

# CS432 – Module 3 Task Report

Medical Dispensary Management System for IIT Gandhinagar

---

## Team Members

- Harshith Venigalla (22110283)
  - Sai Charan Miriyala (22110153)
  - Sriram Srinivasan (22110258)
  - Pavan Deekshith (22110190)
- 

## 1. Introduction

We developed a secure, database-integrated **Medical Dispensary Management System** for IIT Gandhinagar as part of CS432 Module 3. This system supports:

- Appointments,
- Prescriptions,
- Staff management,
- Inventory control, and
- Emergency handling.

It integrates seamlessly with the **centralized Campus Information Management System (CIMS)** and enforces **session-based validation**, **role-based access control**, and **logging mechanisms**.

## 2. System Architecture

### 2.1 Database Design

We use **two databases** in compliance with project guidelines:

#### Centralized CIMS Database (cs432cims)

Used without duplication:

- **members**: Stores user identity information.
- **login**: Manages credentials and session tokens.
- **members\_group\_mapping**: Maintains user-role mapping.

#### Project-Specific Database (cs432g12)

Custom tables for dispensary operations:

- **G12\_Doctors**: Doctor profiles.
- **Staff**: Non-medical staff.
- **Appointments**: Doctor-patient bookings.
- **Prescriptions**: Doctor-issued prescriptions.
- **Medications**: Medicine inventory.
- **MedicinesGiven**: Medicine dispensation records.
- **Students**: Details of student users.
- **Vehicles**: Ambulance tracking.
- **HospitalReferrals**: Partner hospitals for referrals.
- **EmergencyCases**: Emergency patient records.
- Supporting tables like **DoctorAvailability**, **Referrals**, etc.

No central tables like **members** or **login** were duplicated.

### 2.2 System Components

| Component         | Description                                 |
|-------------------|---|
| Authentication    | Session validation via JWT tokens           |
| Role-Based Access | Roles: Admin, Doctor, Staff, Student        |
| Frontend          | Responsive UI with separate views per role  |
| API Layer         | RESTful APIs with session & role validation |

|                |  |
|----------------|--|
| <b>Logging</b> | Logs all access and data changes locally and to server |
|----------------|--|

## 3. Implementation Details

### 3.1 Member Creation (Task 1)

When new members are created:

- We insert into `members` (CIMS).
- Corresponding `login` entry is added with default hashed credentials.
- Role is linked via `members_group_mapping`.

### 3.2 Role-Based Access Control (Task 2)

Implemented via backend decorators:

- Admin: Full access to all modules.
- Doctor: View appointments, add prescriptions.
- Staff: Manage inventory and ambulance requests.
- Student: Book appointments and view history. Unauthorized access attempts are blocked and logged.

### 3.3 Member Deletion (Task 3)

Handled carefully to maintain integrity:

- If a member has other group links: only `members_group_mapping` is updated.
- Else: remove from both `members` and `login`.

### 3.4 Table Creation (Task 4)

All dispensary-specific tables were created only in `cs432g12`, with appropriate foreign key constraints referencing CIMS tables.

### 3.5 API Development (Task 5)

All APIs:

- Use middleware to verify session tokens via `/isValidSession`.
- Restrict admin-level functions via role-check decorators.
- Log both successful and failed operations locally and to a server log file.
- Unauthorized direct DB access is flagged and logged.

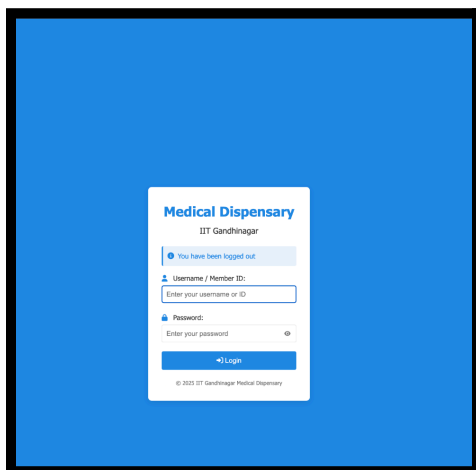
### 3.6 Logging Changes (Task 6)

- Every API call that modifies CIMS data logs both:
  - **Local log** (`logs/changes.log`)
  - **Server log** (via logging microservice)
- Transactions without valid sessions are not logged on server, exposing any bypass attempts.

