HOSPITAL MANAGEMENT SYSTEM

A PROJECT REPORT

Submitted by

MOHAMED IBRAHIM F (2303811724321068)

in partial fulfillment of requirements for the award of the course

CGB1221 – DATABASE MANAGEMENT SYSTEMS

in

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

JUNE - 2025

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY
(AUTONOMOUS)

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report on **" HOSPITAL MANAGEMENT SYSTEM "** is the bonafide work of **MOHAMED IBRAHIM F (2303811724321068)** who carried out the project work during the academic year 2024 - 2025 under my supervision.

SIGNATURE

Dr.T.AVUDAIAPPAN M.E.,Ph.D.,

HEAD OF THE DEPARTMENT

ASSOCIATE PROFESSOR

Department of Artificial Intelligence

K. Ramakrishnan College of Technology

(Autonomous)

Samayapuram–621112.

SIGNATURE

Mrs.S. GEETHA, M.E.,

SUPERVISOR

ASSISTANT PROFESSOR

Department of Artificial Intelligence

K. Ramakrishnan College of

Technology (Autonomous)

Samayapuram–621112.

Submitted for the viva-voce examination held on …… 04/06/25

INTERNAL EXAMINER

EXTERNAL EXAMINER

DECLARATION

I declare that the project report on **"HOSPITAL MANAGEMENT SYSTEM"** is the result of original work done by me and best of my knowledge, similar work has not been submitted to **"ANNA UNIVERSITY CHENNAI"** for the requirement of Degree of **BACHELOR OF TECHNOLOGY**. This project report is submitted on the partial fulfillment of the requirement of the award of the course **CGB1221- DATA BASE MANAGEMENT SYSTEMS.**

Signature

MOHAMED IBRAHIM F

Place: Samayapuram

Date: 04/06/25

ACKNOWLEDGEMENT

It is with great pride that I express our gratitude and in-debt to our institution "**K.Ramakrishnan College of Technology (Autonomous)**", for providing us with the opportunity to do this project.

I glad to credit honourable chairman **Dr. K. RAMAKRISHNAN**, **B.E.,** for having provided for the facilities during the course of our study in college.

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INSTITUTE

Vision:

- To serve the society by offering top-notch technical education on par with global standards.

Mission:

- Be a center of excellence for technical education in emerging technologies by exceeding the needs of industry and society.
- Be an institute with world class research facilities.
- Be an institute nurturing talent and enhancing competency of students to transform them as all – round personalities respecting moral and ethical values.

DEPARTMENT

Vision:

- To excel in education, innovation, and research in Artificial Intelligence and Data Science to fulfil industrial demands and societal expectations.

Mission

- To educate future engineers with solid fundamentals, continually improving teaching methods using modern tools.
- To collaborate with industry and offer top-notch facilities in a conducive learning environment.
- To foster skilled engineers and ethical innovation in AI and Data Science for global recognition and impactful research.
- To tackle the societal challenge of producing capable professionals by instilling employability skills and human values.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- **PEO1:** Compete on a global scale for a professional career in Artificial Intelligence and Data Science.
- **PEO2:** Provide industry-specific solutions for the society with effective communication and ethics.
- **PEO3** Enhance their professional skills through research and lifelong learning initiatives.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- **PSO1:** Capable of finding the important factors in large datasets, simplify the data, and improve predictive model accuracy.
- **PSO2:** Capable of analyzing and providing a solution to a given real-world problem by designing an effective program.

PROGRAM OUTCOMES (POs)

Engineering students will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3. **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
4. **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
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6. **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
7. **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

responsibilities and norms of the engineering practice.

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

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

10. **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.

11. **.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.

12. **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.

ABSTRACT

The Hospital Management System (HMS) is a database-driven software application designed to streamline and centralize hospital operations such as patient registration, doctor appointments, billing, medical records, and staff management. This project demonstrates how a relational database can be effectively used to store, retrieve, and manage large volumes of structured healthcare data while ensuring accuracy, consistency, and data integrity. The system supports various user roles, including administrators, doctors, and receptionists, each with controlled access to relevant modules. By automating routine tasks and enabling real- time data access, the HMS enhances hospital efficiency, reduces human errors, and improves patient care. The database design includes well-structured tables, keys, constraints, and relationships to reflect real-world entities and their interactions within a hospital environment, making it a practical application of core DBMS principles.e the various operations of a hospital. It aims to improve efficiency, enhance patient care, and ensure seamless management of hospital resources. The system integrates different functions, such as patient management, appointments, billing, inventory management, and doctor-staff management, into one unified platform.

