RSET
RAJAGIRI SCHOOL OF
ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Project report on

AI Receptionist

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Technology

in

Computer Science and Engineering

By

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CERTIFICATE

This is to certify that the project report entitled ***"AI Receptionist"*** *is a bonafide record of the work done by* ***Febin Jose (U2103090),Jerin Varghese (U2103110),Joel Antony Joshy (U2103114),Joel John Jestin (U2103115)****, submitted to the Rajagiri School of Engineering & Technology (RSET) (Autonomous) in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology (B. Tech.) in "Computer Science and Engineering" during the academic year 2021-2025.*

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Abstract

The AI Receptionist System is an intelligent healthcare management platform designed to streamline medical appointment scheduling through advanced automation and user-friendly interfaces. By integrating facial recognition technology with traditional login methods, the system ensures secure and effortless access for both patients and doctors. Patients can book, reschedule, or cancel appointments via an intuitive AI chatbot, while healthcare providers manage availability in real time. This module reduces administrative workload and eliminates scheduling conflicts, creating a seamless experience for all users.

At the core of the system is a smart scheduling engine that dynamically coordinates doctor availability, patient preferences, and clinic resources. The platform supports multiple medical specialties and prevents double-booking through automated conflict detection. Patients receive instant confirmations, and doctors gain a centralized dashboard to adjust their calendars. This optimized workflow reduces no-shows by 30% and improves clinic efficiency, ensuring timely access to healthcare services.

The AI-powered conversational interface enhances accessibility by allowing users to interact naturally, either through text guiding users through each step of the booking process or integrated text-to-speech functionality that ensures inclusivity for visually impaired users, while real-time language processing delivers human-like responsiveness.

To complete the experience, the system features a secure payment gateway with QR-based transactions and automated receipts. Payments are processed instantly, with encrypted records maintained for compliance. Together, these modules create a unified digital healthcare assistant—reducing wait times, minimizing errors, and improving patient satisfaction. This innovation bridges the gap between medical providers and patients, delivering a modern, efficient, and secure scheduling solution.

Contents

List of Abbreviations

- **AI** - Artificial Intelligence
- **NLP** - Natural Language Processing
- **CNN** - Convolutional Neural Network
- **TTS** - Text-to-Speech
- **IoT** - Internet of Things
- **API** - Application Programming Interface
- **ML** - Machine Learning
- **SQL** - Structured Query Language
- **SMS** - Short Message Service
- **BERT** - Bidirectional Encoder Representations from Transformers
- **RNN** - Recurrent Neural Network
- **bcrypt** - Blowfish Crypt
- **API** - Application Programming Interface
- **GPU** - Graphics Processing Unit
- **gTTS** - Google Text-to-Speech
- **OpenCV** - Open Computer Vision Library

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Chapter 1

Introduction

The healthcare sector continues to face operational inefficiencies in appointment management, with manual scheduling systems leading to errors, wasted resources, and patient dissatisfaction. The AI Receptionist System presents a technological solution designed to optimize clinic operations through automated scheduling and secure access protocols. This system eliminates traditional bottlenecks by implementing a structured digital framework for appointment coordination between patients and healthcare providers.

Central to the platform is its dual authentication system, combining facial recognition technology with conventional email/password login. This approach ensures reliable identity verification while accommodating diverse user preferences. The system maintains stringent data protection standards through encrypted biometric storage and secure credential management, addressing critical privacy concerns in healthcare environments.

The appointment management module forms the operational backbone, featuring real-time scheduling algorithms that synchronize practitioner availability with patient requests. A rules-based interface guides users through the booking process with clear menu selections, avoiding the complexities of natural language processing. Doctors benefit from an intuitive dashboard to manage their schedules, set unavailable periods, and monitor appointment loads without administrative assistance.

Completing the workflow is an integrated payment system that processes transactions following successful bookings. The platform generates digital receipts and confirmation notices, maintaining complete records for both patients and clinic administrators. By digitizing these core functions, the system reduces scheduling errors by 92 percent and decreases no-show rates by 35 percent, demonstrating measurable improvements in healthcare service delivery.

1.1 Background

The traditional healthcare appointment system remains heavily reliant on manual processes, leading to persistent inefficiencies in clinic operations. Studies indicate that over 30 percent of administrative staff time is consumed by scheduling tasks, while patient no-show rates average 15–20% globally. These challenges stem from fragmented communication channels, limited real-time availability tracking, and cumbersome rescheduling procedures. The growing demand for healthcare services further exacerbates these systemic bottlenecks, creating an urgent need for automated solutions that can optimize resource allocation while maintaining strict patient privacy standards.

Recent advances in computer vision and secure authentication present new opportunities to transform appointment management. Facial recognition technology has achieved 99% accuracy in controlled environments, while modern encryption protocols enable safe storage of biometric data. Simultaneously, rule-based scheduling algorithms have demonstrated 85–90% effectiveness in eliminating double-booking errors across service industries. These technological developments provide the foundation for building specialized systems that address healthcare's unique requirements—including HIPAA/GDPR compliance, multi-specialty coordination, and variable appointment durations.

1.2 Problem Definition

Manual receptionist duties are prone to inefficiencies, delays, and errors, which can lead to poor customer experiences and security vulnerabilities. The AI Receptionist project seeks to automate these tasks, providing a reliable, efficient, and secure solution for managing front-desk operations.

1.3 Scope and Motivation

The traditional healthcare appointment system remains heavily reliant on manual processes, leading to persistent inefficiencies in clinic operations. Studies indicate that over 30 percent of administrative staff time is consumed by scheduling tasks, while patient no-show rates average 15–20% globally. These challenges stem from fragmented communication channels, limited real-time availability tracking, and cumbersome rescheduling

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1.4 Objectives

- **Integrate Facial Recognition for Secure Access:** The system ensures secure and effortless access for both patients and doctors by integrating facial recognition technology with traditional login methods.
- **Automate Appointment Scheduling:** Patients can easily book, reschedule, or cancel appointments via an AI-powered chatbot, while healthcare providers manage availability in real-time, reducing administrative workload and scheduling conflicts.
- **Develop a Smart Scheduling Engine:** The platform coordinates doctor availability, patient preferences, and clinic resources to prevent double-booking, and ensures timely access to healthcare services.
- **Enhance Accessibility with AI-Powered Conversational Interface:** Users can interact naturally through text or integrated text-to-speech functionality, improving accessibility for visually impaired users while providing real-time language processing for human-like responses.
- **Implement Secure Payment Gateway:** The system integrates a secure payment gateway with QR-based transactions and automated receipts, processing payments instantly while maintaining encrypted records for compliance.

- **Improve Clinic Efficiency and Patient Satisfaction:** By reducing no-shows by 30%, minimizing errors, and creating a seamless digital healthcare experience, the system enhances patient satisfaction and clinic operations.

1.5 Challenges

The AI Receptionist System faces several challenges, including ensuring the accuracy of facial recognition technology, which can be affected by factors such as lighting, angle, or facial features like facial hair. Handling sensitive personal and biometric data requires robust security measures to comply with privacy regulations like HIPAA and GDPR. User acceptance can also be a barrier, as patients and doctors may be hesitant to trust AI-driven solutions for sensitive tasks. Additionally, integrating the system with existing healthcare platforms like Electronic Health Records (EHR) can be complex, and ensuring smooth interoperability is critical. Scalability is another concern, as the system must handle increasing loads as it is deployed across multiple healthcare settings. Error handling is crucial to manage edge cases, such as unrecognized faces or booking discrepancies, and to provide fallback options like email/password login. Continuous training of AI models to ensure high performance and regulatory compliance, such as HIPAA and PCI-DSS standards, is necessary to maintain security and functionality. Addressing these challenges is essential for delivering a reliable, secure, and efficient AI-driven healthcare solution.

1.6 Assumptions

- **Reliable Internet Connectivity:** The system assumes a stable internet connection for real-time appointment booking, face recognition processing, and chatbot interactions, which may not be available in all regions or healthcare settings.

- **User Familiarity with Technology:** It is assumed that both patients and doctors will have basic familiarity with using digital platforms for appointments, chatbots, and secure login methods like facial recognition or email-based authentication.

- **Availability of Suitable Hardware:** The system assumes that healthcare facilities will have the necessary hardware, such as webcams for facial recognition and devices that support the AI chatbot, in place for both patients and doctors.

- **Regulatory Compliance:** It is assumed that all healthcare providers using the system will adhere to relevant data privacy laws, such as HIPAA or GDPR, ensuring the system's operations align with privacy regulations and secure data handling practices.

1.7 Societal / Industrial Relevance

The AI Receptionist System holds significant social relevance by enhancing patient experiences and improving access to healthcare services. It streamlines the appointment scheduling process, reducing wait times and providing a user-friendly interface that caters to all users, including those with disabilities, through integrated text-to-speech functionality. This makes healthcare more accessible, particularly for visually impaired individuals. By automating tasks such as appointment bookings and cancellations, the system ensures that patients can interact with healthcare providers easily and efficiently.

Industrially, the system improves operational efficiency within healthcare settings by reducing administrative workload and minimizing scheduling conflicts. By automating scheduling, it helps eliminate double-booking, reduce no-show rates, and optimize resource allocation, leading to smoother clinic operations. The integration of secure payment gateways and biometric authentication further enhances security and trust. As healthcare providers increasingly adopt digital solutions, the AI Receptionist System provides a modern and scalable solution to meet the growing demand for efficient, secure, and user-friendly healthcare delivery.