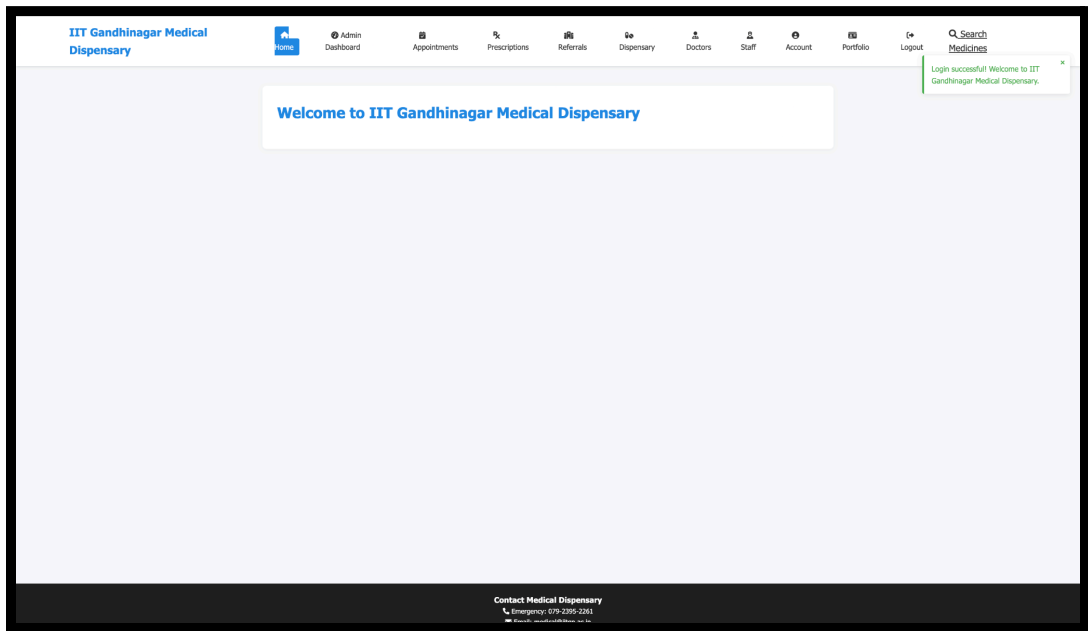
## 4. User Interface Showcase

### 4.1 Login System

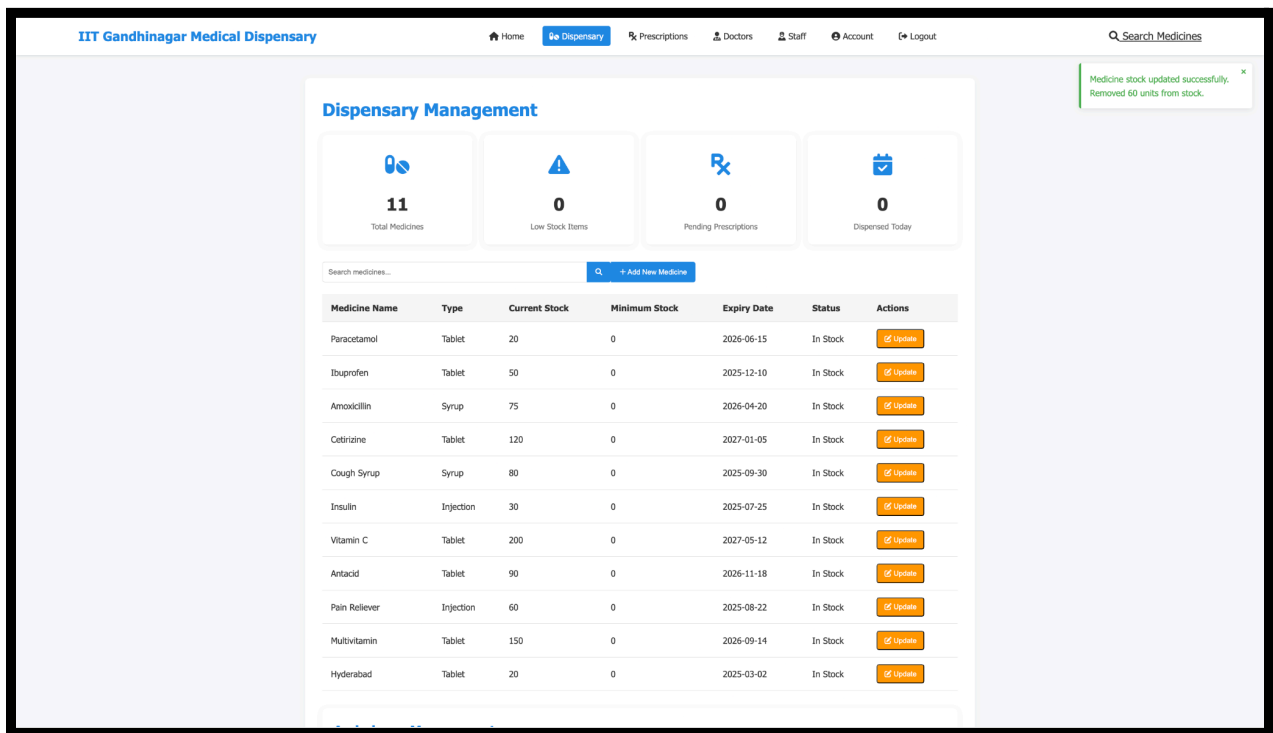
- Secure password hashing (bcrypt)
- JWT token issuance
- Role-based dashboard redirection



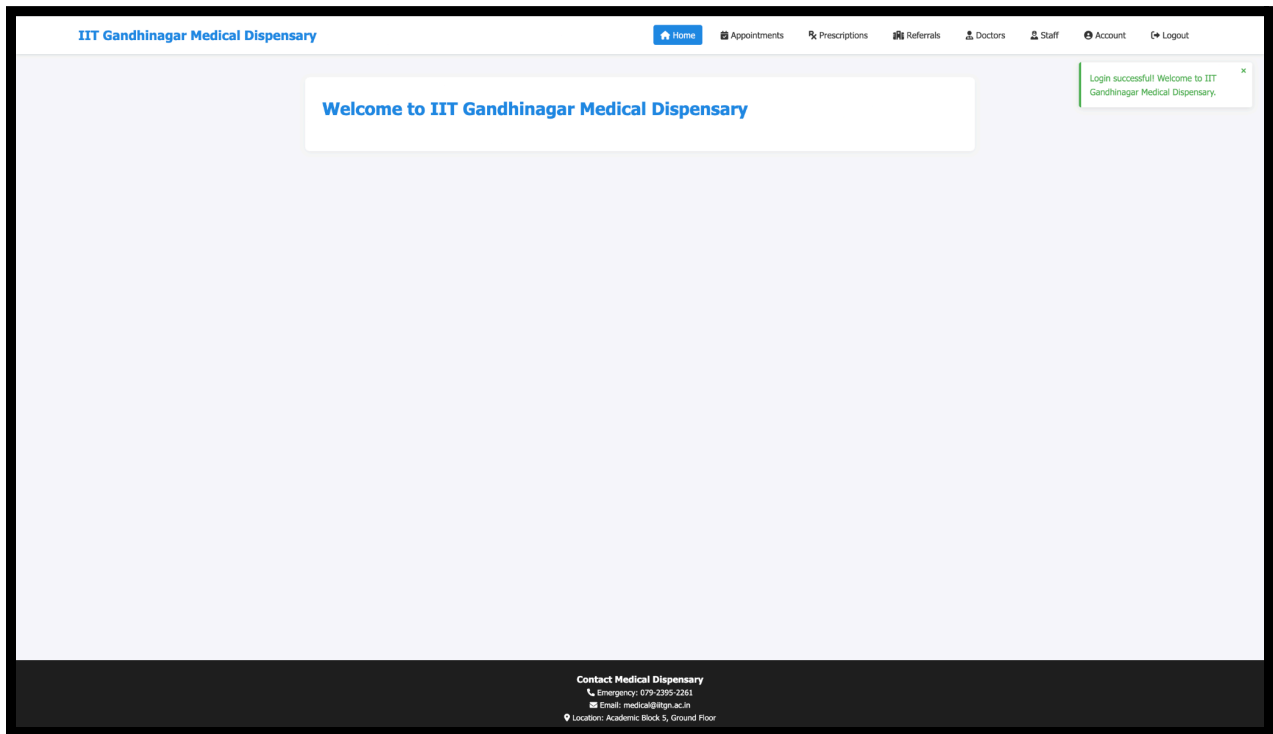
For Admin:



