder and Appointment Booking Website using DJANGO", 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM), 2002, Gautam Buddha Nagar, India. Available: <https://ieeexplore.ieee.org/document/9753977>
- [3] Vijay Ingawale, Dinesh Bartakke, Shrikant Virkar, Sagar Chavan, Prof. Manisha Navale, "Smart Hospital Chatbot-Virtual Doctor Consultation and Appointment" in International Journal of Advanced Research in Science, Communication, and Technology, 9 February 2022 Available: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2778683](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2778683)
- [4] Ivica Lukić, M. Köhler, Erik Kiralj, "Appointment scheduling system in multi-doctor/multi-services environment" in International Journal of Electrical and computer engineering systems, 27 August 2021. Available: <https://ijeces.ferit.hr/index.php/ijeces/article/view/417>
- [5] Andres Meza, Gustavo López, Luis Quesada, Luis A. Guerrero, "Architecture to Design Booking Appointment Applications for the Smart Personal Assistant Alexa" in International Conference on Ubiquitous Computing and Ambient Intelligence, 20 November 2019. DOI: <https://doi.org/10.3390/proceedings2019031017>
- [6] H Karthikraj, V Savitha, M. Pavithra, M MohammedFayyazK, K. Sangeetha, "Doctor Appointment System Using Cloud" in International Research Journal on Advanced Science Hub, 20 March 2021. Available: [https://www.rspsciencehub.com/article\\_9830.html](https://www.rspsciencehub.com/article_9830.html)
- [7] A. Shukla, G. Gao, Ritu Agarwal, "How Digital Word-of-Mouth Affects Consumer Decision Making: Evidence from Doctor Appointment Booking" in Robert H. Smith School Research Paper No. RHS 2778683, 11 May 2016. DOI: <https://doi.org/10.1287/mnsc.2020.3604>
- [8] A. Chaudhari, A. Phadnis, Prajakta Dhokane, Jayshree Nimje, Akansha Sharma, "Android Application for Healthcare Appointment Booking System" in Imperial Journal of interdisciplinary research, 1 April 2017.
- [9] Ruchit, Pulkit Suryavanshi, Sagar Kaushik, D. Dev, "An Automated Model for Booking Appointment in Health Care Sector" in 2021 International Conference on Technological Advancements and Innovations (ICTAI), 10 November 2021. DOI: <https://doi.org/10.1109/ICTAI53825.2021.9673206>
- [10] Siddheshwar Patil, Shobha B. Patil, Omarsharif A. Terdalkar, B. Yelure, "Smart Web Application for Efficient Management of Hospital Appointments" in 2022 IEEE International Conference on Current Development in Engineering and Technology (CCET), 23 December 2022. DOI: <https://doi.org/10.1109/CCET56606.2022.10080100>.