

# E-healthcare System Using Python (Medlink)

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**Abstract** - *Technological interventions for better service and improved patient outcomes in the health sector have been prevalent in this phase of digital transformation. This paper presents MedLink: a eHealthcare system developed in Python that delivers a powerful platform for patients and doctors. user-friendly interface provides patients and doctors help secure a place for quick access to various services with MedLink. The connected databases allow data sharing, consistency and accuracy of the application. Patients can use MedLink to search for the doctor, view their profiles, book and cancel appointments, manage their profiles and medical records, and also interact with an AI chatbot to view the fees and video call links for virtual consultations. For doctors, MedLink provides functionalities like calculating costs, generating receipts, creating video call links, and storing patients' medical records and appointment schedules. By integrating all these functionalities, MedLink aims to improve the costs and availability of health care. It also aims to decentralize the current online healthcare system by giving all the power to the users. In this paper, the system architecture, significant functionalities, and how it benefits patients and health providers are outlined. Actually, when MedLink is put into operation, its capability for effective streamlining of medical processes is validated naturally in facilitating an overall healthier experience.*

**Key Words:** eHealthcare System, MedLink, Patient Management, Doctor-Patient Interaction, AI Chatbot, Virtual Consultations

## 1.INTRODUCTION

The increasing development in technology also causes impacts on many sectors, among them health. In this scenario, we introduce MedLink, an innovative eHealthcare system to help and enhance medical services for patients and doctors. MedLink provides a comprehensive platform with separate logins and signups for patients and doctors, ensuring that access is personalized and secure.

For patients, MedLink gives enriching features whereby users can search for doctors, view doctors' profiles, book or cancel appointments, view or edit their profiles, upload medical records, interact with an AI chatbot to be able to view the fees, order health-related services, and access video call links for virtual consultations. Other features can be added, like calculating the cost and generating receipts, creating a video call link, viewing patient medical records, and appointment management.

These functions embedded within MedLink ensure the closing of the gap between patients and tertiary health care services within a smooth, efficient, and user-friendly eHealthcare interface. This paper presents the development, implementation, and functionalities of MedLink that could potentially change the scenario in realizing increased access and quality delivery of healthcare services.

## 1.1 Importance of digital solution

Being at the forefront of greatness in this fast-moving sphere of healthcare, digital solutions became the ones that changed the approach to service delivery in healthcare use; that is to say, they have made it more efficient, accessible, and patient-centric. It facilitates real-time communication between the patient and the provider of services in health care and administrative processes and assures accuracy in diagnosis and treatment due to advanced data analytics and AI.

Along this line, digital solutions such as electronic health records, telemedicine, and mobile health applications empower patients to care for their health status and well-being independently. It provides various features to healthcare professionals to monitor a patient's progress, such that time to time proper actions can be taken by doctors regarding patient's health. For providing cost-effective qualitative services, there is a need for digital solutions that can improve patient outcomes, make optimum use of resource bases, and ensure that healthcare systems respond to the needs of diverse populations.

## 1.2 Issues faced by current healthcare technologies

Despite the significant advancements in healthcare technologies, current systems often show critical issues related to ownership and bias. Many existing healthcare applications are owned and operated by hospitals or large healthcare groups, which are inherently profit-oriented. This model can lead to biased practices, such as the promotion of in-house doctors over external specialists, regardless of patient needs or preferences. Thus, patients may get recommendations based not on the best available medical expertise but on the financial interests of the institution.

This capitalist approach undermines the core principle of healthcare, which is to provide the best possible care to patients. Additionally, the lack of communication between these systems can create fragmented patient records, complicating the continuity of care and leading to potential medical errors. These issues highlight the need for more

transparent, patient-centered digital solutions that prioritize unbiased access to quality healthcare over institutional profit margins.

## 2. LITERATURE SURVEY

The literature review on smart healthcare gives the information about integration of technology into healthcare services, which mainly focuses on patient improvement, their monitoring, data management, and personalized care. The review also covers innovations such as wearable devices, telemedicine, and AI-driven diagnostics, emphasizing their potential to enhance efficiency and patient outcomes. Challenges such as data privacy, interoperability, and accessibility, reliability and security are also discussed.

There is also a survey on mobile health apps usage among medical undergraduates reveals that fitness and health monitoring are primary reasons for using these apps. It shows that more users, about 58.7% use them to stay fit. Popular apps include Samsung Health, Fitbit, and Nike Fitness. The survey also indicates that students are motivated by these apps to maintain and track their health, with many updating their details regularly and finding the provided tips useful.

