BSDS-02

Remote Patient Monitoring System

FINAL PROJECT REPORT

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Github Link:
https://github.com/anasnorani1/Remote-Patient-Monitoring-System-OOP-Project

Remote Patient Monitoring System

1. Introduction

In an era of increasing demand for remote healthcare solutions, this project—**Remote Patient Monitoring System (RPMS)**—was developed to bridge the gap between patients and healthcare providers. The system offers real-time appointment scheduling, vital health data sharing, prescription management, emergency alerts, and video consultations. It is designed to provide a user-friendly, role-based platform that facilitates seamless interactions among **Patients**, **Doctors**, and **Administrators**.

2. Objectives

- To facilitate efficient remote health monitoring.
- To provide a secure and interactive platform for doctors and patients.
- To ensure real-time communication and decision-making through appointment scheduling, feedback, and emergency alerts.
- To automate backend processes such as email notifications, data visualization, and system logs.

3. Technologies Used

Component	Technology
Frontend	Java FX
Backend	Java
Database	MySQL
Data Handling	CSV for vital sign uploads
Email Notifications	SMTP / Jakarta Mail
Data Visualization	JFreeChart

4. System Architecture

The system operates on a **role-based access model**, featuring:

- **Patient Dashboard**
- **Doctor Dashboard**
- **Admin Dashboard**

Each role has distinct access rights and functionalities, connected to a unified database, with automatic **email notifications** for key events such as appointment confirmations, video call invites, and emergency alerts.

5. System Workflow

5.1 Patient Dashboard

Authentication:

- Secure login connected to the MySQL database.

Functional Modules:

1. **Upload Vitals**
    - Upload .csv files containing patient vitals (e.g., blood pressure, heart rate).
    - Data is stored in the database and viewable by the doctor.
2. **View Doctor Feedback**
    - Displays the feedback provided by the respective doctor after reviewing vitals or appointments.
3. **Book Appointment**
    - Patients can book appointments with available doctors.
    - Requests are sent to the **Admin**, who approves or rejects them.
    - Email notification is sent to the patient with status.
4. **View Scheduled Appointments**
    - Displays all accepted appointments with relevant details.
5. **Emergency Panic Button**
    - Allows patients to send emergency alerts with a description.
    - Triggers an email to the doctor and includes an optional **video call request**.
6. **Send Messages**
    - Triggers an email to the doctor and includes an optional **video call request**.
    - Can Send Messages to Doctor.
7. **Generate Report**
    - Shows prescription history and medications recommended by the doctor.
8. **Change Password**

- Allows patients to update their credentials securely.

9. **Logout**
    - Ends the session and returns to the login page.

5.2 Doctor Dashboard

Authentication:

- Login credentials authenticated via database.

Functional Modules:

1. **View Appointments**
    - View scheduled appointments booked and approved via the Admin.
2. **View Vitals**
    - Displays uploaded patient vitals in **graphical format** (charts).
    - Enables trend analysis and historical review.
3. **Provide Feedback**
    - Allows the doctor to write observations or health advice visible to the patient.
4. **Prescribe Medications**
    - Doctor inputs prescriptions, which are stored and shown in the patient's report section.
5. **Send Reminder**
    - Email reminders can be sent to specific patients for follow-up visits or medication adherence.
6. **Initiate Video Call**
    - A **video meeting link** (e.g., Zoom, Meet) can be entered and sent to a patient via email for virtual consultations.
7. **View Chat History**
    - Displays patient-initiated messages for follow-up or concerns.
8. **Change Password**
    - Secure mechanism to change password.
9. **Logout**
    - Terminates session securely.

5.3 Admin Dashboard

Authentication:

- Admin access is protected by secure login credentials.

Functional Modules:

1. **Add/Edit/Delete Users**
    - Admin can register doctors and patients.
    - Upon registration, **login credentials are sent via email**.
    - Admin can update or delete user records.
2. **View Appointments**
    - **Requested Appointments**: View and manage appointment requests (approve/reject).
    - **Scheduled Appointments**: Displays all confirmed appointments across the system.
3. **Send Email**
    - Custom email interface for communication with patients or doctors.
4. **System Logs**
    - Tracks all administrative actions (e.g., user creation, appointment handling).

6. Database Design (Summary)

The MySQL database includes the following key tables:

1. admins table

- **Stores administrative details like admin ID, CNIC, and password.**
- **Primary Key: admin_id**
- **Unique Key: cnic**

2. appointment_requests table

- **Contains information about patients' requests for appointments with doctors.**
- **Primary Key: id**
- **Foreign Keys:**
    - **patient_id references patients(id)**
    - **doctor_id references doctors(doctor_id)**

3. appointments table

- **Represents confirmed appointments between patients and doctors.**
- **Primary Key: id**
- **Foreign Keys:**
    - **patient_id references patients(id)**
    - **doctor_id references doctors(doctor_id)**

4. emergency_alerts table

- **Captures emergency alerts for patients.**
- **Primary Key: id**
- **Foreign Keys:**
    - **patient_id references patients(id)**
    - **doctor_id references doctors(doctor_id)**

5. feedback table

- **Stores feedback from patients about their experiences with doctors.**
- **Primary Key: feedback_id**
- **Foreign Keys:**
    - **doctor_id references doctors(doctor_id)**
    - **patient_id references patients(id)**

6. messages table

- **Allows for communication between patients and doctors, with optional video call requests.**
- **Primary Key: id**

7. patients table

- **Contains patient information like name, age, contact details, and illness.**
- **Primary Key: id**

8. prescriptions table

- **Stores details about prescribed medicines for patients.**
- **Primary Key: prescription_id**
- **Foreign Keys:**

- **doctor_id references doctors(doctor_id)**
- **patient_id references patients(id)**
- **appointment_id references appointments(id)**

9. system_logs table

- **Logs various system activities and actions performed within the application.**
- **Primary Key: id**

10. vital_signs table

- **Captures the vital signs of patients, like heart rate, oxygen level, temperature, and blood pressure.**
- **Primary Key: id**
- **Foreign Key:**
  - **doctor_id references doctors(doctor_id)**

Key Relationships:

- **Patients and Doctors are central to most of the tables:**
  - **appointment_requests, appointments, feedback, prescriptions, and vital_signs are all linked to both the patients and doctors tables.**
- **Emergency Alerts and Appointments can be traced to both patients and doctors, ensuring that doctors and patients have access to the relevant data.**
- **Feedback and Prescriptions tables enable patients to give feedback and receive prescriptions, connected to doctors and appointments.**

7. Email Notification System

Email alerts are triggered in the following scenarios:

- Appointment request approvals or rejections.
- Doctor reminders to patients.
- Emergency alerts.
- Have communication between doctor and patient.
- Login credentials sent to new users.
- Video call meeting invitations from doctors.