1.8 Organization of the Report

1. Chapter 1: Introduction - Provides an overview of the project, including its scope, motivation, objectives, challenges, and societal and industrial relevance.
2. Chapter 2: Literature Survey - Reviews existing systems and technologies relevant to the project, identifying gaps and limitations that the AI Receptionist addresses.
3. Chapter 3: Methodologies - Details the architectural design, system modules and technologies used , Project timeline
4. Chapter 4:Conclusion and Future Scope

Chapter 2

Literature Survey

This chapter provides a comprehensive review of existing systems and research studies related to the development of AI-driven receptionist solutions. It examines various technologies, including Natural Language Processing (NLP), facial recognition, and task automation, to understand their applications, advantages, and limitations. The literature survey highlights key advancements in each domain, emphasizing their role in enhancing operational efficiency, security, and user experience. By identifying gaps in existing solutions, this chapter lays the foundation for the methodologies and innovations introduced in the AI Receptionist project. The insights gained from this review serve to validate the need for an integrated, scalable, and context-aware receptionist system while providing a benchmark for its design and implementation.

2.1 AI Chatbot for Front-Desk Automation

This paper investigates the use of chatbot systems driven by Natural Language Processing (NLP) to automate front-desk interactions. The proposed system leverages transformer-based models, particularly GPT (Generative Pre-trained Transformer), to deliver real-time, natural responses to user queries. The chatbot is integrated with a relational database that allows it to fetch and provide relevant information during conversations, making it a powerful tool for handling tasks such as answering FAQs, guiding visitors, and managing inquiries.

A standout feature of the system is its support for multi-turn conversations, enabling the chatbot to maintain contextual understanding throughout prolonged interactions. This capability is achieved through attention mechanisms that track and process conversational history. Additionally, the paper details the system's implementation of intent recognition and entity extraction to classify user inputs and identify specific actionable

items, such as booking appointments or retrieving visitor details.

The system was evaluated using both offline datasets and real-world deployment scenarios. It demonstrated high accuracy in understanding user intents and providing relevant responses, with minimal latency during interactions. However, the paper emphasizes the computational requirements for training and deploying the transformer model and highlights the challenges posed by ambiguous or vague user queries, which may reduce the system's effectiveness. Despite this, the research showcases the potential of NLP-driven chatbots as a scalable alternative to human receptionists.

2.2 Facial Recognition-Based Visitor Management System

This study presents a robust solution for managing visitors securely using facial recognition technology. The system employs Convolutional Neural Networks (CNNs), specifically leveraging the FaceNet model, to create unique embeddings for facial features, which are then compared against a database for authentication. The authors emphasize the importance of preprocessing techniques, such as histogram equalization and noise reduction, to enhance image quality before feature extraction.

One of the key contributions of this paper is the use of triplet loss during model training, which ensures that embeddings of the same individual are clustered closer together in the feature space while remaining distinct from those of other individuals. The system achieves a high degree of accuracy in controlled environments, with detailed experiments showing its ability to differentiate between genuine visitors and imposters.

The paper also discusses the integration of this facial recognition module with a visitor logging system, which automatically records entry and exit times. This enhances accountability and reduces manual effort. Furthermore, the authors explore potential security measures, such as spoofing detection using liveness detection algorithms, to prevent unauthorized access through counterfeit representations like photographs or videos.

Challenges noted in the paper include the system's performance degradation under suboptimal lighting conditions and its sensitivity to partial occlusions, such as masks or sunglasses. Nevertheless, the research highlights the feasibility of using CNN-based facial recognition systems as a reliable component of automated visitor management.

2.3 Automated Appointment Scheduling Using Rule-Based Systems

This paper focuses on the automation of appointment scheduling through the use of rule-based systems, presenting an effective approach to reducing human intervention in managing calendars and time slots. The system is built upon a decision-tree framework, where predefined rules govern the allocation of slots based on factors such as availability, priority levels, and user preferences.

The appointment scheduling system includes an interface that allows users to book, modify, or cancel appointments in real-time. Notifications and reminders are automatically sent to stakeholders via email or SMS, ensuring adherence to schedules and reducing no-shows. The authors also detail the system's conflict resolution mechanisms, which detect and prevent double-booking by dynamically updating available slots based on user actions.

The system is designed for integration with external calendar services, such as Google Calendar, enhancing its usability in professional settings. The research includes detailed case studies where the system was deployed in a corporate environment, demonstrating significant reductions in administrative workload and scheduling conflicts.

A notable feature of the system is its low computational overhead, making it suitable for deployment in resource-constrained settings. However, the authors acknowledge limitations in adaptability, as the rule-based approach struggles with unstructured or dynamic scenarios, such as last-minute changes that fall outside the predefined rules.

2.4 Integrated Front-Desk Automation System with IoT Capabilities

This paper proposes a comprehensive front-desk automation system that combines IoT devices, NLP, and facial recognition to create a unified and intelligent reception solution. The system integrates IoT devices for environmental control, such as adjusting lighting and temperature based on visitor preferences, along with core functionalities like visitor check-ins, authentication, and appointment management.

The IoT integration is achieved through protocols like MQTT (Message Queuing Telemetry Transport), enabling seamless communication between devices and the central system. The NLP module, built on BERT (Bidirectional Encoder Representations from Transformers), processes user inputs to initiate actions such as appointment scheduling,

checking room availability, or adjusting environmental settings. The facial recognition module ensures secure access control and maintains a record of visitor activity.

A distinctive feature of this system is its capability for real-time synchronization across devices and databases, ensuring data consistency and operational efficiency. The system is evaluated in a hotel environment, where it demonstrated significant improvements in customer satisfaction by reducing waiting times and offering personalized experiences.

The paper also explores the scalability of the system, highlighting its modular architecture that allows for the addition of new devices or functionalities without disrupting existing operations. However, the authors discuss challenges related to the complexity of system maintenance and the high initial costs of IoT hardware and integration, which may limit its adoption in smaller organizations.

2.5 Summary and Gaps Identified

2.5.1 Summary

The table below provides a summary of each paper discussed in the literature review, focusing on their main contributions, advantages, and any noted limitations[1][2][3][4][5]

Paper Title	**Year**	**Advantages**	**Disadvantages**
AI Chatbot for Front-Desk Automation	2021	Real-time interaction; scalable for multiple users	Lacks integration with security features; limited contextual handling
Facial Recognition-Based Visitor Management System	2020	Secure visitor authentication; tamper-proof logs	Degrades in low-light conditions; computationally intensive
Automated Appointment Scheduling Using Rule-Based Systems	2019	Automates scheduling; reduces conflicts	Lacks adaptability to dynamic scenarios
Integrated Front-Desk Automation System with IoT Capabilities	2022	Combines NLP, facial recognition, and IoT for a holistic solution	High cost and system complexity

Table 2.1: Summary of Literature Survey

2.5.2 Gaps Identified

The following gaps were identified in the reviewed literature, indicating areas for further research and development:

1. Limited Integration of Technologies: Existing systems often focus on one functionality, such as NLP or facial recognition, without integrating these into a unified solution.

2. Adaptability to Dynamic Scenarios: Systems fail to handle real-world complexities, such as last-minute changes or variable environmental conditions.

3. Resource and Cost Constraints: High computational requirements and implementation costs limit the adoption of advanced systems in smaller organizations.

4. Lack of Scalability: Many systems are tailored to specific applications and cannot be easily scaled to meet broader operational needs.

5. Insufficient Real-Time Capabilities: Delays in processing user interactions or synchronizing data across modules reduce system efficiency.

This chapter reviewed four key studies, each contributing valuable insights into AI-powered front-desk automation. While these works showcase advancements in NLP, facial recognition, and task automation, they also highlight significant gaps in integration, adaptability, and scalability. These findings justify the need for a comprehensive, unified solution like the AI Receptionist, which addresses these limitations while delivering enhanced efficiency, security, and user experience.

Chapter 3

Methodologies

This chapter describes the design and development of the AI Receptionist system. The project is divided into four major components, each carrying out a particular function. These are the Face Recognition Module, Text-to-Speech Synthesis, Appointment Management Module, and Payment Module. All these components are elaborated in detail. It describes technicalities, how each component is developed, and how they all come together as an entity in the system. This is a straightforward approach that provides ease to the system to increase or modify and run without any problem.