The Apollo Hospital app offers a range of features aimed at improving patient access and convenience. In addition to facilitating medication orders, the app provides options for video consultations and booking in-person consultations. Patients can securely access their medical records and communicate with healthcare providers, enhancing care coordination and patient engagement.

The Jupiter Hospital app streamlines the appointment booking process by allowing patients to upload relevant documents and specify consultation criteria. This innovative approach reduces administrative burden and enhances the efficiency of healthcare delivery. Patients can also receive personalized recommendations and alerts based on their health profile, promoting proactive health management.

## 3. FEATURES

MedLink is an innovative eHealthcare system designed to streamline medical interactions between patients and doctors. With separate login portals for patients and doctors, it offers a comprehensive range of features tailored to each user group. Patients can effortlessly search for doctors, view their profiles, and book or cancel appointments at their convenience. They can also access their appointment history, update their profiles, and securely upload medical records for better-informed consultations. A sophisticated AI chatbot enhances user experience by providing instant assistance. Patients can easily access fee information and video call links for virtual consultations. On the other hand, doctors can calculate fees, generate receipts, and seamlessly manage appointments. They have access to patient medical records

for informed decision-making and can easily generate video call links for virtual appointments. MedLink revolutionizes healthcare access and management, offering a holistic solution for both patients and doctors.

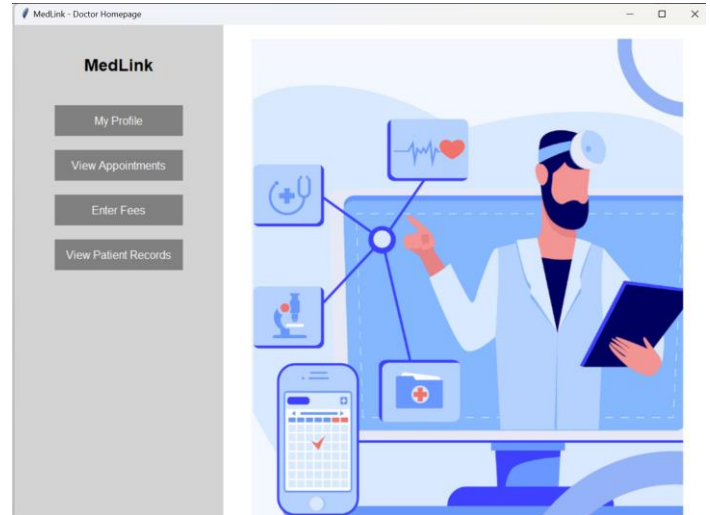


fig-1 :doctor's homepage

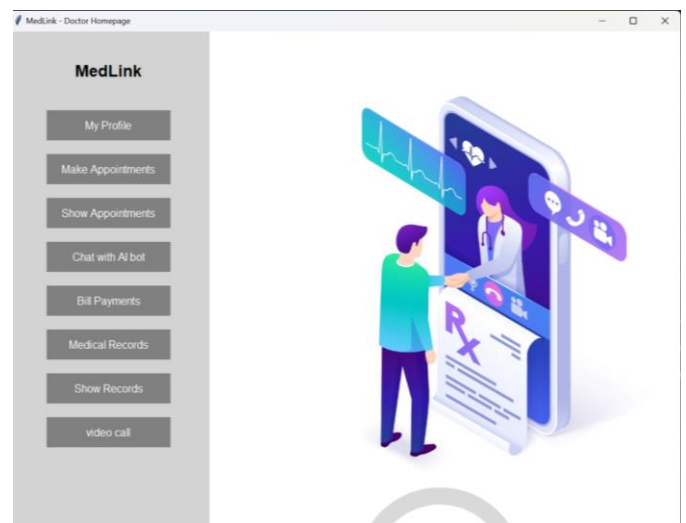


fig-2 :patient's homepage

### 3.1 User Authentication

User authentication is a fundamental aspect of MedLink, ensuring secure access to the platform for both patients and doctors. Users can create individual accounts with unique login credentials, safeguarding their personal and medical information. Patient registration involves providing essential details such as name, contact information, and medical history, while doctors are required to submit professional credentials for verification. MedLink employs industry-standard encryption protocols to protect sensitive data during transmission and storage, maintaining strict confidentiality. Upon successful authentication, users gain access to personalized features tailored to their roles,

fostering trust and confidence in the platform's reliability and security.