8. Security Measures

- **Role-Based Access Control (RBAC)** ensures data privacy and role limitations.
- Password encryption and secure password update functionality.
- Session-based login/logout for all users.
- Admin-controlled data management.

9. Key Features Summary

Role	Feature	Description
Patient	Upload Vitals	Via CSV, saved in database
	View Feedback & Prescriptions	See doctor inputs and historical reports
	Book/View Appointments	Schedule and monitor appointment statuses
	Emergency Panic Button	Sends alerts and optional video call request
	Change Password	Secure credentials update
Doctor	View Vitals with Charts	Historic visualization for accurate diagnosis
	Provide Feedback & Prescribe Medicines	Shared with patients via their dashboard
	Initiate Video Call	Meeting link sent via email
	Send Reminder	Email reminder for meds or appointments
Admin	Manage Users	Add/edit/delete patient and doctor accounts
	Handle Appointments	Approve/reject/view appointment requests
	Send Emails & View Logs	Communication and tracking of actions

10. Conclusion

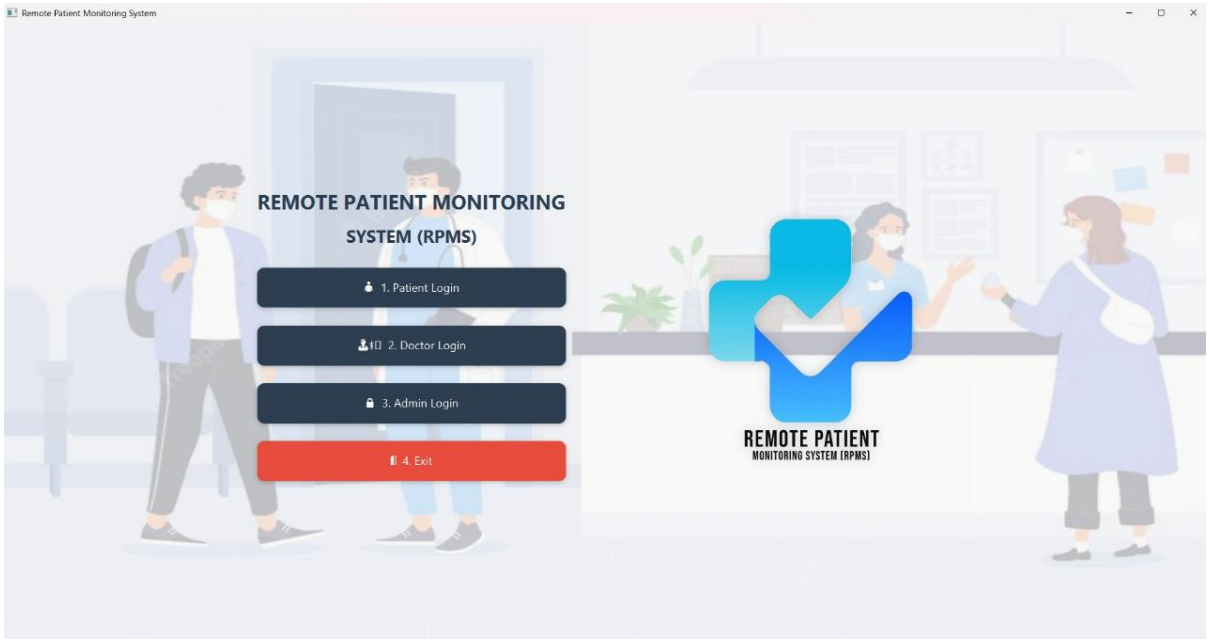
The Remote Patient Monitoring System is a comprehensive, secure, and scalable platform that meets the modern requirements of telehealth. By enabling doctors to monitor patients remotely, provide feedback, and respond to emergencies, the system fosters better healthcare outcomes. Integration of chart visualization, appointment management, and video consultation makes the platform highly practical and efficient.

11. Future Enhancements

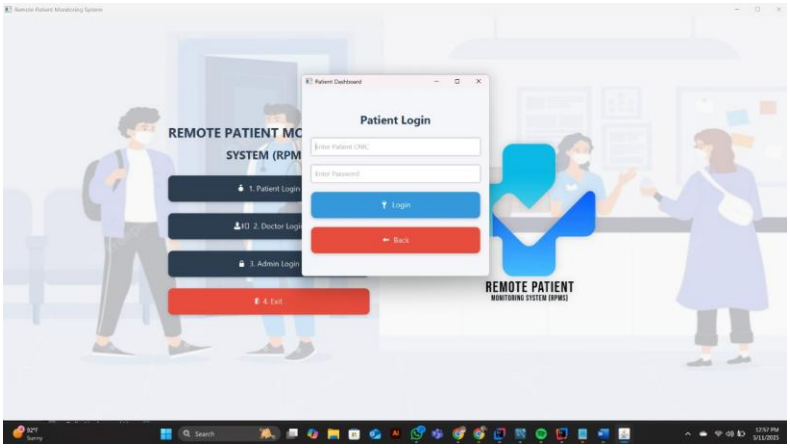
- Integration with IoT wearable devices for real-time vitals.
- In-built video conferencing feature.
- Mobile app development.
- Advanced analytics for predictive health insights.
- Multi-language support for broader accessibility.