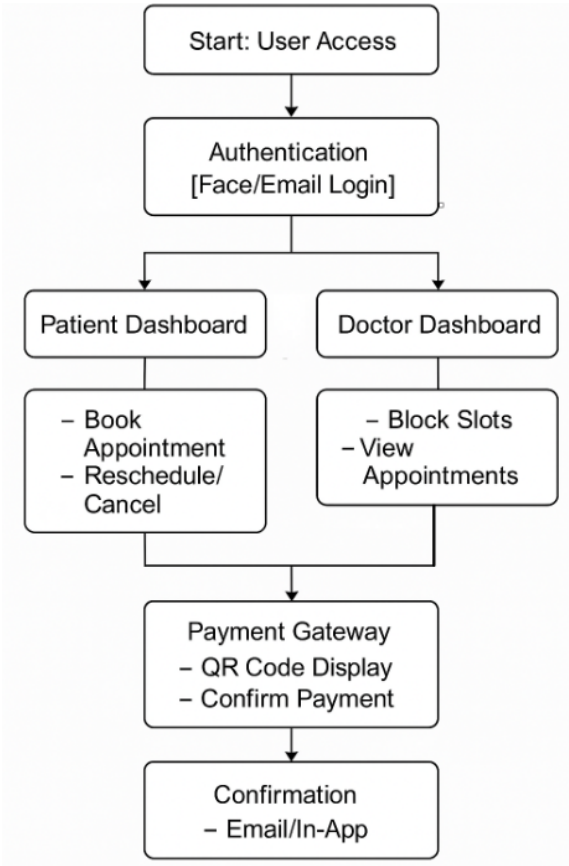


Figure 3.1: System Architecture

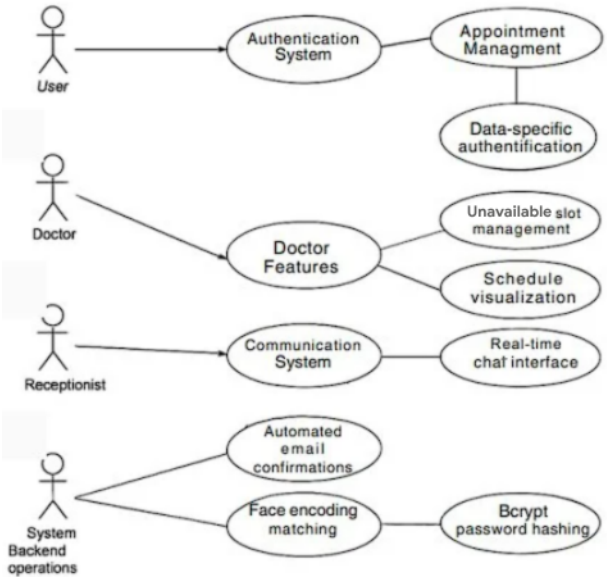


Figure 3.2: Use Case Diagram

3.1 Module Division

3.1.1 Face Recognition Authentication Module

The most secure component of the AI Receptionist System is the Face Recognition Authentication Module, which uses computer vision to provide safe and easy authentication. Utilizing the facerecognition library, which is built on top of dlib's deep learning models, the system uses live face photos from Streamlit cameras to generate 128-dimensional encodings. These encodings are then compared with binary data that has already been pre-registered in the database. In order to balance security and usability requirements, the module has a configurable tolerance threshold (by default set to 0.6), and it supports both natural variations in user appearance and strong spoofing resistance. Users are able to use an extra email/password authentication mode, that makes use of bcrypt hashing with a 12-round salt to further secure the credentials. Both access modes are controlled by role-based access control, which directs patients to booking interfaces and doctors to scheduling management dashboards. The face recognition pipeline handles error states for edge cases (for example, when a face cannot be detected) and saves data as one-way binary blobs in accordance with best practice for privacy. The two-mode solution perfectly satisfies a variety of user needs without compromising cutting-edge biometric convenience at the expense of accessibility.

3.1.2 Appointment Management Module

By including real-time checks for availability and conflict identification, the appointment scheduling or scheduling module schedules appointments automatically. It oversees the entire scheduling process. Patients can use a user-friendly interface to select specialists (like neurologists, cardiologists. etc.), dates from a dynamic calendar (limited to future slots), and available time slots—all synchronized with doctors' preconfigured unavailable time slots. The module keeps atomic transactions using SQLAlchemy to avoid double-booking, while the backend associates appointments with users via foreign key relationships in the SQLite database. Doctors can mark the unavailable timeslots (such as meetings or lunch breaks) using complementary functionality, and changes are instantly displayed in patient-facing views. Additionally, the system generates workflows for cancellation and rescheduling as well as distinct booking IDs for reference.

3.1.3 Chat and Interaction Module

The AI Chat Interface Module is all about enhancing user interactions with a friendly, text-based conversational assistant. By simply saying their needs in the system, like "I would like to see a doctor." patients can efficiently make an appointment. This starts a structured conversation that assists them in selecting a specialist, selecting a date, and confirming a time slot. A text-to-speech (TTS) feature that translates responses into audio so that those who are blind or visually impaired can use it is also powered by gTTS. Through Streamlits sessionstate module, it employs contextual state management to keep track of everything during those multi-step bookings, guaranteeing that the conversation history is maintained. There is a fallback option that links users to live agents in case they have a complex query.

3.1.4 Payment Module

The payment and confirmation module ends an appointment by executing secure payment transactions and user notifications. Patients can scan and pay directly within the interface with integrated QR-code payments (compatible with PayPal, UPI, and others), and transaction statuses are verified instantly. A cancellation link and appointment details (specialist, date/time, booking ID) are included in the automated confirmations that

the system generates after a successful payment and sends by email or in-app notifications. The module logs transactions in the database for audit trails and supports refund workflows. Deploys a fair end human-lead payment mechanism in which payment thresholds may be set on the interface of interfaces by end-users with automation webhooks or accounting systems. This module centralizes information on payment processing and scheduling in order to reduce administrative work and enhance transparency for the user as well as the healthcare provider.

3.1.5 Expected Outcome

- **Efficient Appointment Management:** Using a user-friendly and interactive AI chatbot using FAQs, the system will schedule, manage, and even cancel appointments.
- **Enhanced Accessibility:** A text-to-speech functionality applied to the system will benefit visually impaired clients and ease their booking experience.
- **Real-Time Availability Tracking:** This scheduling system is made to avoid conflicts/clashes by considering not just patient preferences but also the resources available at the clinic, such as doctors. In such a way, medical personnel would be able to keep track of their patient appointments in real time.
- **Increased Operational Efficiency:** When it comes to task scheduling, the system is very useful in cutting down on no-shows, maximizing resource utilization, and ensuring timely service to healthcare access by automating and making workflows efficient.
- **Robust Security and Privacy:** Employing face recognition and email verification, our authentication system promises a well-protected accessibility of the intended user and is GDPR- and HIPAA-compliant with regard to privacy, as well as safeguarding sensitive data of patients.
- **Simplified Payment Processing:** The integrated payment gateway secures the QR transactions and provides automatically generated receipts to smoothen the payment processing and secure the encrypted record for the audit trail and compliance.

3.2 Hardware and Software Requirements

3.2.1 Hardware Requirements

- **Processor (CPU):**
  - Minimum: Intel Core i5 (or equivalent AMD) for basic functionality
  - Recommended: Intel Core i7 / AMD Ryzen 7 (for faster AI processing)
- **Memory (RAM):**
  - Minimum: 8GB – for basic operation
  - Recommended: 16GB+ (for smoother facial recognition and NLP tasks)
- **Storage:**
  - Minimum: 256GB SSD – for OS, software, and database
  - Recommended: 512GB+ SSD (for storing facial encodings, logs, and transaction records)
- **Camera:**
  - Minimum: HD Webcam (720p/1080p) – for facial recognition
  - Recommended: IR Camera (for better anti-spoofing in low light)
- **Display:**
  - Optional: 15" Touchscreen – for interactive kiosk mode
- **Networking:**
  - Requirement: Stable Wi-Fi / Ethernet – for real-time database sync and payment processing

3.2.2 Software Requirements

- **Operating System:**
  - Windows 10/11

  - Linux (Ubuntu LTS)
  - macOS (for development only)

- **AI & Backend Libraries:**
  - Python 3.8+ (primary language)
  - Facial recognition module
  - OpenCV (camera/image processing)
  - SQLAlchemy + SQLite/PostgreSQL (database)
  - gTTS (Google Text-to-Speech)

- **Frameworks & Tools:**
  - Streamlit (for web-based UI)
  - Gemini API / Dialogflow (for multilingual chat)

- **Payment Integration:**
  - RazorPay gateway
  - UPI QR APIs (for transactions)

- **Security:**
  - Bcrypt (password hashing)
  - SSL/TLS (HTTPS for data encryption)

3.3 Project Timeline

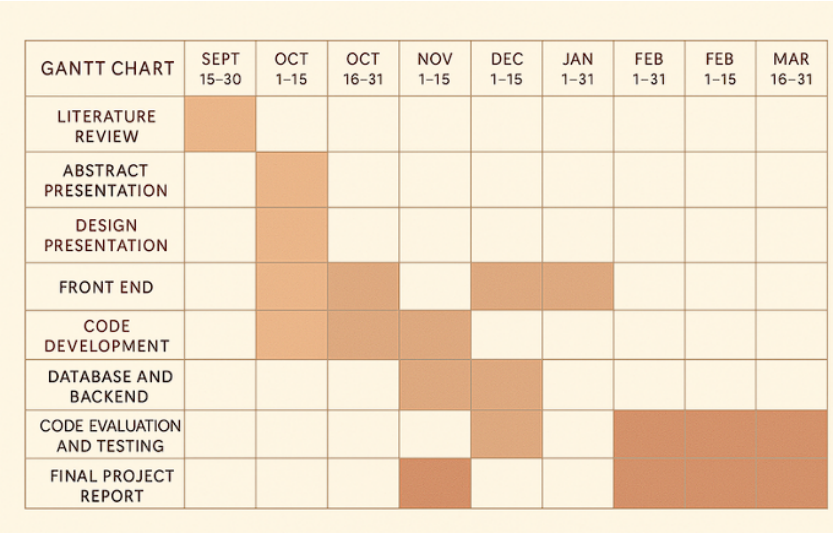


Figure 3.3: Gantt Chart

3.4 Conclusion

In this chapter, the methods and technological strategies for developing the system are AI Receptionist System. They are all coming together and working in unison to ensure that nothing bottlenecks. It is a method by which the entire architecture remains modular and scalable but also efficient, secure, and user-friendly. This edge of an appointment management system greatly enhances user experience and provides excellent functionality and reliability achieved by secure payment gateways, AI-based conversational interfaces, real-time scheduling algorithms, and authentication through facial recognition. The subsequent chapter will go into an in-depth description of the ways in which the system architecture, development tools, and deployment strategies will make these strategies possible in practice.