ABSTRACT WITH POs AND PSOs MAPPING

CO 5 : BUILD JAVA APPLICATIONS FOR SOLVING REAL-TIME PROBLEMS.

ABSTRACT	POs MAPPED	PSOs MAPPED
The Hospital Management System (HMS) is a database-driven software application designed to streamline and centralize hospital operations such as patient registration, doctor appointments, billing, medical records, and staff management. This project demonstrates how a relational database can be effectively used to store, retrieve, and manage large volumes of structured healthcare data while ensuring accuracy, consistency, and data integrity. The system supports various user roles, including administrators, doctors, and receptionists, each with controlled access to relevant modules. By automating routine tasks and enabling real- time data access, the HMS enhances hospital efficiency, reduces human errors, and improves patient care. The database design includes well-structured tables, keys, constraints, and relationships to reflect real-world entities and their interactions within a hospital environment,	**PO1 -3** **PO2 -3** **PO3 -3** **PO4 -3** **PO5 -3** **PO6 -3** **PO7 -3** **PO8 -3** **PO9 -3** **PO10 -3** **PO11-3** **PO12 -3**	**PSO1 -3** **PSO2 -3**

Note: 1- Low, 2-Medium, 3- High

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CHAPTER 1

INTRODUCTION

1.1 OBJECTIVE

The Hospital Management System (HMS) is a comprehensive software solution designed to streamline and automate the various operations of a hospital. It aims to improve efficiency, enhance patient care, and ensure seamless management of hospital resources. The system integrates different functions, such as patient management, appointments, billing, inventory management, and doctor-staff management, into one unified platform.

1.2 OVERVIEW

The purpose of developing a Hospital Management System (HMS) is to create an integrated, efficient, and automated solution for managing and optimizing hospital operations. The goal is to move away from traditional paper-based systems and disconnected processes to a more streamlined and data-driven approach. The HMS system aims to centralize various hospital functions and departments such as patient management, appointments, billing, medical records, and staff coordination, providing a unified platform to facilitate smoother workflows and better decision-making.

Importance:

Automation of Hospital Functions:

The HMS automates routine hospital tasks such as patient registration, appointment scheduling, billing, and inventory management, reducing manual work and the chances of human error.

Improved Patient Care:

A well-designed HMS ensures that all necessary patient data, including medical history, treatment plans, and test results, are readily available for doctors, enabling timely and informed decisions.

1.3 SQL and DATABASE CONCEPTS

The **Hospital Management System (HMS)** is a database-driven application designed to streamline and manage the day-to-day operations of a hospital. It automates key functions such as patient registration, doctor allocation, appointments, billing, and medical record keeping. The system ensures data accuracy, security, and easy access to critical information, ultimately improving the efficiency of hospital administration

1. **Requirement Analysis:**
   a) Identify core functionalities (patient management, appointments, billing, etc.)
   b) Determine user roles (Admin, Doctor, Receptionist, Patient)
   c) Define scope of the project

2. **System Design**
   a) **Use Case Diagrams** – Show interactions between users and the system
   b) **ER Diagram (Entity-Relationship Model)** – Design database structure

c) **Relational Schema** – Convert ER model to tables with relationships

d) **Normalization** – Remove data redundancy and improve data integrity

3. Implementation:

Use SQL to:

a) Create and manage tables (DDL)

b) Insert, update, delete, retrieve data (DML)

c) Write complex queries using **JOINs**, **Views**, and **Stored Procedures**

d) Optionally implement UI with a frontend (e.g., HTML/CSS/JS)

4. Security Measures:

a) Implement role-based access control

b) Prevent SQL injection (in frontend/backend implementations).

CHAPTER 2

PROJECT METHODOLOGY

2.1 PROPOSED WORK

SQL (Structured Query Language) is a standard language used to **interact with relational databases**. It allows users to **create**, **read**, **update**, and **delete** data — often referred to as **CRUD operations**.SQL is essential in developing any **database management system (DBMS)** such as a Hospital Management System, where it helps store and retrieve data like patient records, appointments, and billing details efficiently.