12. ScreenShots:

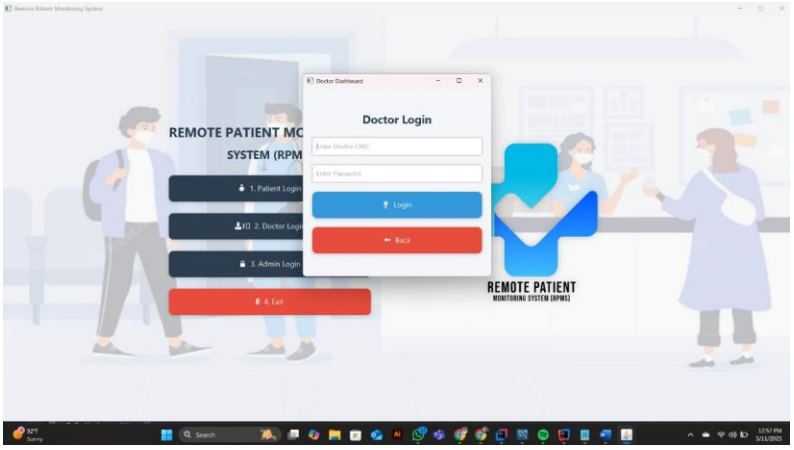
Main Login Page



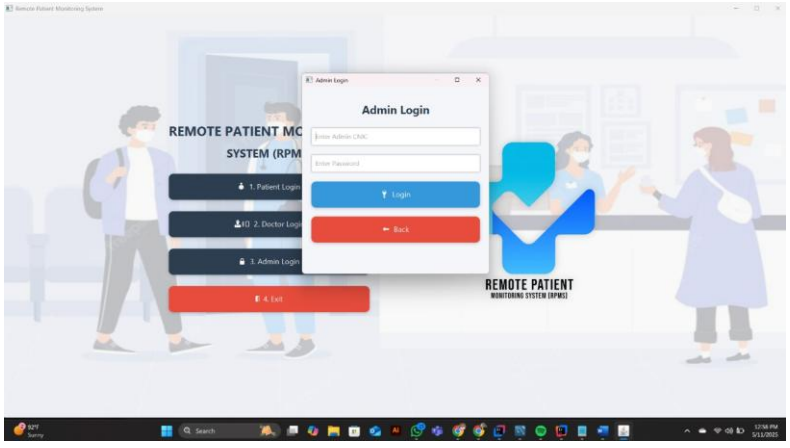
Patient Login Credentials



Doctor Login Credentials

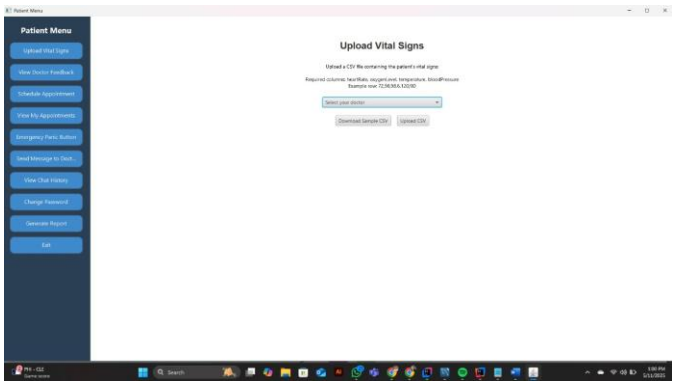


Admin Login Credentials

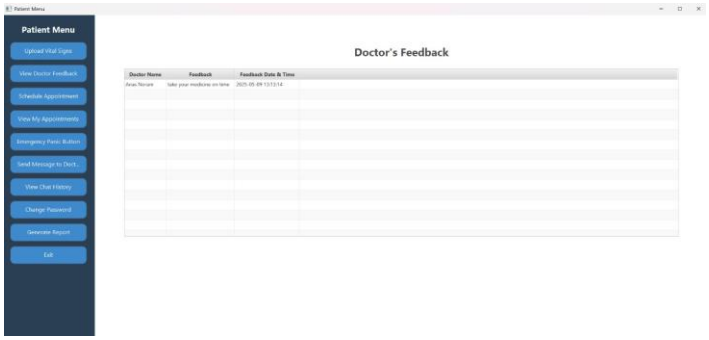


Patient dashboard

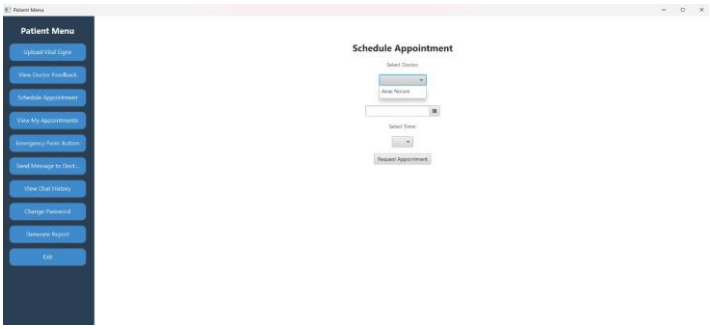
Uploading vitals



Doctor's Feedback



Scheduling Appointment



Your Appointment Update Inbox ×

Remote Patient Monitoring System
to me

Hello Norani Anas,

Dear Norani Anas,

Your appointment has been approved.

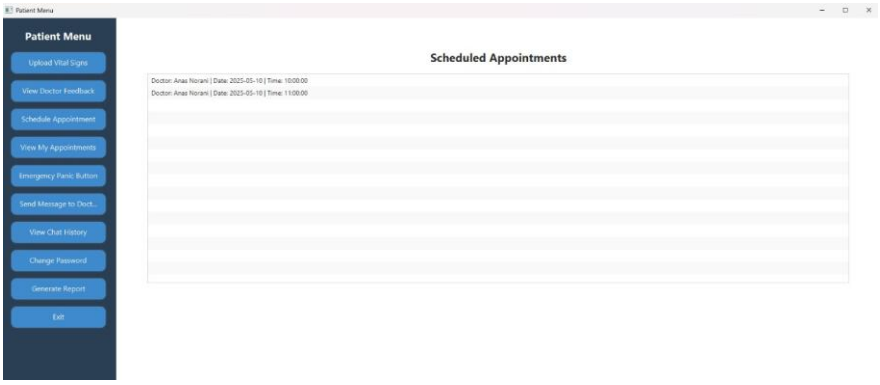
Date: 2025-05-10
Time: 10:00:00

Thank you.

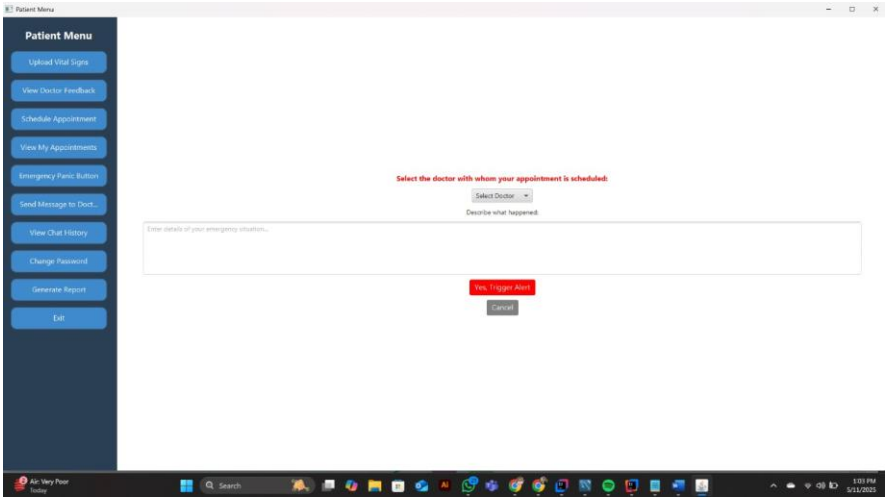
For questions, reply to this email.