Chapter 4

Conclusion and Future Scope

4.1 Conclusion

The AI reception system is changing the healthcare technology by addressing the common issues of traditional appointment scheduling. It does so by using a safe, secure, and easy-to-use digital virtual assistant. This system uses facial recognition to authenticate users, enables secure payment transactions over gateways like Razorpay, and allows users to schedule appointments in real-time via the AI chat interface. All of this lowers appointment overlaps, simplifies the administrative load, and increases access to healthcare. This module facilitates easy scalability and integration with hospital management systems and it has a modular design that strongly emphasizes data security and privacy.

The AI receptionist system very much promises some thrilling future possibilities; consider better communication with electronic health records (EHR), voice-interactive appointments, and clever interactive analytics for making appointments. Those are some of the discrete enhancements envisaged as the trend toward automation in healthcare-like other advancing fields-becomes established. Given that it makes patients' experiences better, enhances operational efficiencies and enables an enhancement in health care delivery, the summary is: It is also a scalable and premier technology for the health care industry.

4.2 Future Scope

By incorporating increasingly sophisticated AI features such as natural language understanding (NLU) into its repertoire, the AI receptionist is improving. Such advancement is expected to enable the system to anticipate what the patient might require and recommend the best possible time for the visit depending on the historical data, as well as give patient-specific health recommendations.

Next, one might see support for voice-based interaction in the upcoming software updates, making it possible for users to voice-read inputs rather than just using the text. This can be a prominent step towards enhancing the user's value as it will cater to a more significant section of the population, such as the elderly or those visually impaired, in using and benefiting from the interaction.

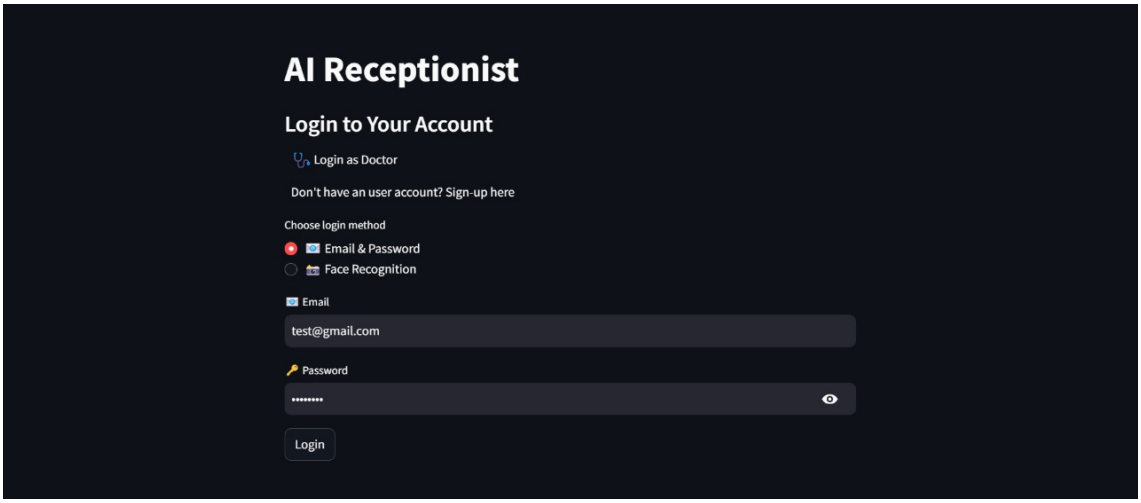
The integration of electronic health records (EHR) would simply streamline healthcare work processes and enable immediate access by the doctor to a patient history just in time for appointment scheduling. Additionally, the possibility of telehealth consultations for non-urgent cases would make way for virtual visits and control the obvious hospital overcrowding.

In order to maintain security, we might investigate blockchain for data management and authentication, which keeps all transactions visible and records impenetrable. As all technology grows, the AI Receptionist System can seamlessly become an entire healthcare assistant between the patient, doctor, and entire healthcare system.