High-Level System Architecture

Architecture for a Hospital management system consists of several key components:

1. Internal Level (Physical Level)
2. Conceptual Level (Logical Level)
3. External Level (View Level)

Components of the System Architecture:

- **Internal Level (Physical Level) :**

Description: The internal level is the lowest level of database architecture, dealing with how data is physically stored on storage devices like hard drives or SSDs.

Components:

- **Data Representation**: Defines how the data is stored in memory, disk, or other media.

- **Data Compression & Encryption**: Techniques for reducing storage space and securing data.

➢ **Conceptual Level (Logical Level):**

Description: The conceptual level provides a high-level view of the entire database. It focuses on what data is stored in the database and the relationships between different data entities, but not on how it is stored. This level represents the logical structure of the data, without considering the physical storage details.

Components:

Schema: Describes the logical design of the database (e.g., tables, views, relationships).

Data Models: The logical structure of data (e.g., Entity-Relationship (ER) models, relational models).

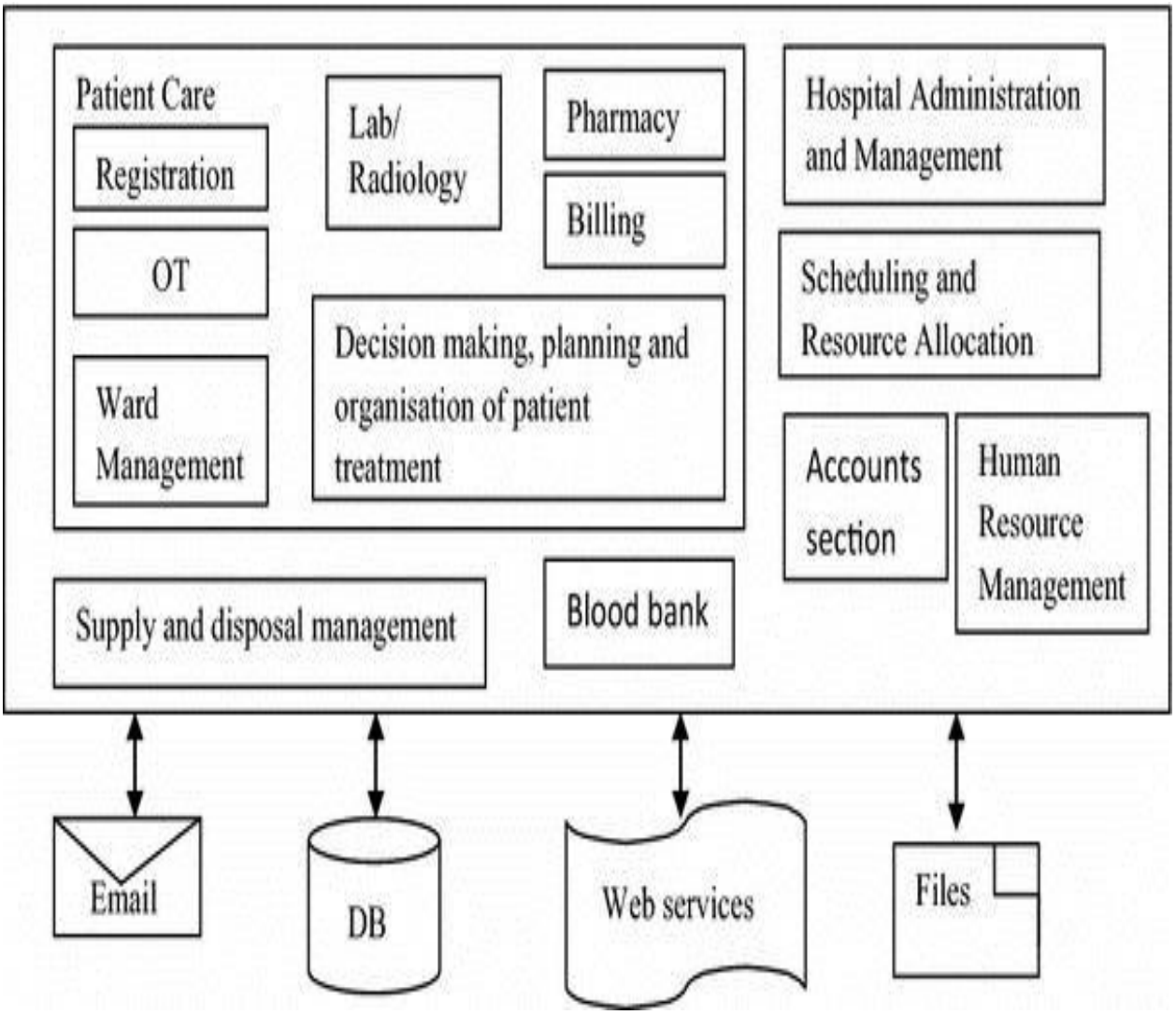
➢ **External Level (View Level)**

Description: The External Level (also known as the View Level) is the top- most layer of the three-level architecture of a DBMS. It defines how individual users or user groups interact with the database through customized views that only show the relevant data.

Components:

- **Data abstraction**: Hides complexity of data structure. Security and privacy: Restricts unauthorized access.

2.2 BLOCK DIAGRAM



CHAPTER 3

MODULE DESCRIPTION

3.1 USER INTERFACE MODULE

Description:

The Patient Management Module is one of the core components of a Hospital Management System (HMS). It is responsible for handling all patient-related information in an organized, digital manner. This module ensures that patient data is securely stored and readily available to healthcare professionals when needed.

Key Features:

- **Patient Registration**: Captures demographic details like name, age, gender, contact, and assigns a unique Patient ID.
- **Electronic Health Records (EHR)**: Stores detailed patient history, including diagnoses, treatments, medications, allergies, and test results.

3.2 APPOINTMENT SCHEDULING MODULE:

Description:

The Appointment Scheduling Module enables efficient and organized booking of appointments for patients with doctors, specialists, or diagnostic services. It streamlines the hospital's workflow and reduces patient wait times.

Key Features:

- **Online and In-Hospital Booking**: Allows patients or front-desk staff to schedule appointments digitally.
- **Doctor Availability Management**: Updates real-time availability of doctors based on their schedules and workload.