© 2025 Remote Patient Monitoring System

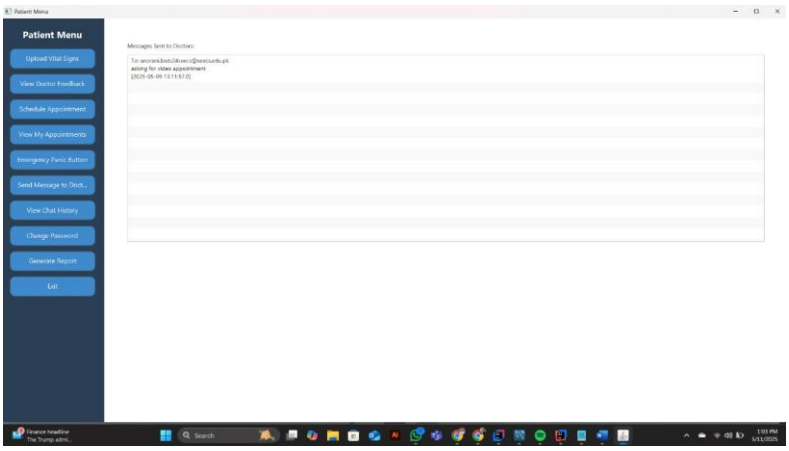
Scheduled Appointments



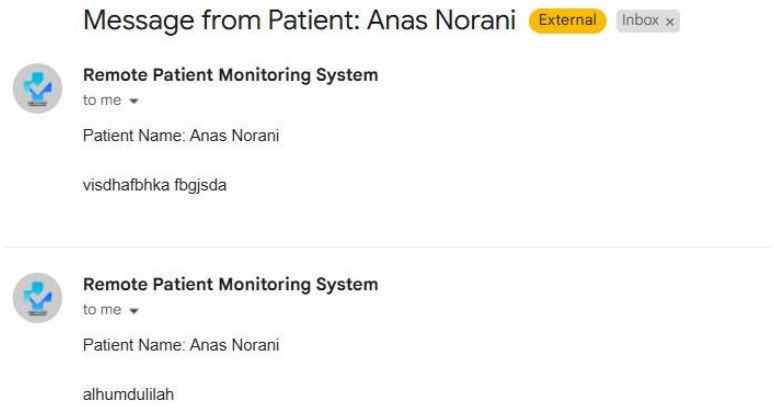
Panic Button



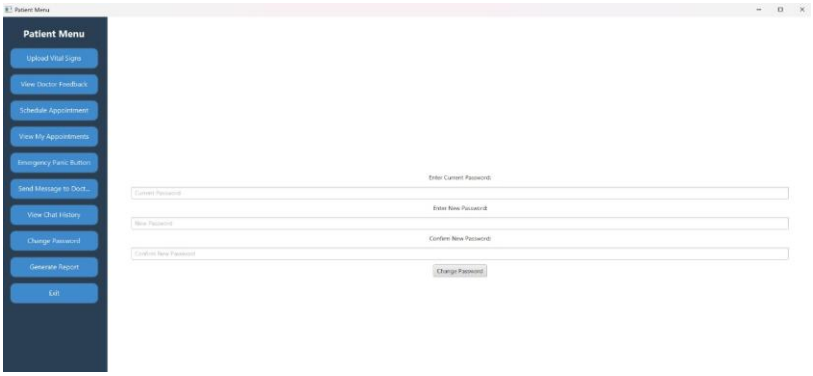
Chat History



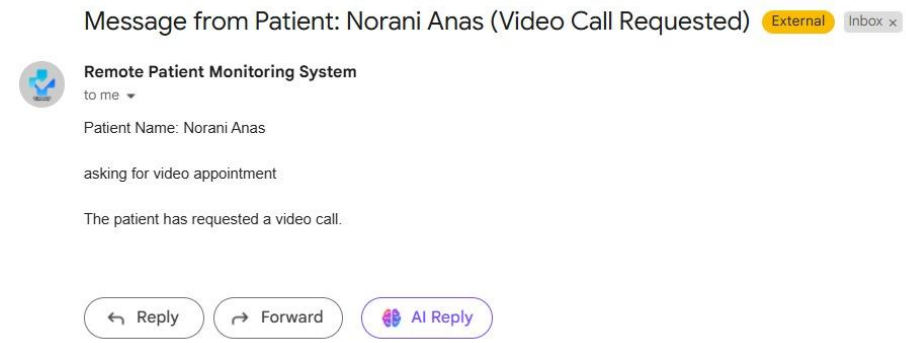
Patient sending messages



Change Password



Request for video call



Message from Patient: Norani Anas (Video Call Requested) External Inbox ×

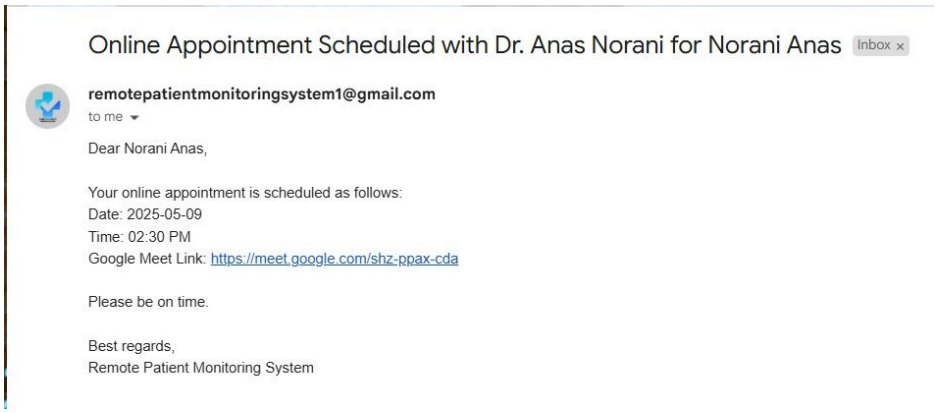
Remote Patient Monitoring System
to me

Patient Name: Norani Anas

asking for video appointment

The patient has requested a video call.

Reply Forward AI Reply



Online Appointment Scheduled with Dr. Anas Norani for Norani Anas Inbox ×

remotepatientmonitoringsystem1@gmail.com
to me

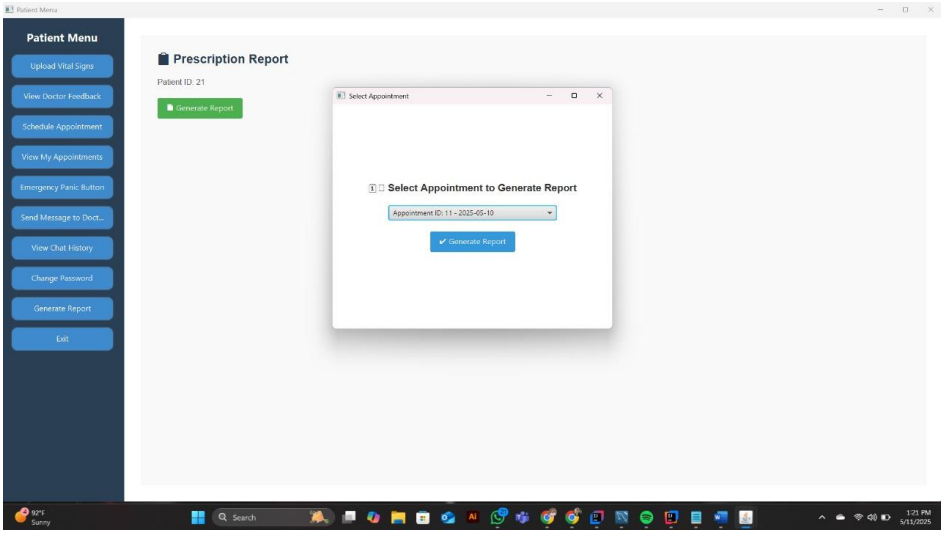
Dear Norani Anas,

Your online appointment is scheduled as follows:
Date: 2025-05-09
Time: 02:30 PM
Google Meet Link: https://meet.google.com/shz-ppax-cda