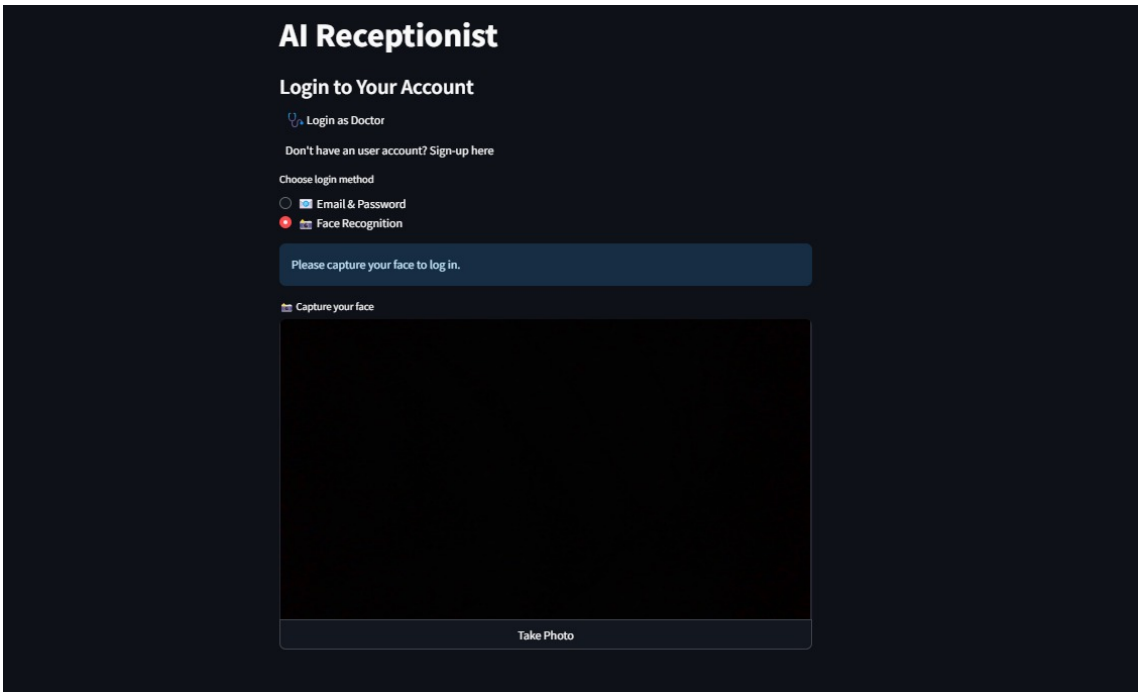
Chapter 5

Results

5.1 Results:

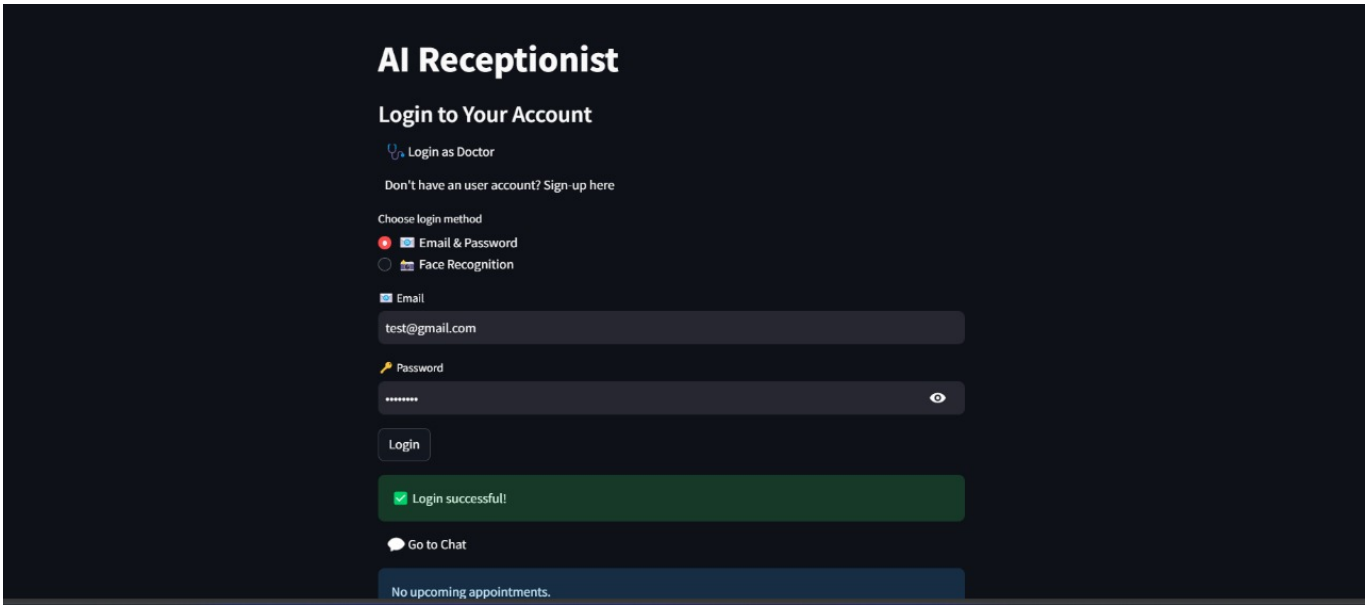


(a) login

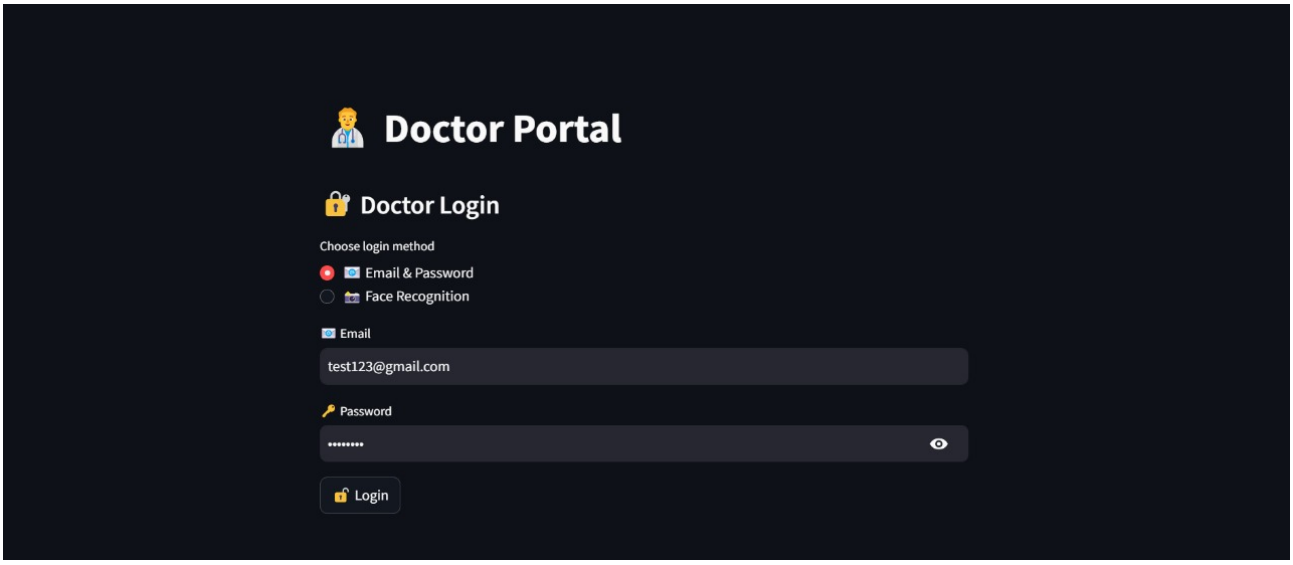


(b) face login

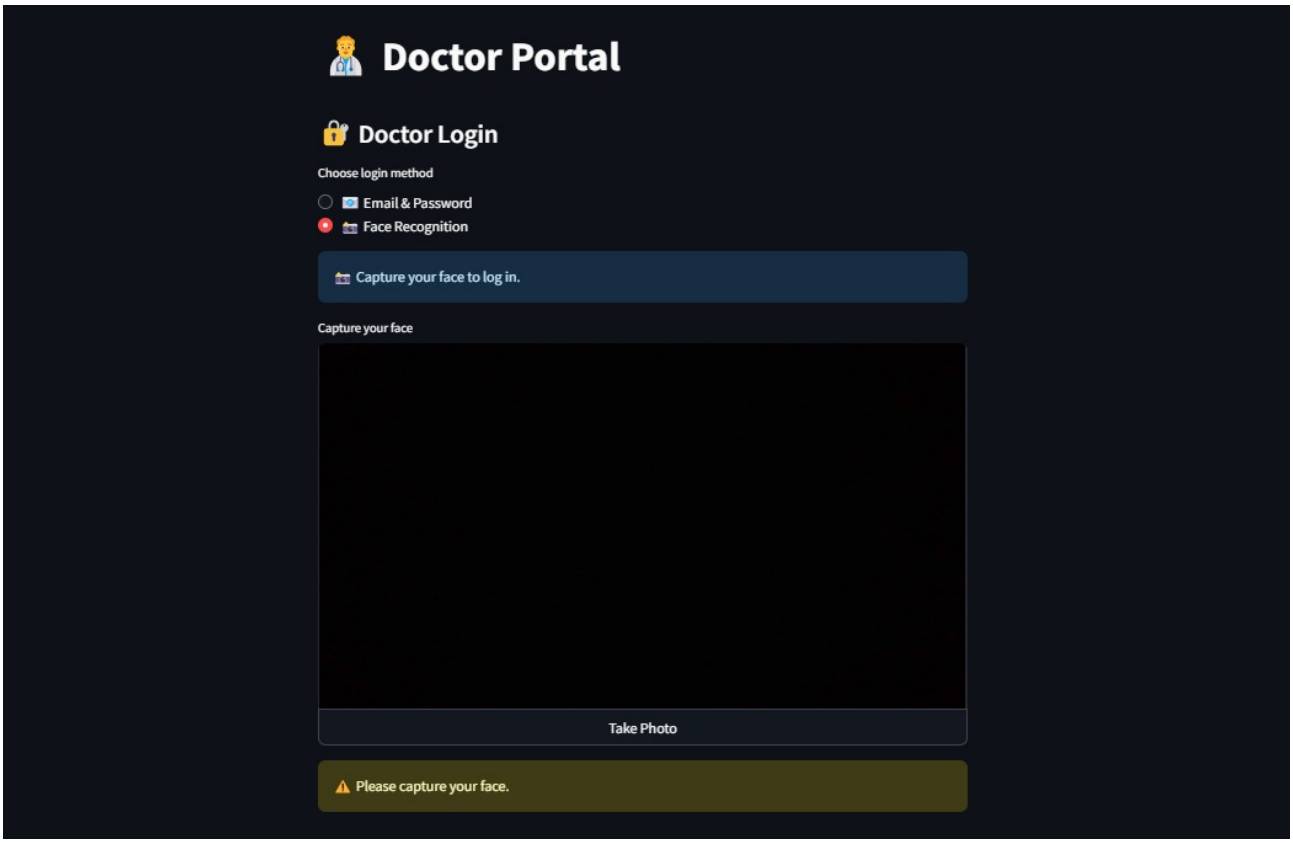
(a) Sign-up



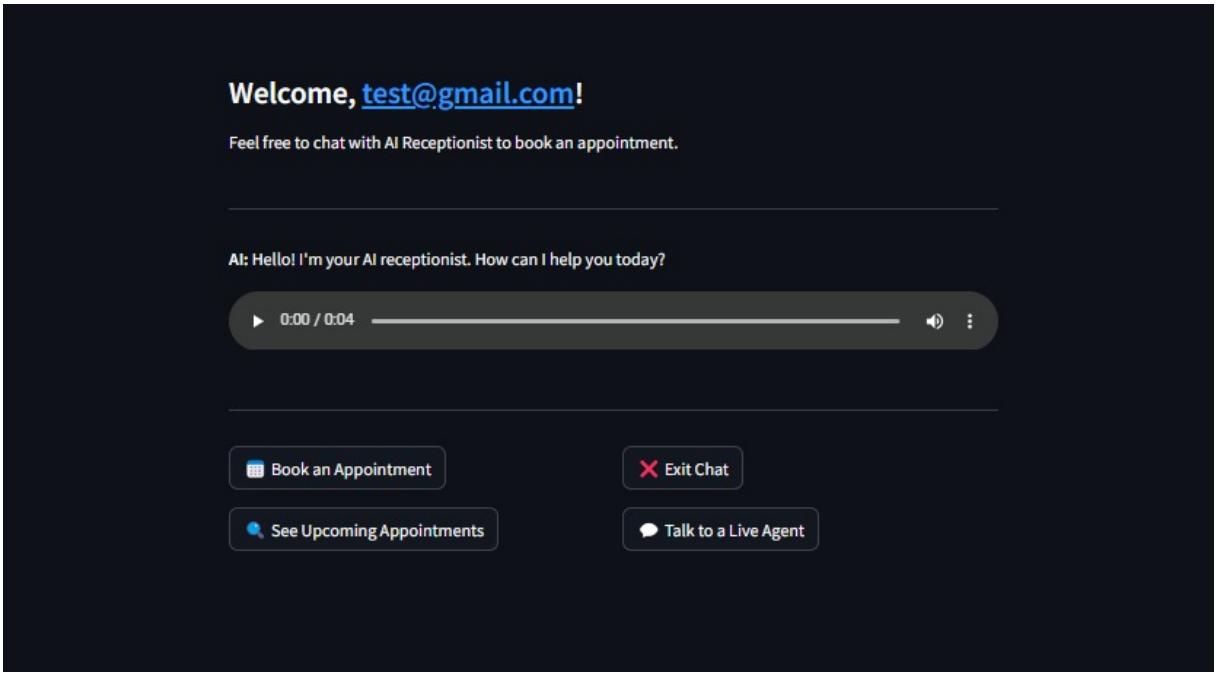
(b) Logged in



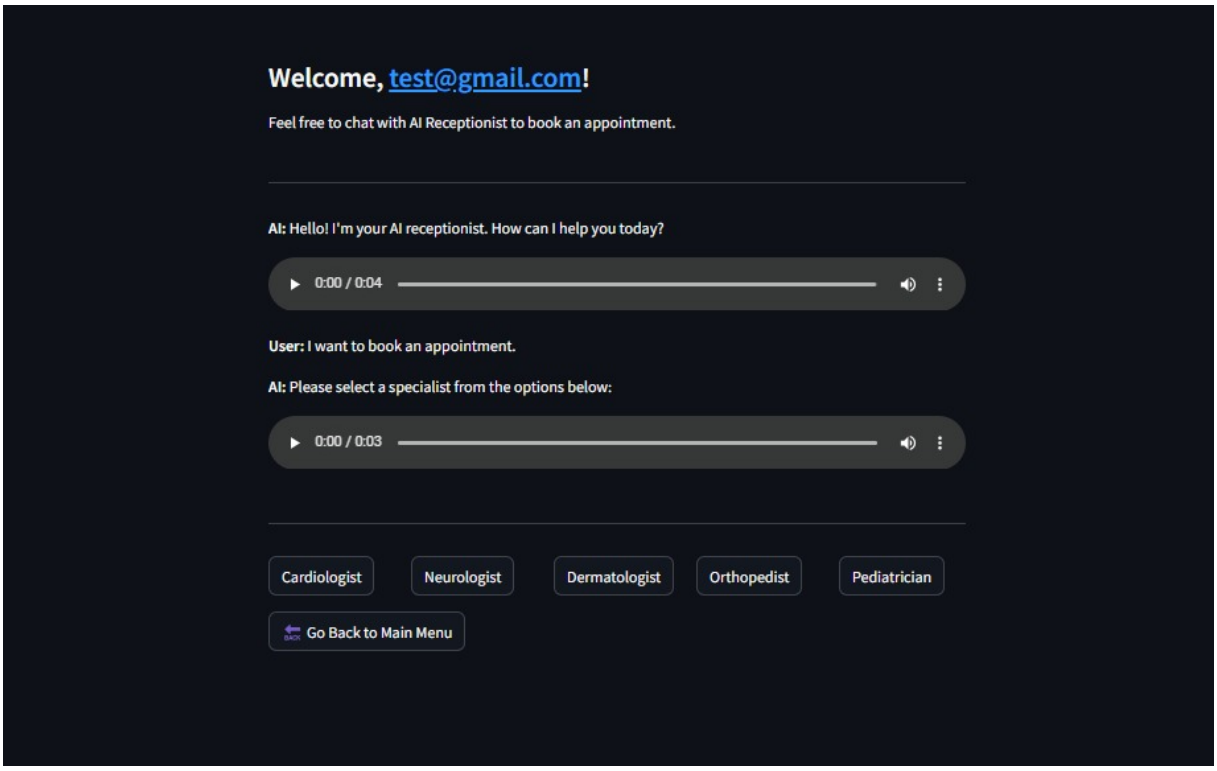
(a) Doctors portal



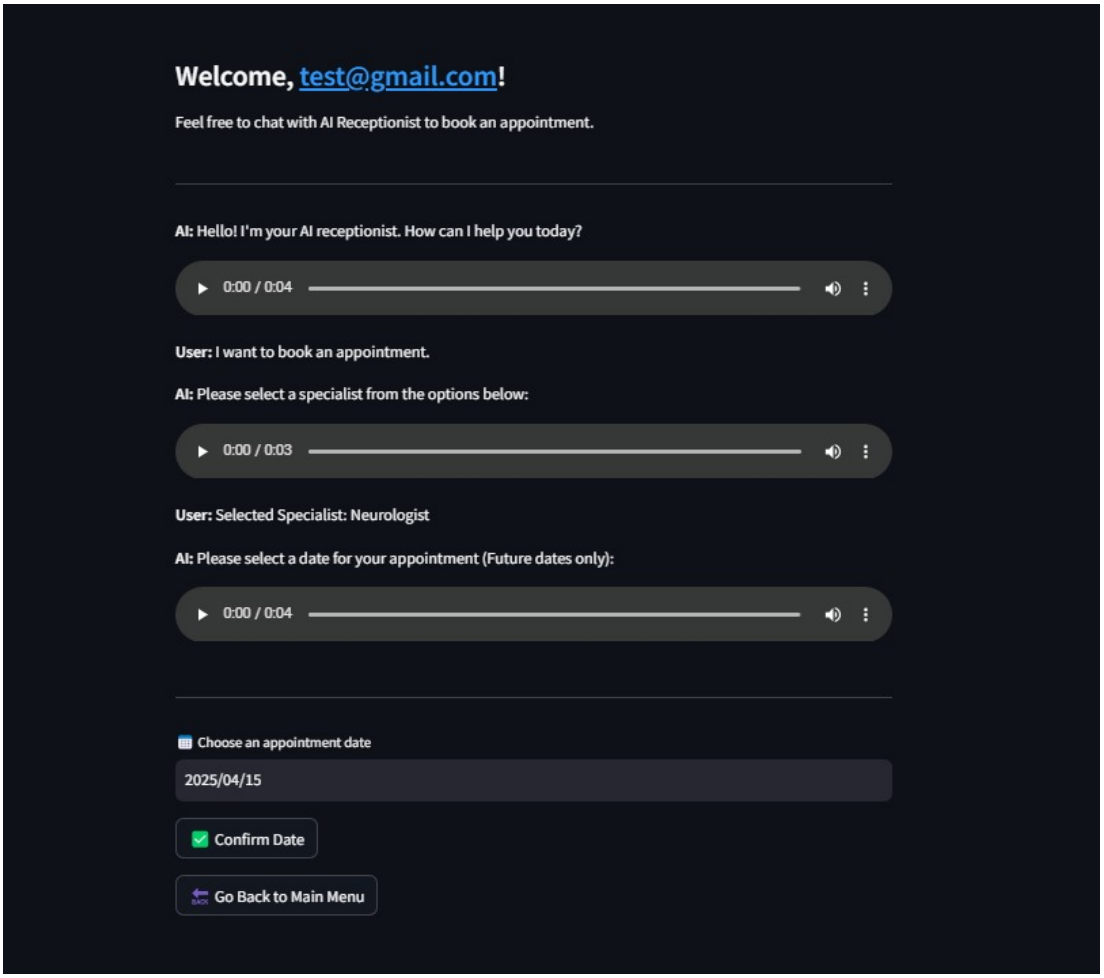