3.3 SECURITY & ACCESS CONTROL MODULE:

Description:

This module ensures that sensitive data in the Hospital Management System is accessed only by authorized personnel. It protects patient privacy, complies with health data protection laws, and guards against cyber threats.

Key Features:

- **Role-Based Access Control (RBAC)**: Assigns specific access permissions to users based on roles (e.g., doctor, nurse, receptionist, admin).
- **User Authentication**: Uses secure login methods like passwords, OTPs, and two-factor authentication.

IMPORTANCE:

With increasing data breaches in healthcare, this module is vital for maintaining trust, legal compliance (e.g., HIPAA, GDPR), and safeguarding both hospital operations and patient information.

CHAPTER 4

CONCLUSION & FUTURE SCOPE

CONCLUSION

The Hospital Management System (HMS) serves as a powerful solution to modernize and streamline the daily operations of healthcare institutions. By integrating core modules such as Patient Management, Appointment Scheduling, and Security & Access Control, it improves the efficiency, accuracy, and accessibility of healthcare services. With digital records replacing paper-based systems, hospitals can now ensure faster decision-making, enhanced patient care, and better resource utilization. Additionally, the use of reporting and analytics tools helps in monitoring hospital performance and identifying areas for improvement.

Overall, the HMS not only reduces manual effort and operational costs but also enhances patient satisfaction and safety. Its modular structure allows hospitals to scale and customize the system as per their requirements, making it a robust andflexible solution in the evolving healthcare landscape. The healthcare industry becomes more data-driven, the Hospital Management System will continue to evolve and play a critical role in improving clinical outcomes, operational efficiency, and overall patient experience.

FUTURE SCOPE

The future scope of Hospital Management Systems is vast and continuously evolving with the advancement of technology. Some key areas of future development include:

1. **Integration with AI & Machine Learning**
    - Predict patient readmissions, disease outbreaks, or equipment failures.
    - Enable automated diagnosis support and treatment recommendations.
2. **Telemedicine & Remote Monitoring**
    - Integrate video consultation features and remote patient health monitoring using IoT devices.
3. **Mobile Health Applications**
    - Develop mobile apps for patients to book appointments, view reports, track medications, and communicate with doctors.
4. **Blockchain for Medical Records**
    - Ensure tamper-proof and decentralized storage of sensitive health data for improved security and transparency.
5. **Cloud-Based Solutions**
    - Enhance scalability, data accessibility, and disaster recovery using cloud platforms.