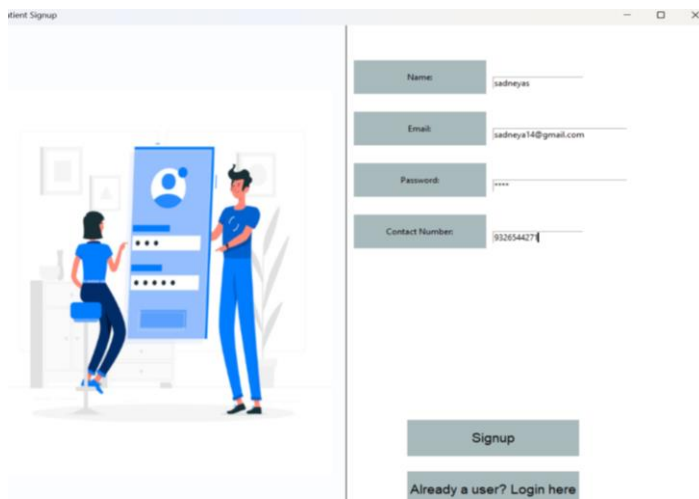


Fig -3: Patient signup page

### 3.2 Doctor Verification

To prevent fraud and illegal practices, we have added a separate login and signup feature for doctors. These doctors shall provide their education history and speciality to build their profile, which will be available to patients while booking an appointment with the doctor. Now, this data provided by the doctor will be checked by the administrator and only after verification of their credentials, will the doctor be able to practice and offer their services on the app.

In the beginning, several doctors can be contacted by the owners of the app to be invited onto the app. Once the app makes a name for itself in the market, we can expect more signups naturally.

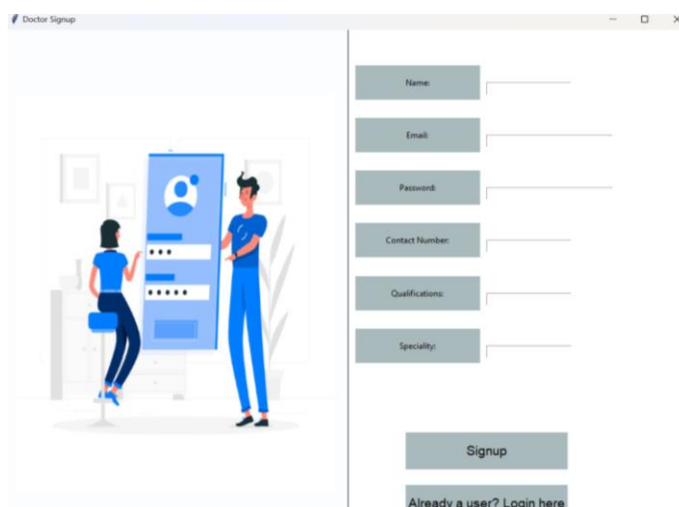


Fig -4: Doctor signup page

### 3.3 Database

MedLink's database system is designed to keep everything running smoothly and securely. It consists of 5 tables, with the names 'appointments', 'bills', 'doctor\_info', 'medical\_records', 'patient\_info' and 'video\_calls'. All these tables are interconnected to share data and ensure accuracy and consistency in the data.

It handles appointments, keeping track of all the bookings, cancellations, and completions, making sure patients and doctors stay coordinated. The bills database keeps a record of all transactions, making fee calculations and receipt generation straightforward and transparent. Doctor profiles and patient histories are carefully managed in separate databases, ensuring all important information is organized and easily accessible. Patients' medical records are stored securely, ready to be accessed whenever needed for consultations and treatments. The video calls database takes care of scheduling and links for virtual consultations, making online interactions as seamless as possible. This comprehensive and user-friendly database system helps ensure that MedLink provides a reliable and efficient service for everyone involved.

### 3.4 Regulatory Compliance

MedLink is committed to maintaining the highest standards of regulatory compliance to protect user data and ensure privacy. Our platform adheres strictly to the Health Insurance Portability and Accountability Act (HIPAA) guidelines, ensuring that all patient information is handled with the utmost confidentiality and security. We employ robust encryption protocols to safeguard data during transmission and storage, preventing unauthorized access and breaches. Regular audits and security assessments are conducted to ensure ongoing compliance and to address any potential vulnerabilities promptly. By aligning with HIPAA and other relevant healthcare regulations, MedLink ensures that users can trust our platform to handle their sensitive information with the highest level of care and integrity. This commitment to regulatory compliance reinforces our dedication to providing a secure and trustworthy eHealthcare system for both patients and doctors.