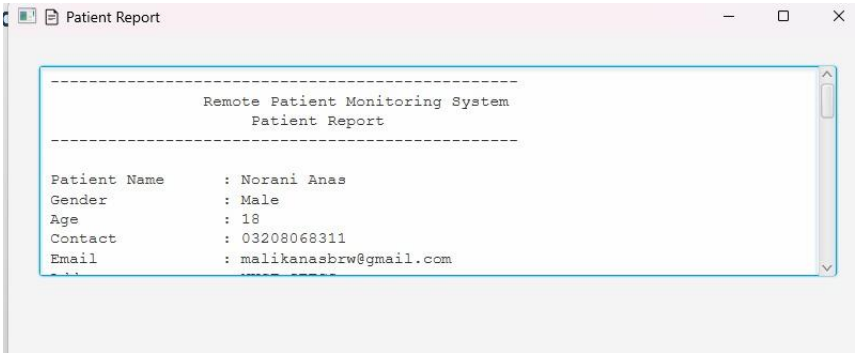
Please be on time.

Best regards,
Remote Patient Monitoring System

Generate Report

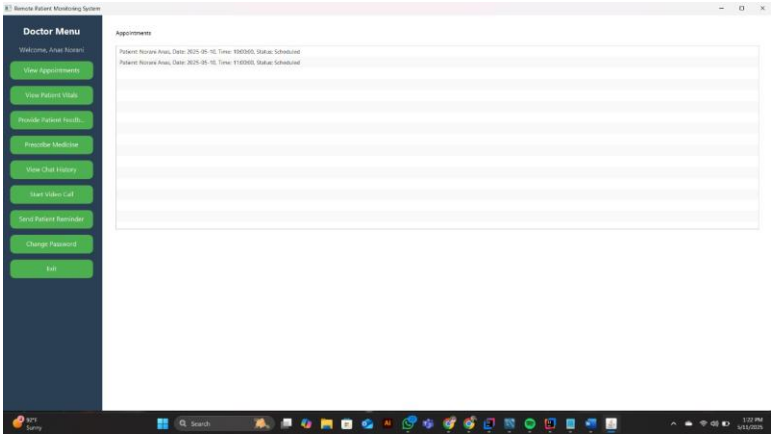


Report

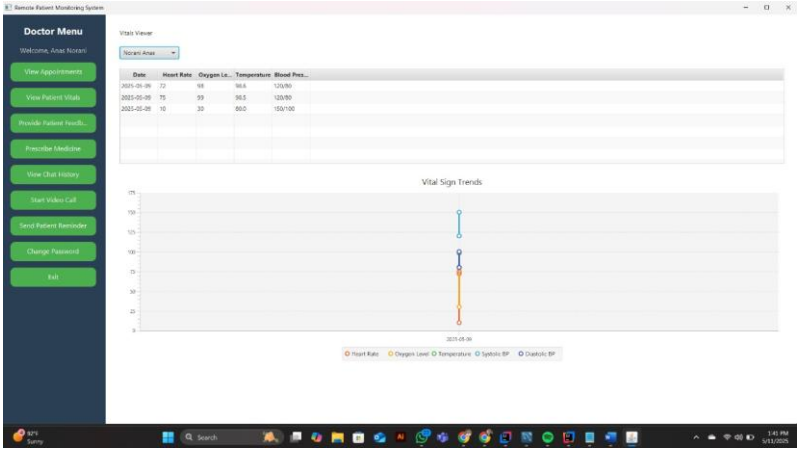


Doctor Dashboard

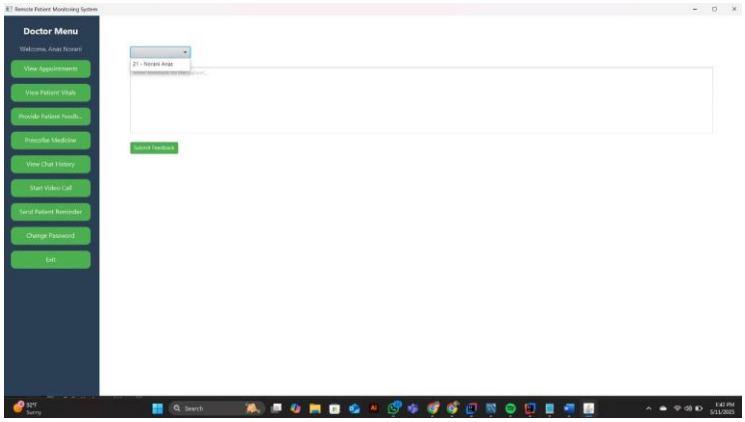
Doctor Appointment



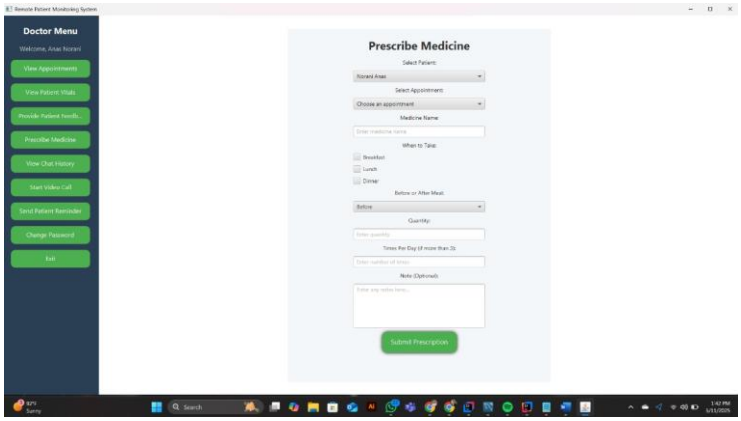
Vital Viewer



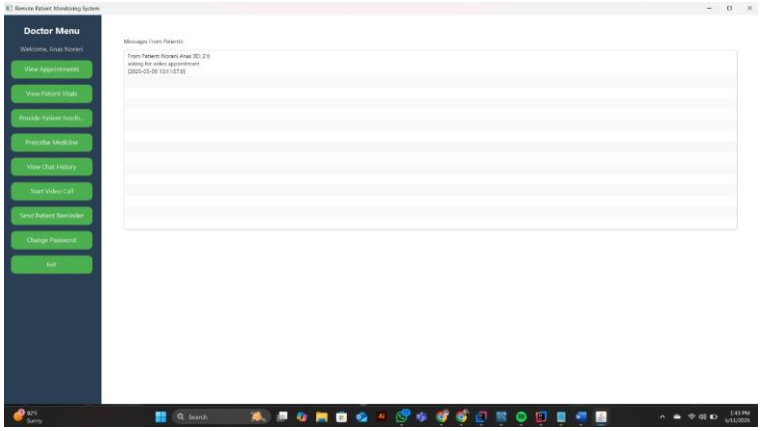
Provide Feedback



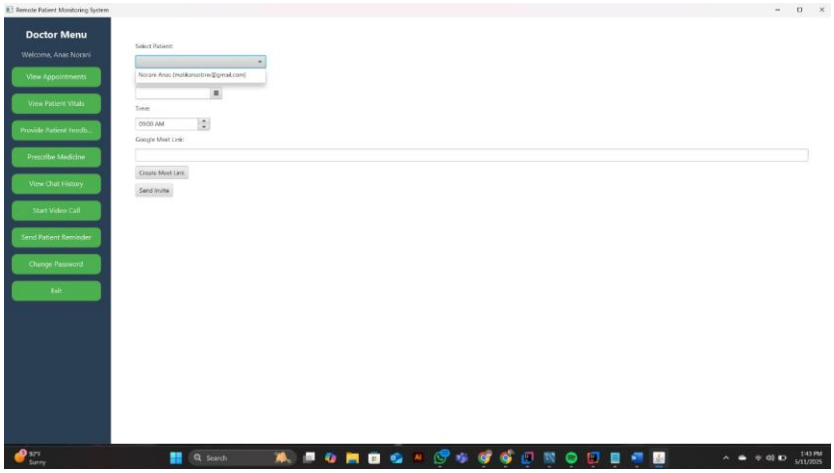
Prescribe medicine