6. **Interoperability with Other Health Systems**
    - Enable data exchange with insurance companies, pharmacies, and other hospitals through standardized APIs.

APPENDIX A-SOURCE CODE

code

```
import sqlite3


def create_database():
    conn = sqlite3.connect('hospital_management.db') c = conn.cursor()

    c.execute('''
        CREATE TABLE IF NOT EXISTS patients (
            patient_id INTEGER PRIMARY
            KEY, name TEXT,
            age INTEGER,
            gender
            TEXT,
            disease
            TEXT
        )
    ''')

    c.execute('''
        CREATE TABLE IF NOT EXISTS doctors (
            doctor_id INTEGER PRIMARY
            KEY, name TEXT,
            specialty TEXT,
            contact_number TEXT
        )
    ''')

    conn.commit()
    conn.close()
create_database()
```

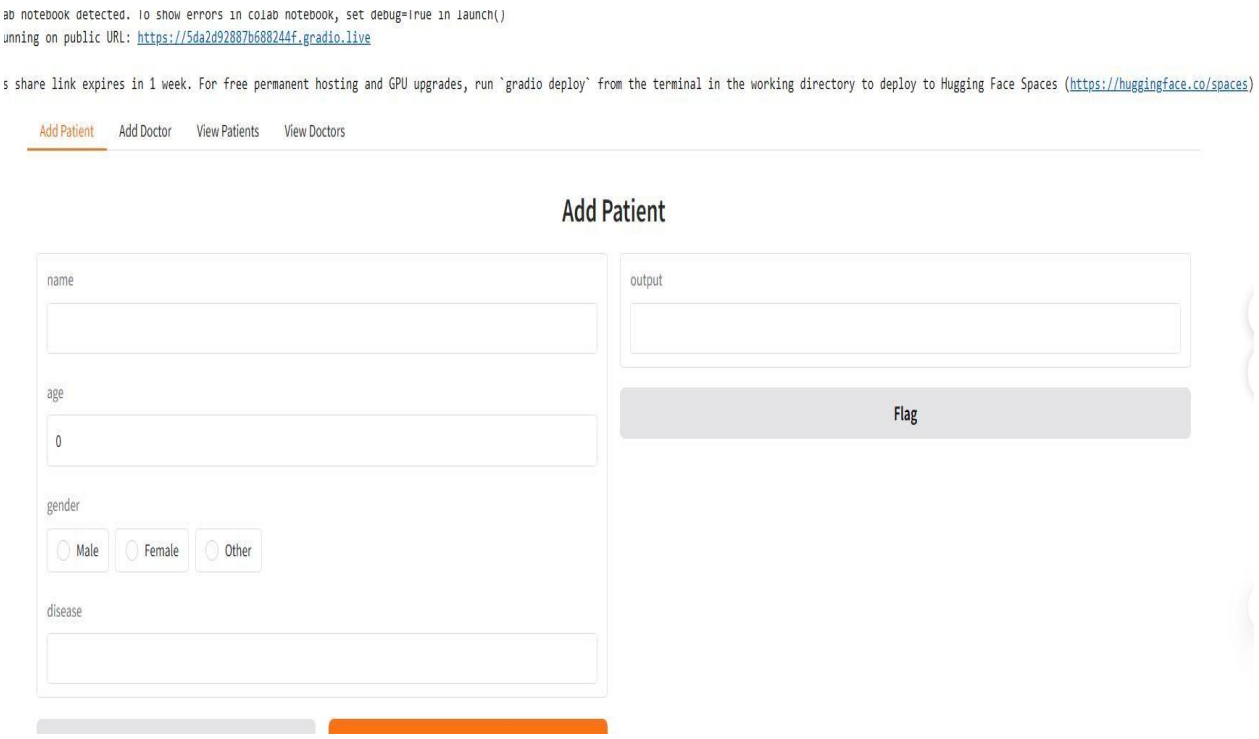
```
        def add_patient(name, age, gender,
    disease):                conn                =
    sqlite3.connect('hospital_management.db')
    c = conn.cursor()
    c.execute("INSERT INTO patients (name, age, gender, disease) VALUES (?, ?,
?, ?)",
            (name, age, gender, disease))
    conn.commit()
    conn.close()
    return f"✅ Patient '{name}' added successfully."


def add_doctor(name, specialty, contact):
    conn =
    sqlite3.connect('hospital_management.db')
    c = conn.cursor()
    c.execute("INSERT INTO doctors (name, specialty, contact_number)
VALUES (?, ?, ?)",
            (name, specialty, contact))
    conn.commit()
    conn.close()
    return f" Doctor '{name}' added successfully."

def view_patients():
    conn =
    sqlite3.connect('hospital_management.db')
    c = conn.cursor()
    c.execute("SELECT * FROM
    patients") data = c.fetchall()
```