### 3.5 AI Chat Bot

The AI chatbot uses basic natural language processing (NLP) techniques to respond to user queries about various diseases and general health remedies. The chatbot includes a function which checks the user's query for keywords related to common diseases (e.g., flu, diabetes, hypertension) and returns relevant information about each condition. If the user asks for remedies or help, the bot provides general health tips or guidance on how to interact with it. The chatbot processes user inputs by identifying specific keywords and categories related to health topics, demonstrating a simple implementation of keyword-based

NLP to understand and respond to user queries accurately. This approach allows the chatbot to offer information and support in a structured manner, although it relies on predefined responses rather than advanced NLP techniques like machine learning or deep learning for more complex language understanding.

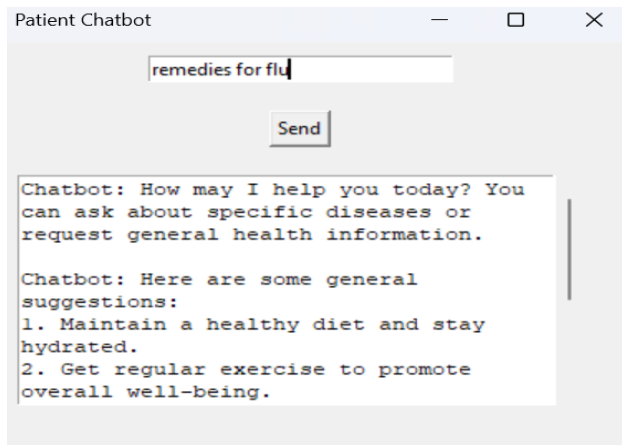


Fig -5: AI chatbot output

### 3.6 Video Call

The integration of Online Meeting Integration capabilities elevates the accessibility and convenience of virtual healthcare consultations. Through seamless integration with popular online meeting platforms such as Google Meet, patients can participate in virtual appointments from the comfort of their homes or remote locations. When appointments are scheduled for online mode, the eHealthcare application generates and dispatches personalized Google Meet links to patients via email. This streamlined approach eliminates logistical barriers associated with in-person visits, expands access to healthcare services, and fosters continuity of care in diverse healthcare settings.

### 3.7 Generate Receipt

The generated receipt generates the receipt of the patient's total fees. In the doctor's section we have enter fees section where doctor enter their fees and it includes various things such as consultation fees, Lab test fees, medication fees and other fees ie. additional fees. If doctors do not enter any fees then also we have default fees set there. Then these fees are used for generating pdf format receipts for patients. It calculates total fees, applies an 18% GST, and adds other fees and extra charges to compute the total amount. The function generate\_pdf sets up the PDF content by defining coordinates for text placement and setting font styles. It includes sections for patient and doctor details, appointment specifics, and detailed information about charges, with each section separated by lines for clarity. Finally, it saves the PDF and returns the file path. This structured approach ensures a

clear and professional receipt for patients. then these files are stored in the medical\_records folder.