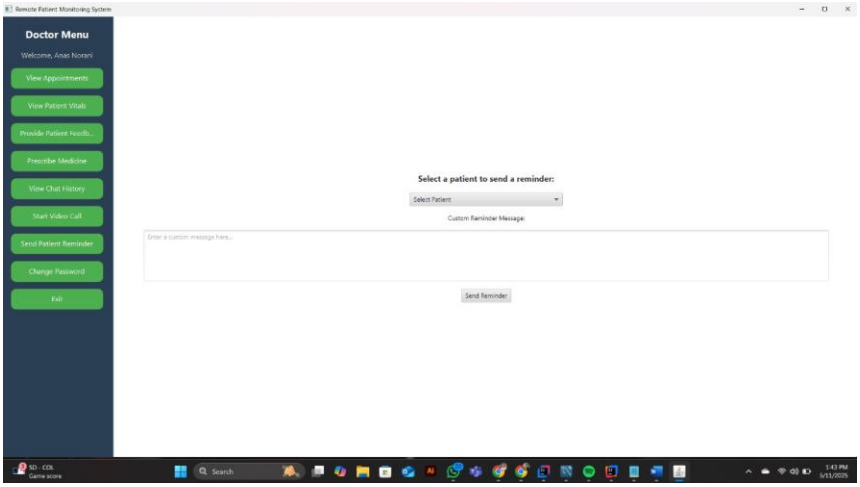
Chat history



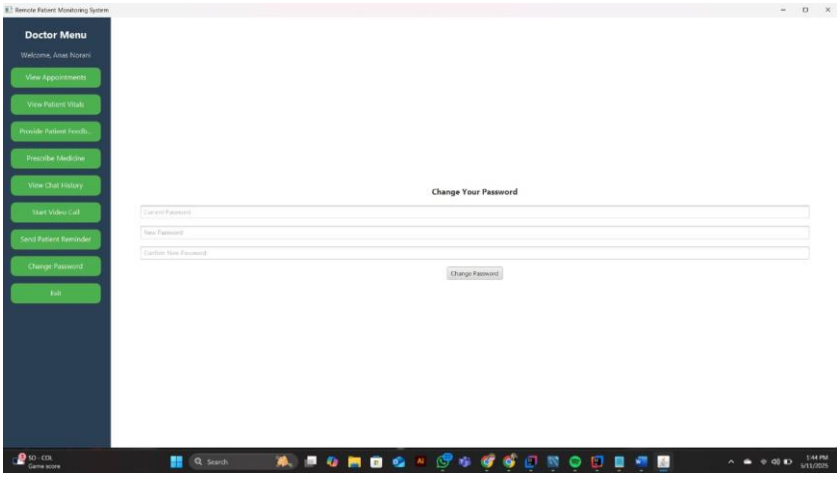
Video Call



Send Reminder

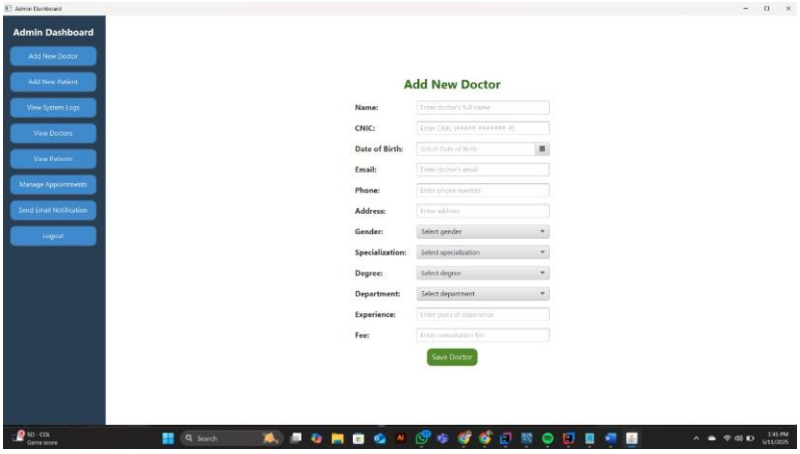


Change Password



Admin dashboard

Add new Doctor



Your Login Credentials - Remote Hospital Monitoring System External Inbox ×

remotepatientmonitoringsystem1@gmail.com
to me

Dear Dr. Anas Norani,

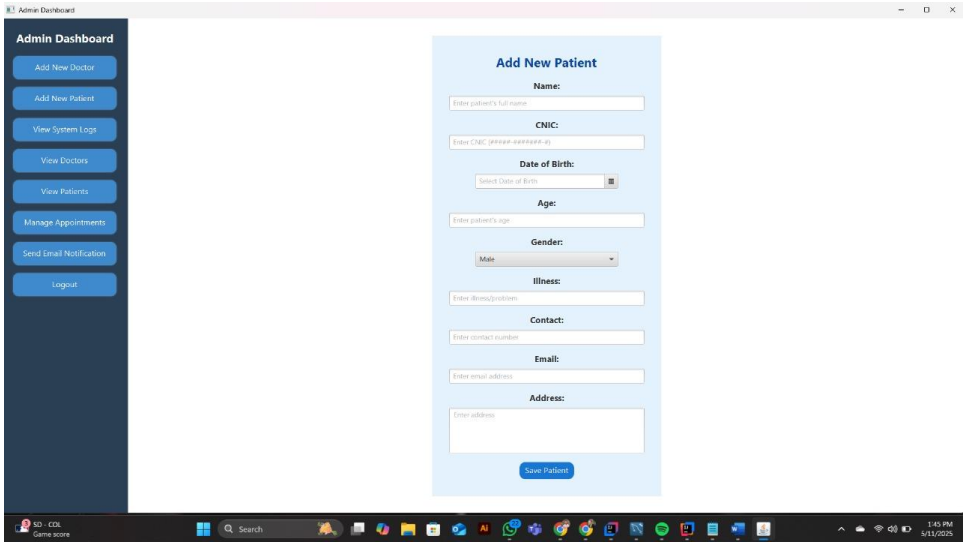
You have been successfully registered in Remote Hospital Monitoring System.