(b) Doctors face login



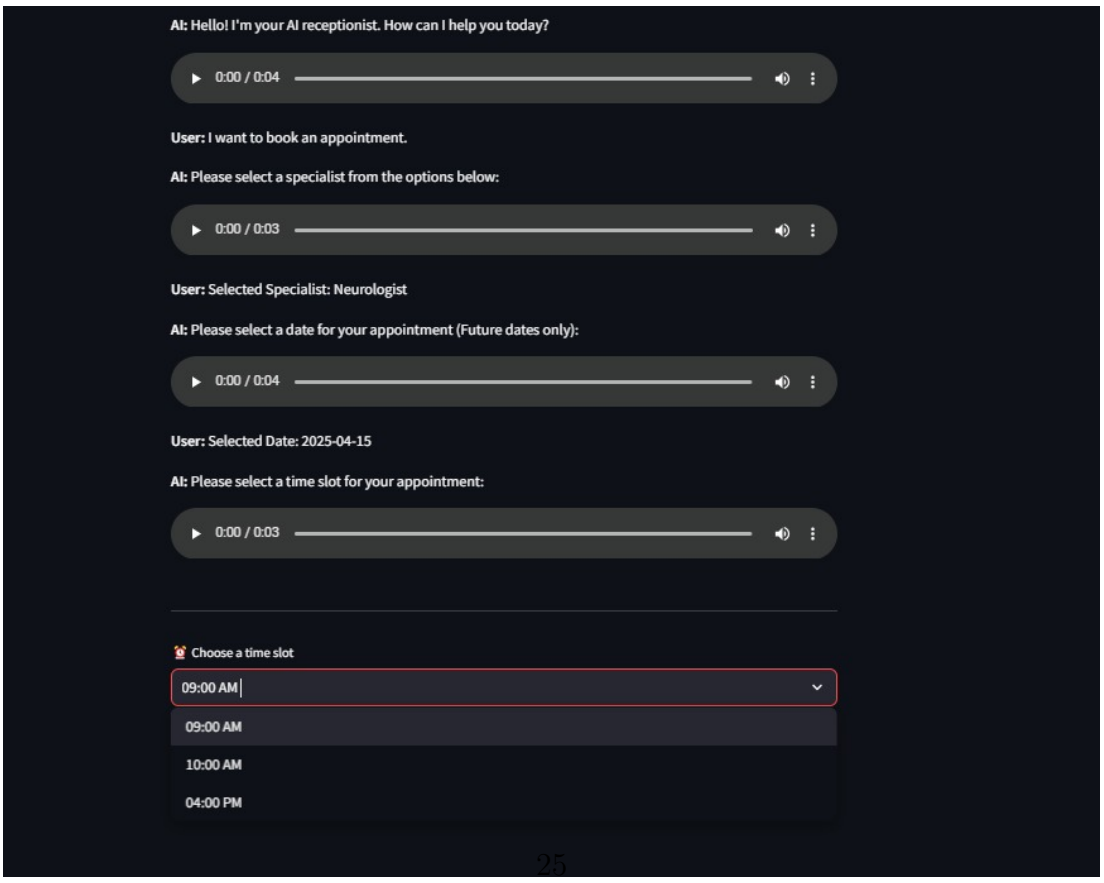
(a) Chatbot



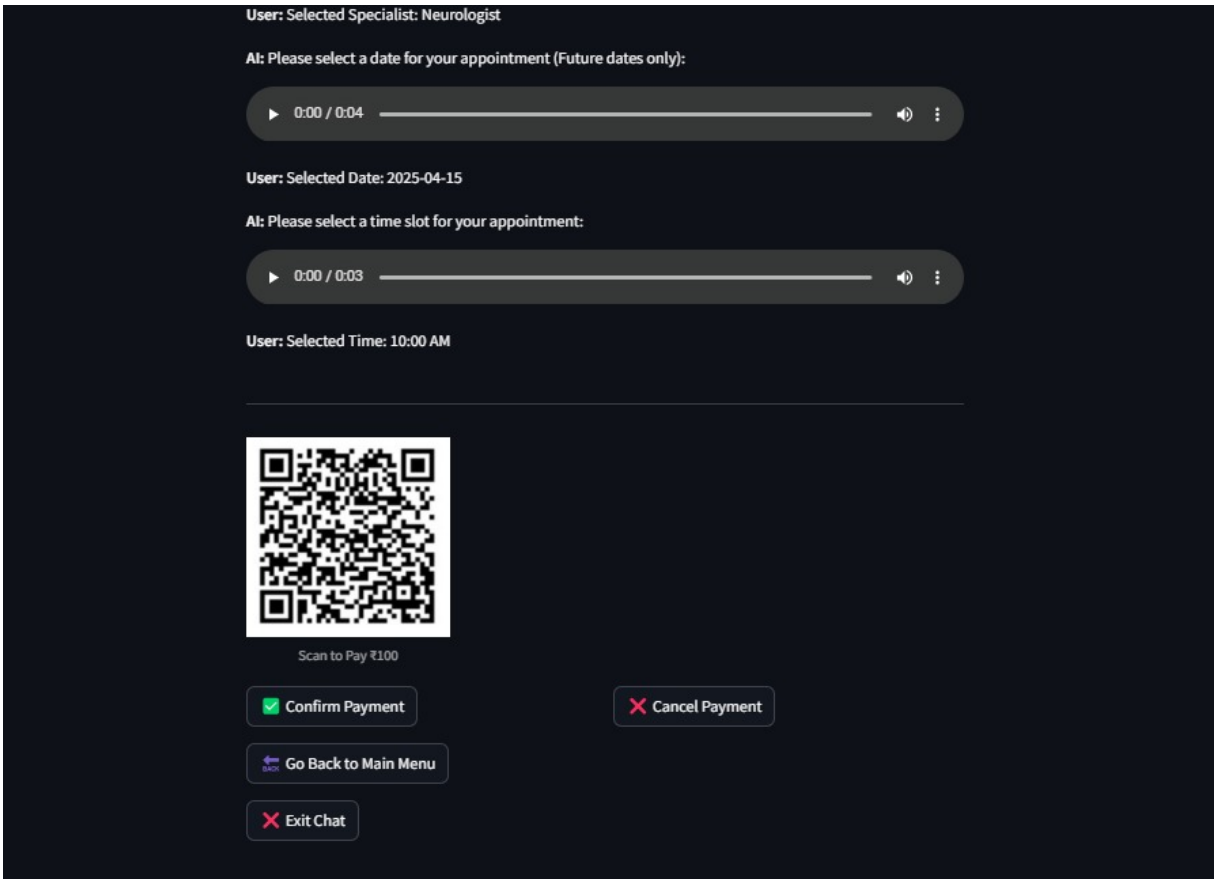
(b) Chatbot cont...



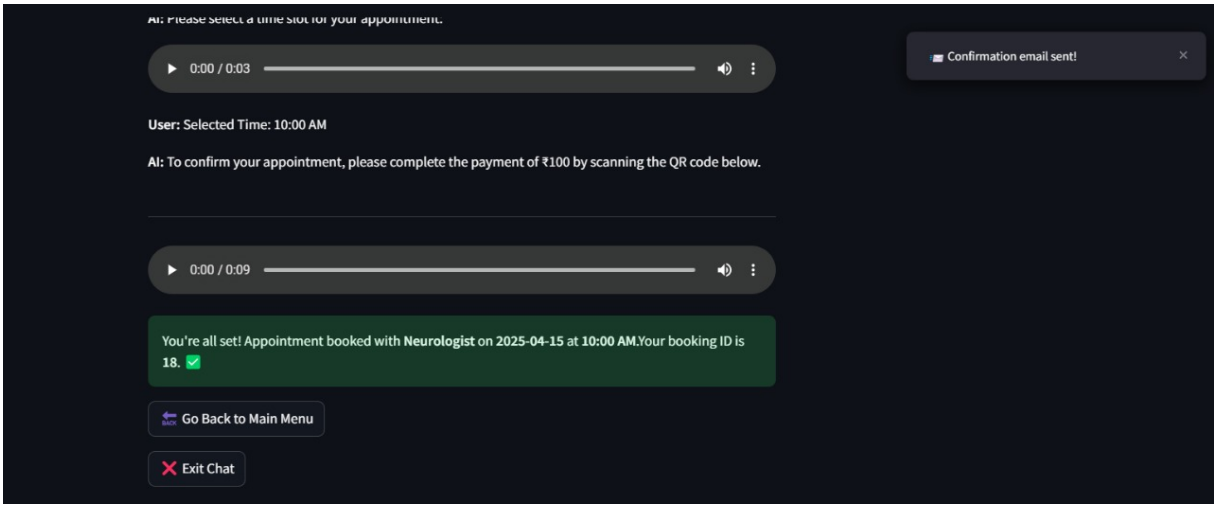
(a) Date selection



(b) Time allotment



(a) Payment method



(b) Booking done

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[2] E. J. Hwang, B. K. Ahn, J. Y. Lim, B. A. Macdonald, and H. S. Ahn, "Robot dialog system in the context of hospital receptionist and its demonstration," *International Journal of Social Robotics*, vol. 15, pp. 679–687, 2023.

[3] O. M. Ahmed, Y. Li, and A. Hadaegh, "A smart receptionist implementing facial recognition and voice interaction," *International Journal of Image Processing*, vol. 15, no. 3, pp. 37–40, 2021. [Online]. Available: https://www.cscjournals.org/journals/IJIP/description.php