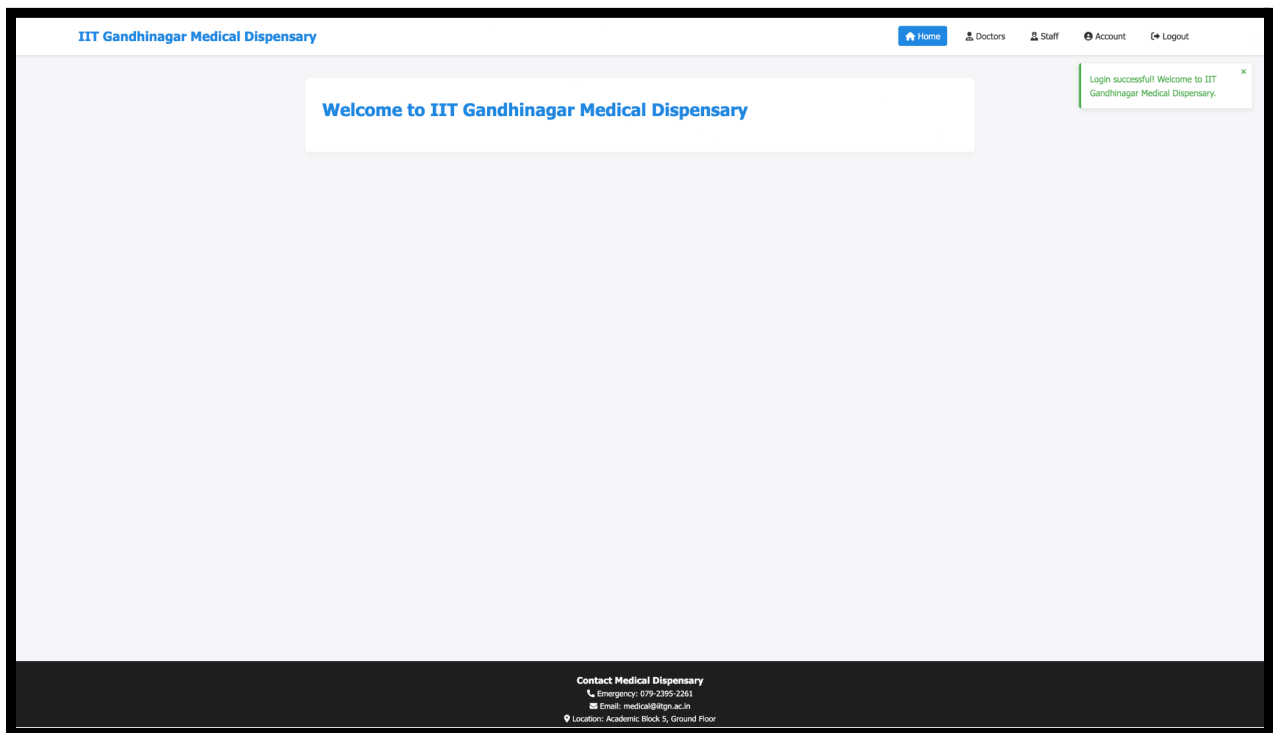
For Staff:



For Doctors:



For students:



## 4.2 Dispensary Dashboard (Staff)

- Track stock and low inventory

The screenshot displays the IIT Gandhinagar Medical Dispensary Staff Dashboard. The top navigation bar includes links for Home, Dispensary, Prescriptions, Doctors, Staff, Account, and Logout. A search bar for medicines is located on the right. The main section, titled "Dispensary Management", features four summary cards: Total Medicines (11), Low Stock Items (0), Pending Prescriptions (0), and Dispensed Today (0). Below these cards is a table listing various medicines with their current stock, minimum stock, expiry date, status, and an update button. A green notification box in the top right corner states: "Medicine stock updated successfully. Removed 60 units from stock."