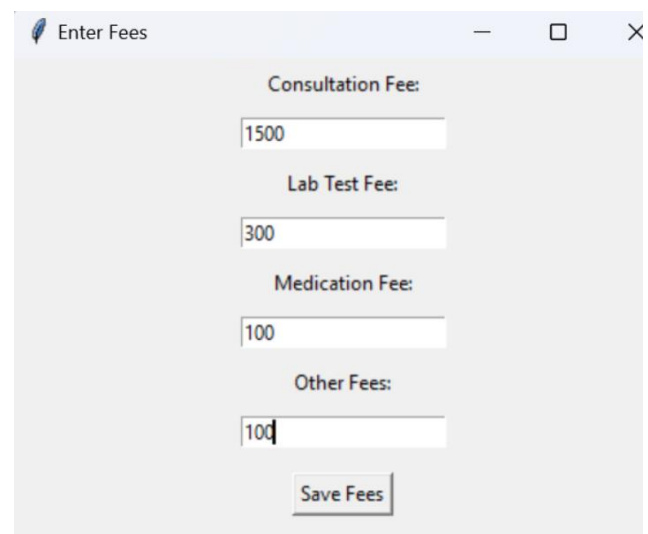


Fig -6: Doctor's window to enter fees

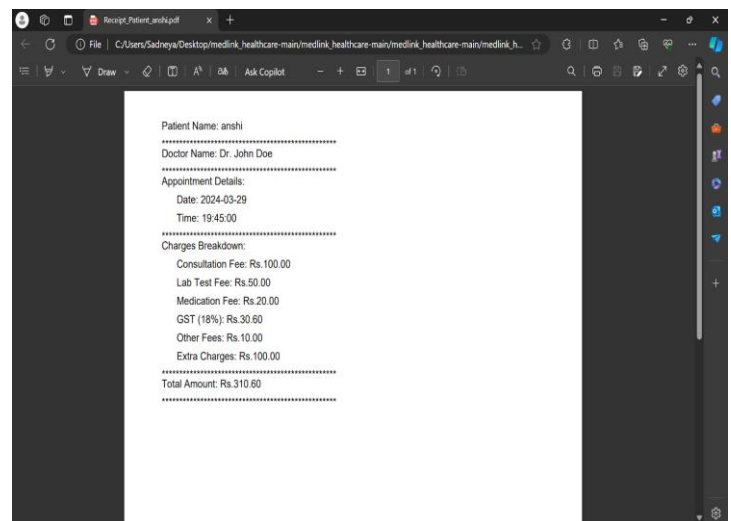
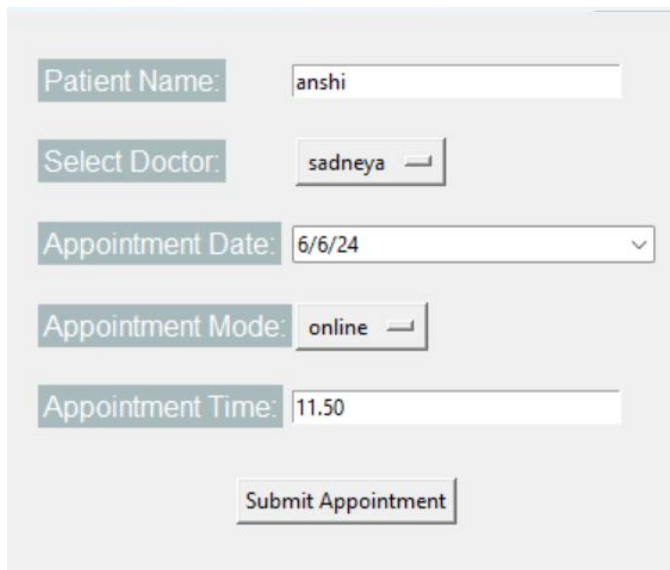


Fig -7: receipt as a PDF file

### 3.8 Appointments

Our ehealthcare application contains an appointment booking feature. In these frame patients can enter their name, select their doctor from a list of doctors, then select appointment date, appointment time and appointment mode. This system provides more accuracy by allowing you to use only future dates based on the doctor's availability, preventing backdated entries. In these we can add time in HH:MM format. In these only future time is accepted. After an appointment is submitted, mail is sent to the patient which contains information such as the doctor's profile, meeting time and complete schedule for meeting. It also includes the information about hospital where the doctor is currently working



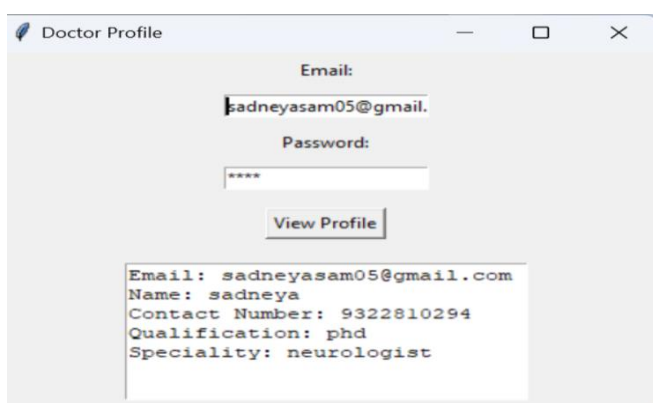
The form contains the following fields and values:

- Patient Name: anshi
- Select Doctor: sadneya
- Appointment Date: 6/6/24
- Appointment Mode: online
- Appointment Time: 11.50
- Submit Appointment button

Fig -8: Patient window to make appointment

### 3.9 Profiles

Upon clicking the "View Profile" button, the function retrieves the doctor's profile information from a database and displays it in a text widget. The displayed information includes the doctor's first name, last name, email address, phone number, and professional qualifications. If the login credentials are incorrect, an error message is shown. Similarly, another function provides a login interface but also includes a "Show Appointments" button to display the doctor's appointments. Similarly, the patients can view their profile as well which consists of their name, contact information, bills (if any) and their prior medical history along with documents that they have uploaded.