Username: 36601-4673227-1
Password: UV4Hvkgg

Please change your password after first login.

Regards,
Hospital Admin

Add new Patient



Your RPMS Account Credentials Inbox ×

remotepatientmonitoringsystem1@gmail.com
to me

Hello, Norani Anas!

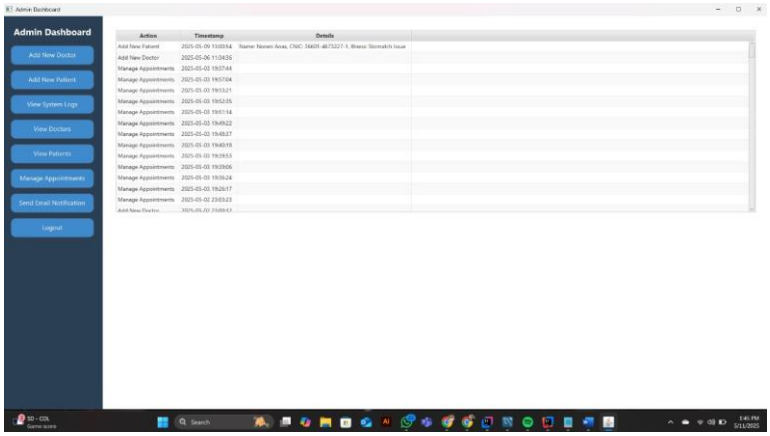
Your account has been created with the following credentials:

Username: 36601-4673227-1
Password: Za2UuMfWEa

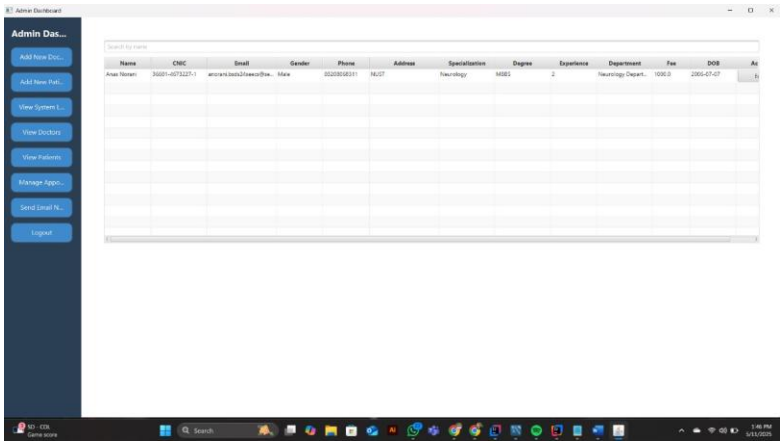
Please keep this information secure.