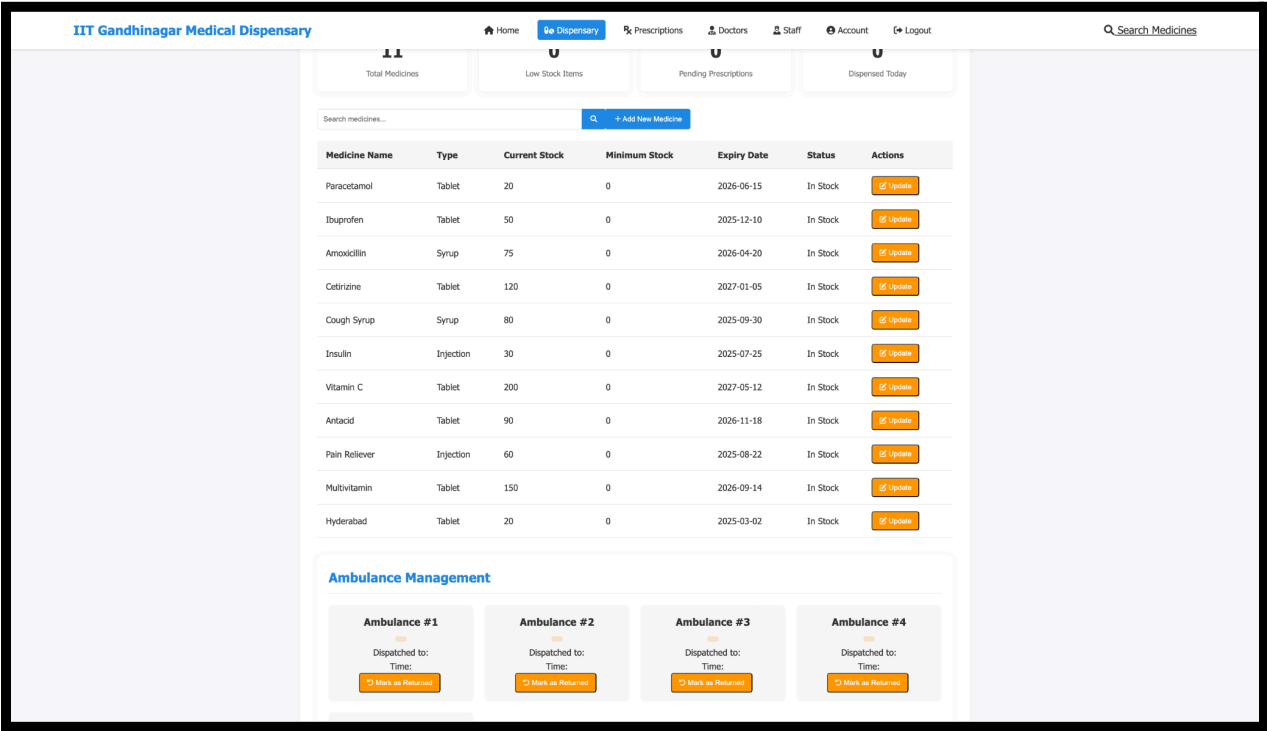
| Medicine Name | Type      | Current Stock | Minimum Stock | Expiry Date | Status   | Actions                 |
|---------------|-----------|---------------|---------------|-------------|----------|-------------------------|
| Paracetamol   | Tablet    | 20            | 0             | 2026-06-15  | In Stock | <button>Update</button> |
| Ibuprofen     | Tablet    | 50            | 0             | 2025-12-10  | In Stock | <button>Update</button> |
| Amoxicillin   | Syrup     | 75            | 0             | 2026-04-20  | In Stock | <button>Update</button> |
| Cetirizine    | Tablet    | 120           | 0             | 2027-01-05  | In Stock | <button>Update</button> |
| Cough Syrup   | Syrup     | 80            | 0             | 2025-09-30  | In Stock | <button>Update</button> |
| Insulin       | Injection | 30            | 0             | 2025-07-25  | In Stock | <button>Update</button> |
| Vitamin C     | Tablet    | 200           | 0             | 2027-05-12  | In Stock | <button>Update</button> |
| Antacid       | Tablet    | 90            | 0             | 2026-11-18  | In Stock | <button>Update</button> |
| Pain Reliever | Injection | 60            | 0             | 2025-08-22  | In Stock | <button>Update</button> |
| Multivitamin  | Tablet    | 150           | 0             | 2026-09-14  | In Stock | <button>Update</button> |
| Hyderabad     | Tablet    | 20            | 0             | 2025-03-02  | In Stock | <button>Update</button> |

- Dispense and log medicines

This screenshot shows the same dashboard as the previous one, but with the "Update Medicine Stock" modal open for Paracetamol. The modal contains fields for Current Stock (20), Action (Add Stock), Amount (60), and Reason (new stock), along with an "Update Stock" button. The background table and summary cards are visible but dimmed.