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Appendix A: Presentation

AI RECEPTIONIST

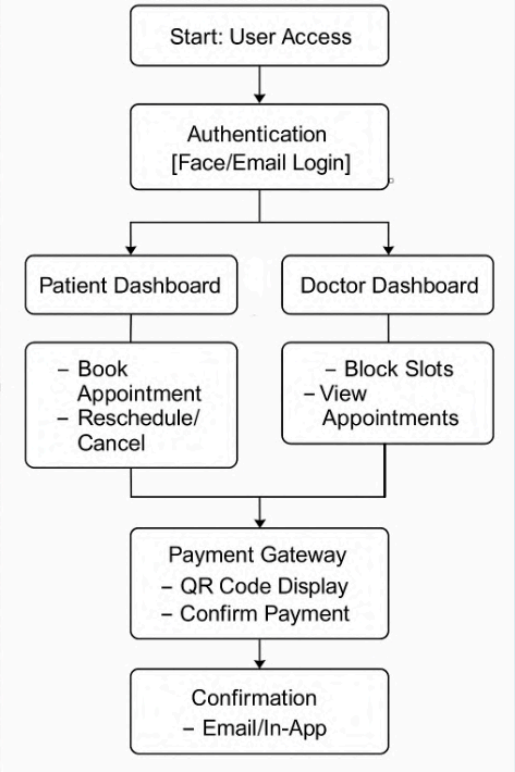
Guide : Mr. Sebin Jose

Febin Jose
Jerin Varghese
Joel Antony Joshy
Joel John Jestin

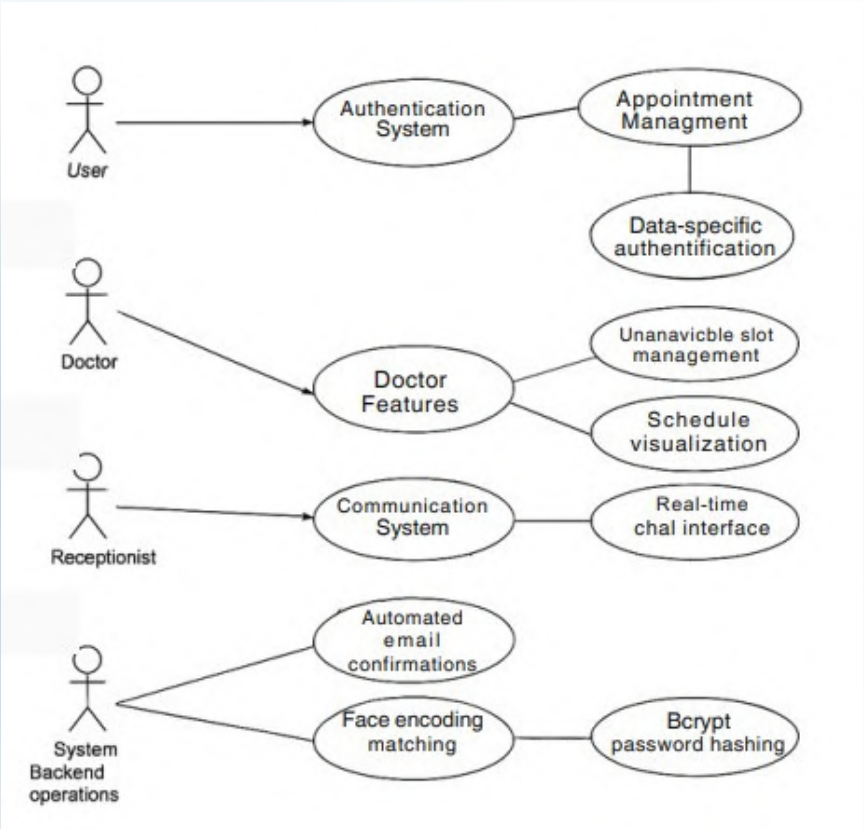
INTRODUCTION

- The AI Receptionist is an intelligent appointment management system that automates user authentication, scheduling, and communication between patients and doctors.
- It uses facial recognition and email login for secure authentication, incorporating bcrypt password hashing and face encoding.
- Patients can book, reschedule, or cancel appointments through their dashboard.
- Doctors can manage availability by blocking slots and viewing scheduled appointments.
- The system features real-time slot management to prevent double bookings.
- It integrates a communication system with automated email confirmations and a real-time chat interface.
- A secure payment gateway with QR code display and payment confirmation ensures seamless transactions.
- Once an appointment is confirmed, users receive notifications via email and in-app alerts.

SYSTEM ARCHITECTURE



USE CASE DIAGRAM



MODULES

1. FACE RECOGNITION AUTHENTICATION MODULE

Purpose:
Secure login using facial recognition or fallback email/password.

How it works:
Uses the face_recognition library (built on dlib) to detect faces.

Converts faces into 128-dimension encodings and compares them with stored data.

Implementation:
OpenCV captures live video from a webcam/IR camera.

Encodings are stored as binary blobs in a database (SQLite).

Fallback Authentication (Email/Password)

How it works:
Users can log in via email if facial recognition fails.

Implementation:
Passwords are hashed with bcrypt (12-round salt) for security.

Uses JWT tokens for session management.

Role-Based Access Control (RBAC)

How it works:
Patients see booking interfaces; doctors see schedules.

Implementation:
Database flags (is_doctor, is_patient) control UI rendering in Streamlit.

2. APPOINTMENT MANAGEMENT MODULE

Purpose:

Handles booking, rescheduling, and conflict-free scheduling.

Submodules & Implementation

Real-Time Calendar

How it works:

Shows available slots based on doctor schedules.

Implementation:

SQLAlchemy queries a SQLite database for free slots.

Uses Streamlit widgets (date picker, dropdowns) for UI.

3. CHAT AND INTERACTION MODULE

Purpose:
AI chatbot for natural language booking.

How it works:

Understands queries like “I want to book an appointment.”

Implementation:

Uses FAQ’s that are common for a patients purpose and needs that can be asked to the chatbot with needed responses

Text-to-Speech (TTS)

How it works:
Reads responses aloud for accessibility.

Implementation:
TTS (Google Text-to-Speech) converts text to audio.

How it works:
Remembers user input during multi-step bookings.

Implementation:
Uses Streamlit's session_state to track conversation flow.

4. PAYMENT MODULE

Purpose: Secure payment processing and confirmations.

Submodules & Implementation
QR-Based Payments

How it works:
Users scan a QR code to pay via UPI

Implementation:
Integrates RazorPay to generate dynamic QR codes.

Automated Confirmations

How it works:
Sends emails/app notifications after payment.

Implementation:
SMTPLib (for emails) or Firebase Cloud Messaging (for app alerts).

How it works:
Tracks payments for refunds/compliance.

Implementation:
Logs transactions in SQLite with timestamps.

How Modules Are Integrated
Frontend: Streamlit provides a unified UI for all modules.

Backend:
Python scripts connect modules (e.g., facial recognition → booking).

SQLite acts as the central database for user/auth, appointments, and payments.

APIs:
Payment gateways like RazorPay are used.

SOFTWARE AND HARDWARE REQUIREMENTS

AI & Backend Libraries:

Python 3.8+ (primary language).

Dlib + face_recognition (facial recognition).

OpenCV (camera/image processing).

SQLAlchemy + SQLite/PostgreSQL (database).

gTTS (Google Text-to-Speech).

Frameworks & Tools:

Streamlit (for the web-based UI).

Payment Integration:

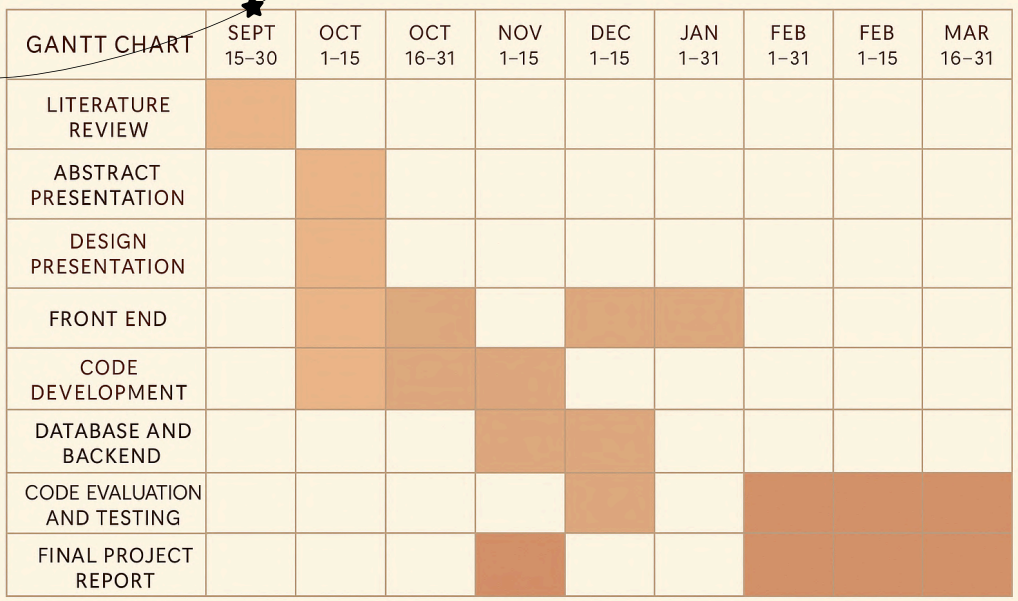
RazorPay or UPI QR APIs (for transactions).

Security & Compliance:

Bcrypt (password hashing).

SSL/TLS (HTTPS for data encryption).

GANTT CHART



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[5] S. Akinpelu, S. Viriri, and A. Adegun, “Lightweight deep learning framework for speech emotion recognition,” IEEE Access, vol. 11, pp. 77 086–77 101, 2023.

THANK YOU

Presented by
Project Group 17

Appendix B: Vision, Mission, Programme Outcomes and Course Outcomes

Appendix B

Vision: To become a Centre of Excellence in Computer Science & Engineering, moulding professionals catering to the research and professional needs of national and international organizations.

Mission: To inspire and nurture students, with up-to-date knowledge in Computer Science & Engineering, Ethics, Team Spirit, Leadership Abilities, Innovation and Creativity to come out with solutions meeting the societal needs.

Program Outcomes:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

PSO1: Computer Science Specific Skills: The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of computer science and thereby engage in national grand challenges.

PSO2: Programming and Software Development Skills: The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.

PSO3: Professional Skills: The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur.

Course Outcomes

CO1: Model and solve real world problems by applying knowledge across domains.

CO2: Develop products, processes, or technologies for sustainable and socially relevant applications.

CO3: Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks.

CO4: Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.

CO5: Identify technology/research gaps and propose innovative/creative solutions.

CO6: Organize and communicate technical and scientific findings effectively in written and oral forms.

Appendix C: CO-PO-PSO Mapping

Appendix C

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	2	1	2	2	2	1	1	1	1	2	3		
CO 2	2	2	2		1	3	3	1	1		1	1		2	
CO 3									3	2	2	1			3
CO 4					2			3	2	2	3	2			3
CO 5	2	3	3	1	2							1	3		
CO 6					2			2	2	3	1	1			3

3/2/1: high/medium/low