Best regards,
RPMS Team

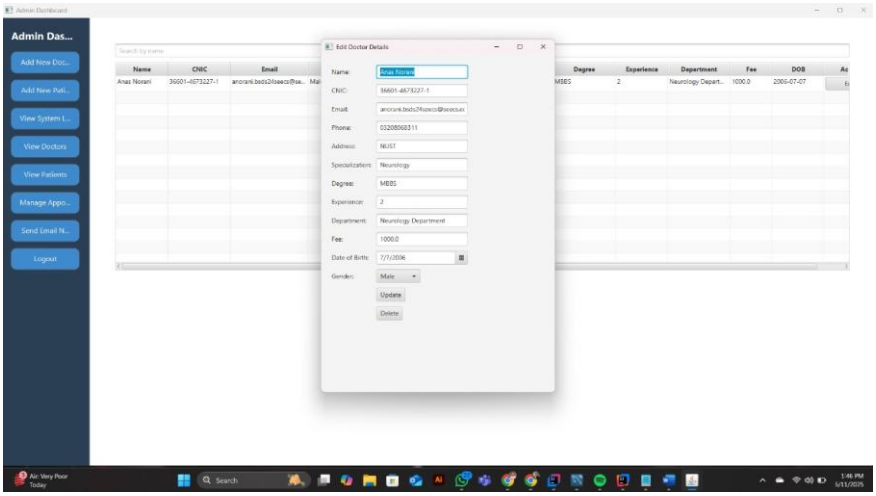
System logs



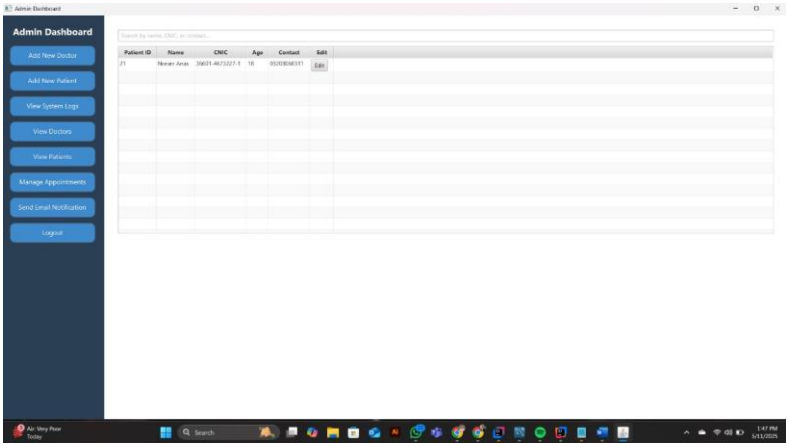
View Doctors



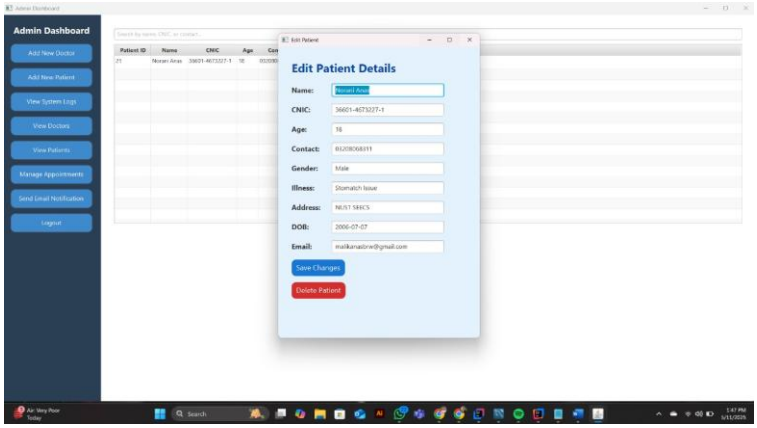
Edit or Delete doctor



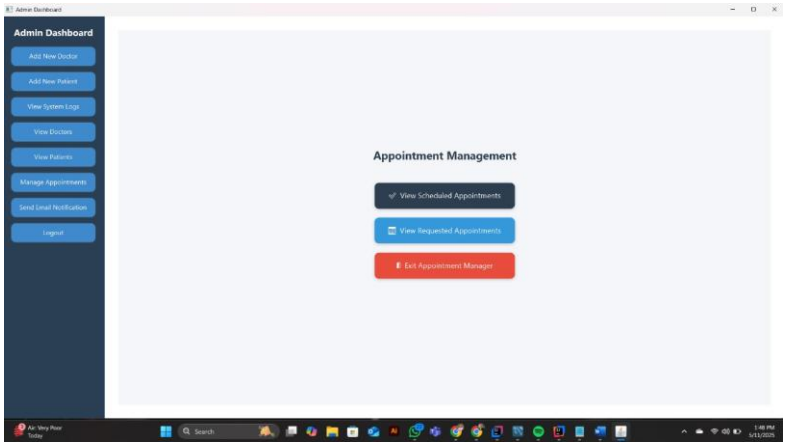
View Patients



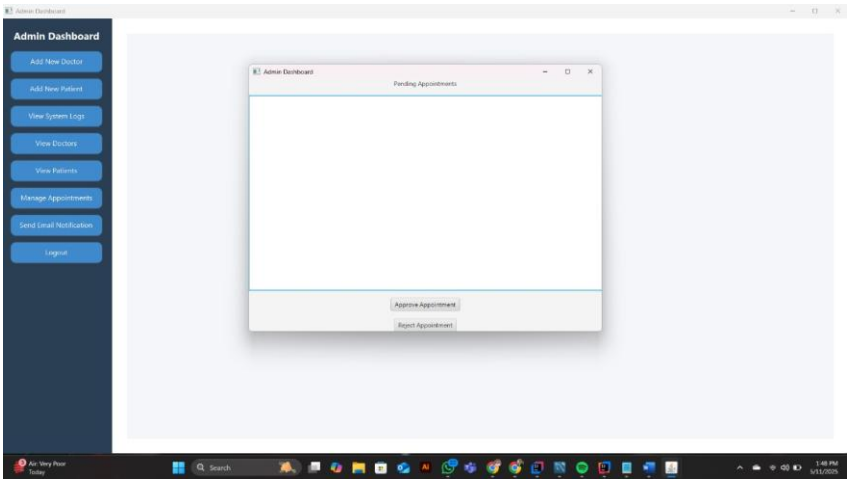
Edit or delete Patient



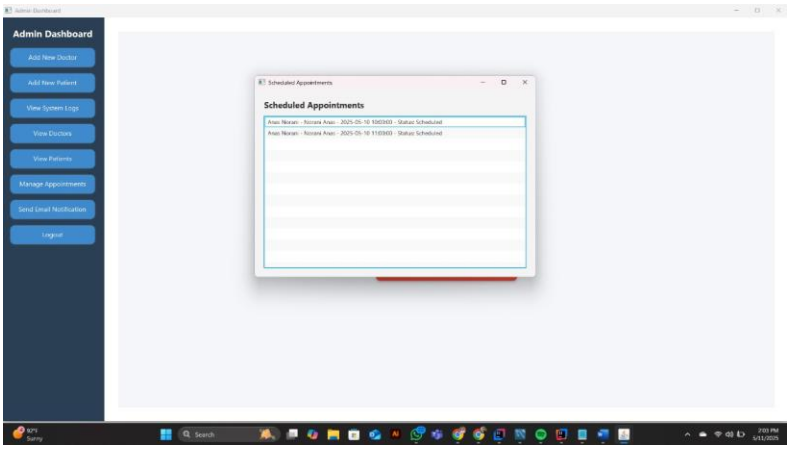
Appointment manager



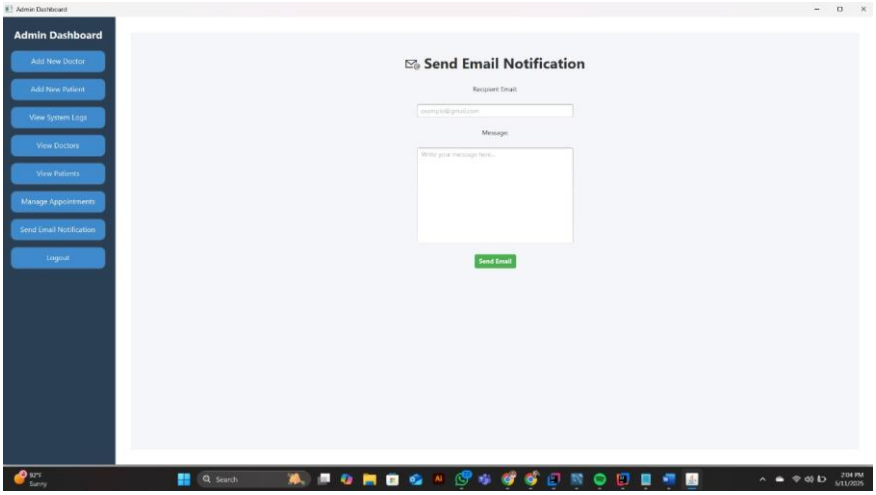
Appointments requested by patient



All scheduled appointments in admin dashboard



Send email notifications



13. CSV Samples

Sample CSV Data:

HeartRate,OxygenLevel,Temperature,BloodPressure

A1 | heartRate

	A	B	C	D
1	heartRate	oxygenLevel	temperature	bloodPressure
2	10	20	30	150/100