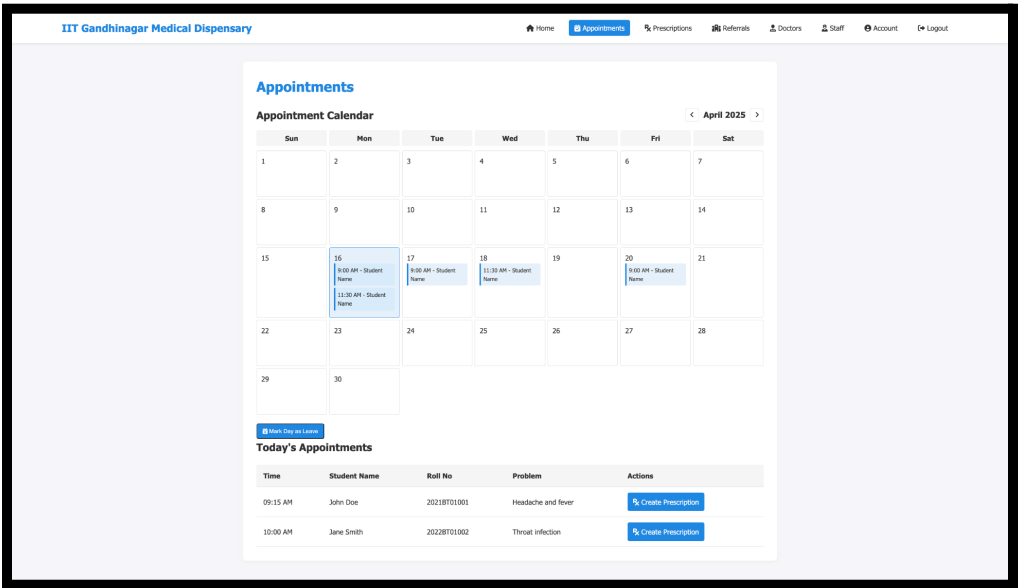
| Medicine Name | Type      | Current Stock | Minimum Stock | Expiry Date | Status   | Actions                 |
|---------------|-----------|---------------|---------------|-------------|----------|-------------------------|
| Paracetamol   | Tablet    | 20            | 0             | 2026-06-15  | In Stock | <button>Update</button> |
| Ibuprofen     | Tablet    | 50            | 0             | 2025-12-10  | In Stock | <button>Update</button> |
| Amoxicillin   | Syrup     | 75            | 0             | 2026-04-20  | In Stock | <button>Update</button> |
| Cetirizine    | Tablet    | 120           | 0             | 2027-01-05  | In Stock | <button>Update</button> |
| Cough Syrup   | Syrup     | 80            | 0             | 2025-09-30  | In Stock | <button>Update</button> |
| Insulin       | Injection | 30            | 0             | 2025-07-25  | In Stock | <button>Update</button> |
| Vitamin C     | Tablet    | 200           | 0             | 2027-05-12  | In Stock | <button>Update</button> |
| Antacid       | Tablet    | 90            | 0             | 2026-11-18  | In Stock | <button>Update</button> |
| Pain Reliever | Injection | 60            | 0             | 2025-08-22  | In Stock | <button>Update</button> |
| Multivitamin  | Tablet    | 150           | 0             | 2026-09-14  | In Stock | <button>Update</button> |
| Hyderabad     | Tablet    | 20            | 0             | 2025-03-02  | In Stock | <button>Update</button> |

- View ambulance status



## 4.3 Doctor Dashboard

- View/manage appointments





- Issue or create prescriptions

**IIT Gandhinagar Medical Dispensary**

Home Appointments **Prescriptions** Referrals Doctors Staff Account Logout

### Prescriptions

#### Create New Prescription

**Patient Information**

Name: John Doe

Roll No.: 20218701001

Diagnosis:

Notes:

**Medicines** + Add Medicine

Medicine:

Dosage: e.g., 1-0-1

Duration: e.g., 7 days

Instructions: e.g., After meals

**Hospital Referral (Optional)**

Refer to Hospital? ☐

Save Prescription

- Create referrals

**IIT Gandhinagar Medical Dispensary**

Home Appointments Prescriptions **Referrals** Doctors Staff Account Logout

### Hospital Referrals

**AIIMS Ahmedabad**

Multi-specialty

📍 Sarita Vihar, AIIMS Campus, Anand

📞 079-1234567

Create Referral

| Date       | Student      | Urgency | Status   |
|------------|--------------|---------|----------|
| 2025-04-15 | John Doe (2) | Normal  | Referred |

#### Create Hospital Referral

AIIMS Ahmedabad

Student Search:

Type student name or roll number

Reason for Referral:

Department:

Urgency Level:

Additional Notes:

Create Referral

**Contact Medical Dispensary**

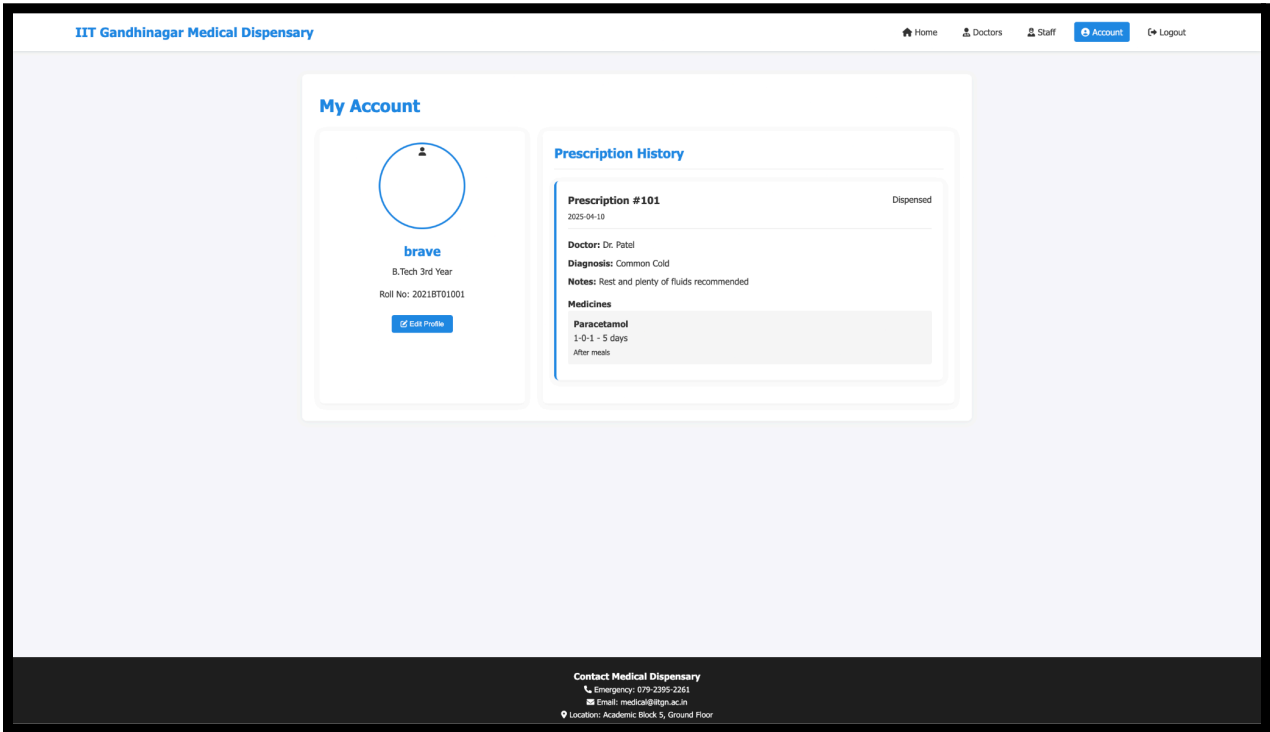
📞 Emergency: 079-2295-2261

✉ Email: medicaldispensary@iitg.ac.in

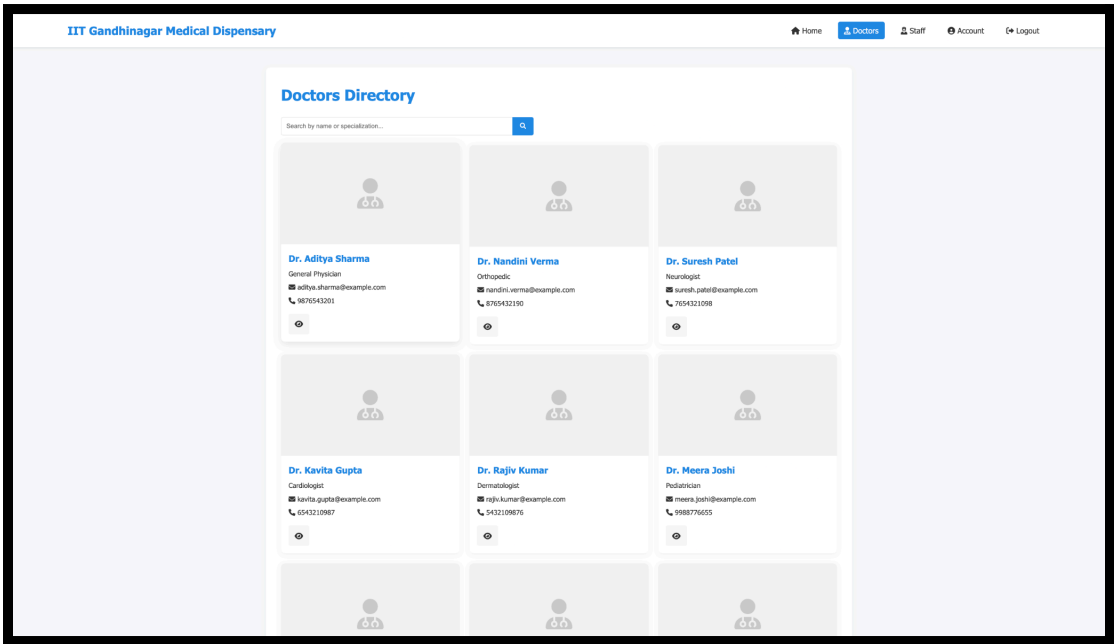
📍 Location: Academic Block 1, Ground Floor