The window displays the following information:

- Email: sadneyasam05@gmail.com
- Password: [masked]
- View Profile button
- Profile details:
  - Email: sadneyasam05@gmail.com
  - Name: sadneya
  - Contact Number: 9322810294
  - Qualification: phd
  - Speciality: neurologist

Fig -9: Doctor's profile window

### 3.10 Other Features

In the realm of eHealthcare applications, the integration of additional features enhances the patient experience. First is the Fee Section Management module, designed for healthcare professionals in efficiently managing their

financial transactions within the digital ecosystem. This provides a doctor to set and update consultation fees, medical charges, lab test fees, and other service-related costs. By incorporating flexible fee structures and customizable parameters, healthcare providers can adapt their pricing models to varying service types, complexities, and durations, thus providing transparency and accessibility.

Our eHealthcare application includes several key features to enhance user experience for both patients and doctors. Patients can upload their medical records for their doctors which get saved in the medical\_records folder and can access records from the "Show Records" section to see their uploaded files. Also doctors have a feature "show patient records" where doctors can receive patients reports.

Another feature is the Automated Email Notifications system, used for seamless communication between healthcare service providers and patients. This feature automates the process of sending email notifications to patients regarding their scheduled appointments, upcoming meetings, and any modifications in appointment status.

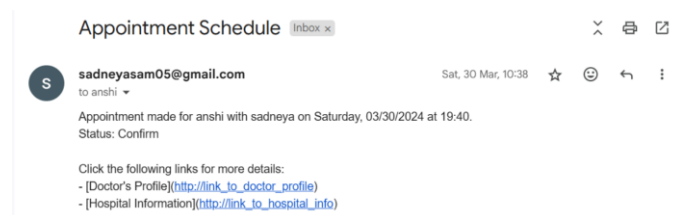


Fig -10: Automated mail for appointment confirmation

With these innovative features, eHealthcare applications build communication between healthcare providers and patients through digital healthcare delivery. The Fee Section Management module ensures financial transparency and flexibility for healthcare professionals, while Automated Email Notifications and Online Meeting Integration enhance patient engagement, communication, and access to care. Together, these features provide efficient healthcare delivery, fostering patient-centric practices, and advancing the future of digital health.

### 4. TECHNOLOGIES USED:

The project was developed using the Python programming language. It was chosen for its variable functioning and large number of libraries. Tkinter is a standard Python library, and was used for creating the graphical user interface (GUI), for intuitive user interface. MySQL, is a widely used relational database management system, used for data storage and management. Image manipulation tasks were handled with the Python Imaging Library (PIL), for using images in the background. Date and time modules were also used for appointment and generating receipt functions. Email functionality was implemented using smtplib and email.mime, with secure communication provided by the ssl

module.. Reportlib library used for pdf generation of receipt. enabling dynamic creation of PDF files within the application. Clipboard interaction was provided through the pyperclip library, allowing for seamless copying and pasting of links of google meet in the database so that when we want to schedule appointments then these links get sent to the patient and doctor via mail through database query .

Automated control of mouse and keyboard actions was achieved using the pyautogui library, streamlining repetitive tasks and enhancing user productivity .It was used for automating the task to go to google meet and create a google meeting automatically. File and directory operations, including file selection and management, storing, were facilitated by the filedialog, os, and shutil modules.

## 5. FUTURE SCOPE

In the future scope we can provide more features and we can make a section where we can track patient health. It should have a section for home care management and remote monitoring and for tracking the activities of patients and a section where patients can upload monthly records for diabetic patients or patients who need constant monitoring .

It should also include tools for log visits, track patient progress, and receive alerts for significant changes in health status. It should also have multilingual support. so more users can use it.This provides a more user-friendly interface. These provide more readability, accessibility.

## 6. CONCLUSIONS

In conclusion, our eHealthcare application solves the challenges faced in traditional healthcare delivery models. Through the integration of technology our platform provides access, communication, and efficiency within the healthcare service functions. It provides seamless interactions between patients and healthcare providers.

Thus, simply put, it provides a more connected, accessible, and patient-centric healthcare ecosystem which is a drastic improvement to the old ways along with aiming at eliminating the biases in our current online healthcare system.

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