## 4.4 Student Dashboard

- View prescriptions



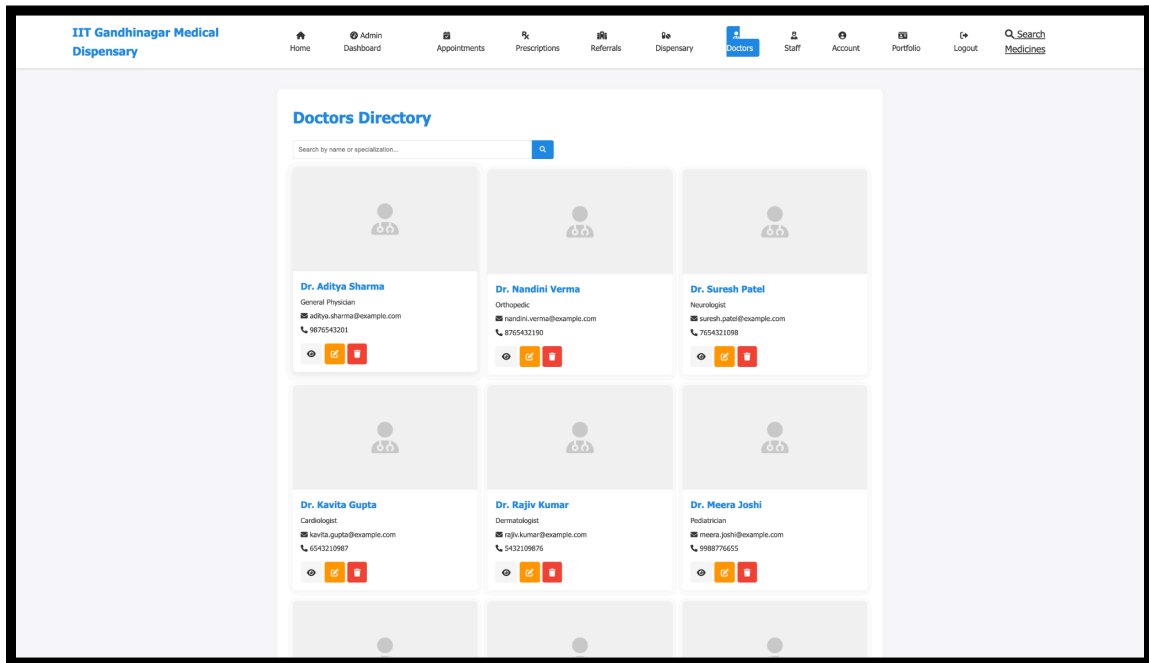
- Browse doctors and staff



## 5. Admin Features

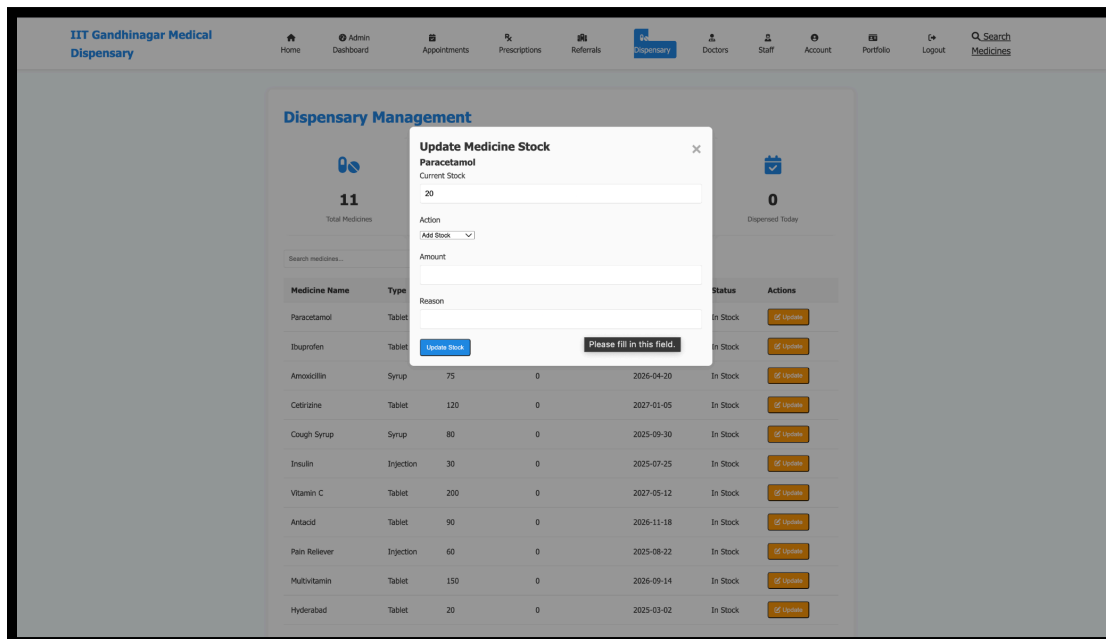
Admins can:

- Add/edit/delete users (via API)

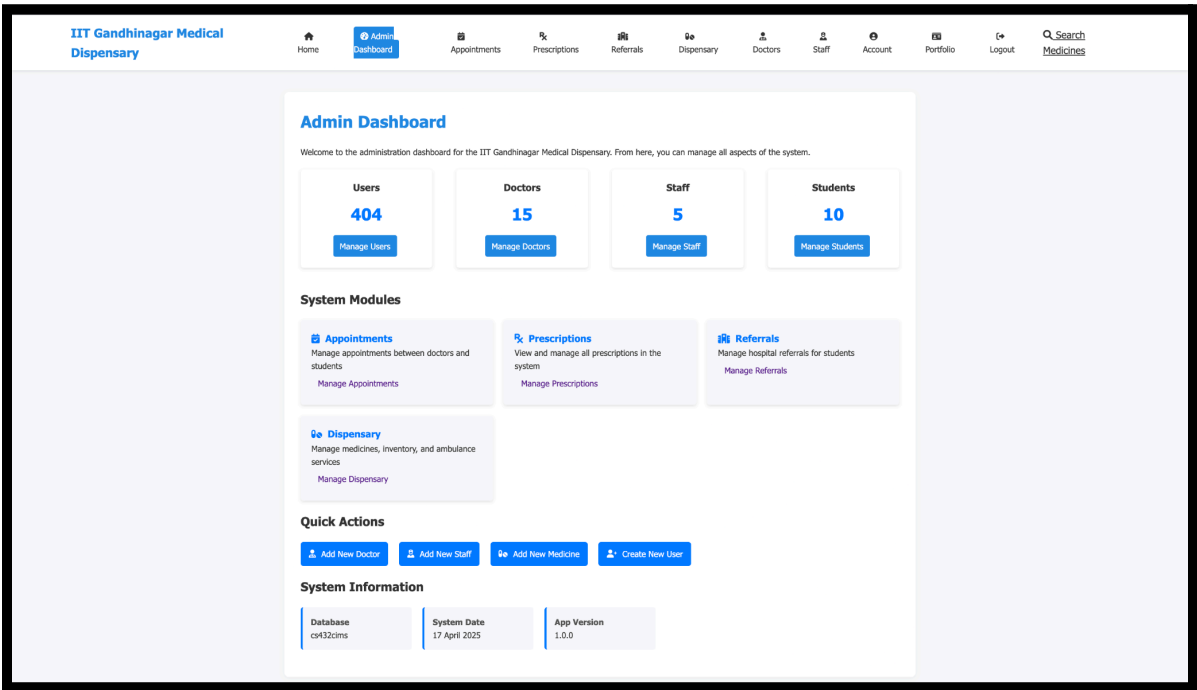


Admin can edit or delete a doctor

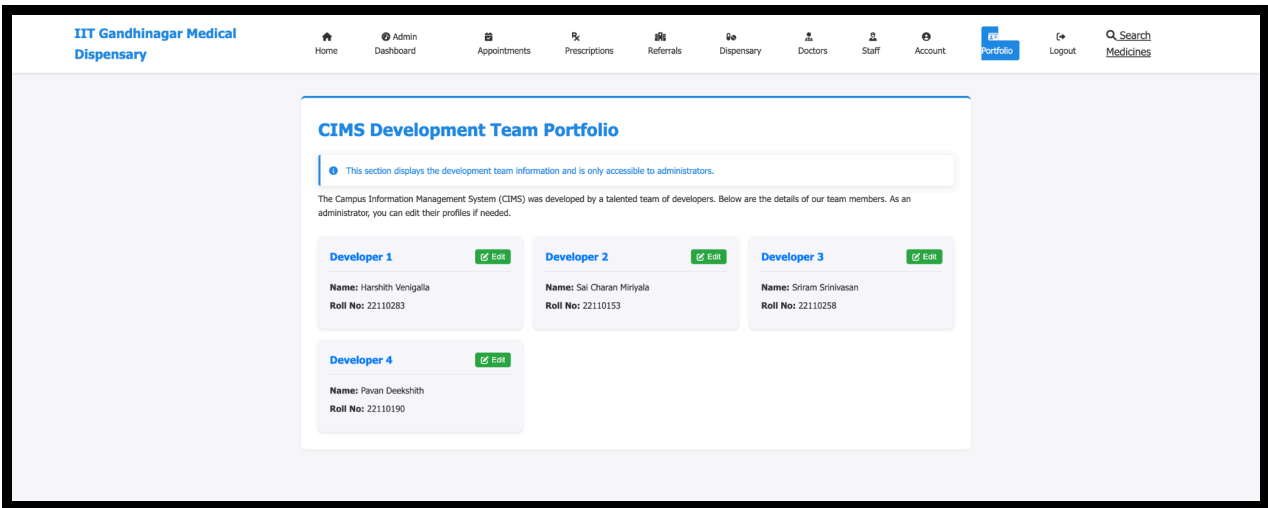
- Edit dispensary details



- Access complete system analytics



- View developer portfolios



## 6. Security Highlights

Security and data integrity are central to our system design. We have implemented multiple layers of protection to ensure safe and authorized access:

| Security Feature                 | Implementation Details   |
|----------------------------------|--|
| Session Management               | JWT tokens with expiry are issued at login and validated on every API request.   |
| Cookie Handling                  | Tokens are stored as secure, HTTP-only cookies to prevent XSS and client-side tampering.   |
| Password Security                | All passwords are hashed using bcrypt before storage in the <code>login</code> table.  |
| Role-Based Access Control (RBAC) | Access to APIs and frontend routes is strictly controlled using user roles stored in the <code>members_group_mapping</code> table. |
| Input Validation                 | All API inputs are validated using server-side checks to prevent SQL injection and malformed requests.                             |
| SQL Query Safety                 | Parameterized queries are used throughout the application to avoid injection vulnerabilities.                                      |

These measures collectively ensure that only authorized users can perform sensitive operations and data remains protected from misuse or attacks.

## 7. Member Portfolio Management (Task 7)

As per the task requirements, we implemented a **Member Portfolio Management Module** that allows the Admin to view and manage basic information about each registered team member.

### Access Control

- **Admin-Only:** The portfolio is strictly accessible only to users with the Admin role.
- **Hidden from Other Groups:** Students, doctors, and staff cannot view or modify portfolio information.

### Features

- Displays each member's **Name**, **Roll Number**, and **Role**.
- Admins can **edit details** of the members via a secure UI.
- Provision for **image upload** is structurally in place (though not enabled), allowing easy extension in future versions.

This module fulfills **Task 7** requirements by demonstrating secure admin-level data access and group-based content visibility.

## 8. Logging and Audit Trail

We implemented a robust logging mechanism to monitor and audit all critical operations, especially those involving CIMS data.

### Local Logging

- All changes to the `members`, `login`, and `members_group_mapping` tables are logged to a **local file** (`logs/changes.log`).
- Includes timestamps, operation type, affected user ID, and API endpoint.

### Server Logging

- Valid session-based operations are also logged to a **central server log**, ensuring consistency and traceability across deployments.

### Unauthorized Activity Logging

- Attempts to access APIs without valid sessions are:
  - Denied access,
  - Logged locally,

- **Not logged to the server**, which highlights potential bypass attempts.

These audit mechanisms ensure transparency, simplify debugging, and make the system resilient to misuse.

## 9. Conclusion

This project successfully meets all the objectives outlined in **CS432 Module 3 – Secure API and Database Integration**. We designed a functional, secure, and scalable **Medical Dispensary Management System** that:

- Integrates with the existing **CIMS** without duplicating central tables,
- Supports **role-based access control** and **session-based validation**,
- Offers a fully functional **admin dashboard** and **member portfolio module**,
- Logs all operations for **accountability and auditability**, and
- Separates sensitive modules with strict **group-level visibility** rules.

The system is modular, extensible, and deployable, making it a solid foundation for real-world institutional use.

## 10. GitHub Repository

Github: [https://github.com/pavandeekshith/Medical\\_Center\\_g12](https://github.com/pavandeekshith/Medical_Center_g12)

Youtube:

## 11. Team Member Roles

| Name                | Contribution   |
|---------------------|--|
| Harshith Venigalla  | Backend APIs, Database schema, Logging mechanism               |
| Sai Charan Miriyala | Role-based decorators, Authentication system, Portfolio module |
| Sriram Srinivasan   | Frontend design, Admin dashboard, Session management           |
| Pavan Deekshith     | Prescriptions module, Appointments, UI testing                 |