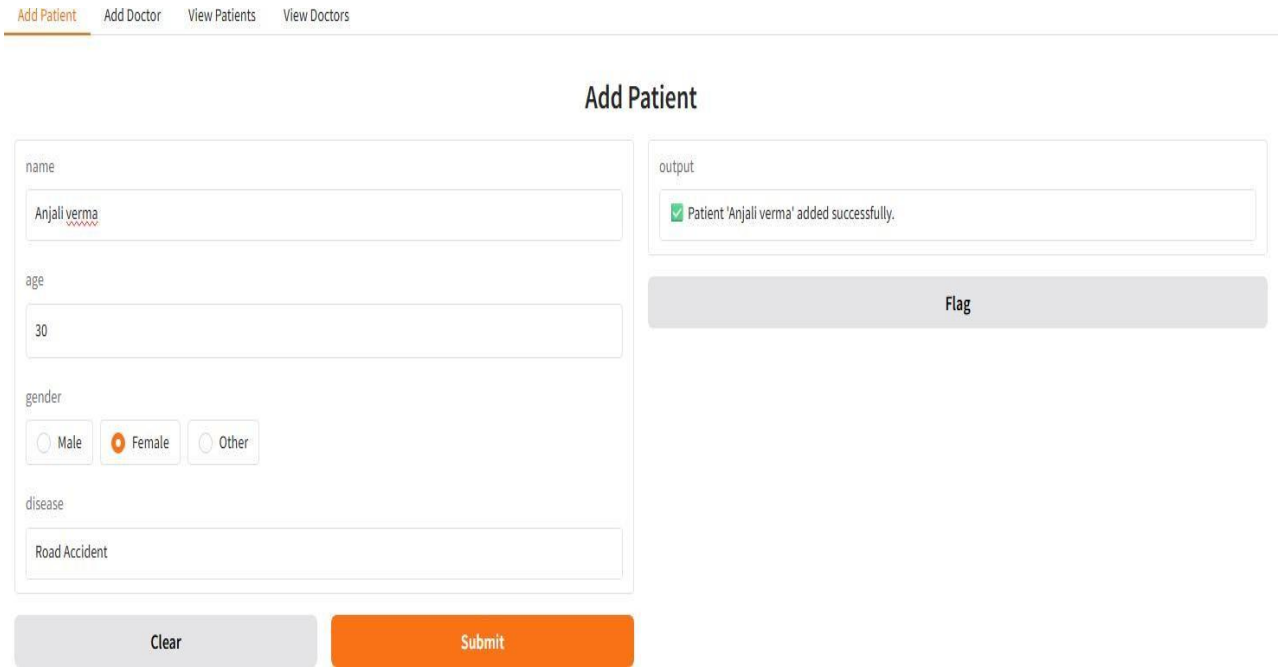
```
    conn.close()
    return "\n".join([f"ID: {p[0]}, Name: {p[1]}, Age: {p[2]}, Gender:
{p[3]},
    Disease: {p[4]}" for p in data]) or "No patients found."
def view_doctors():
    conn =
    sqlite3.connect('hospital_management.db')
    c = conn.cursor()
    c.execute("SELECT * FROM
    doctors")

    data = c.fetchall()
    conn.close()
    return "\n".join([f"ID: {d[0]}, Name: {d[1]},
    Specialty: {d[2]}, Contact:
{d[3]}" for d in data]) or "No doctors found."

            !pip install gradio import gradio as gr

# Add Patient Form add_patient_interface =
gr.Interface(
    fn=add_patient,
    inputs=["text", "number", gr.Radio(["Male",
    "Female", "Other"]), "text"], outputs="text",
    title="Add Patient"
)
# Add Doctor Form add_doctor_interface =
gr.Interface(
    fn=add_doctor, inputs=["text", "text", "text"],
    outputs="text", title="Add Doctor"
)
```

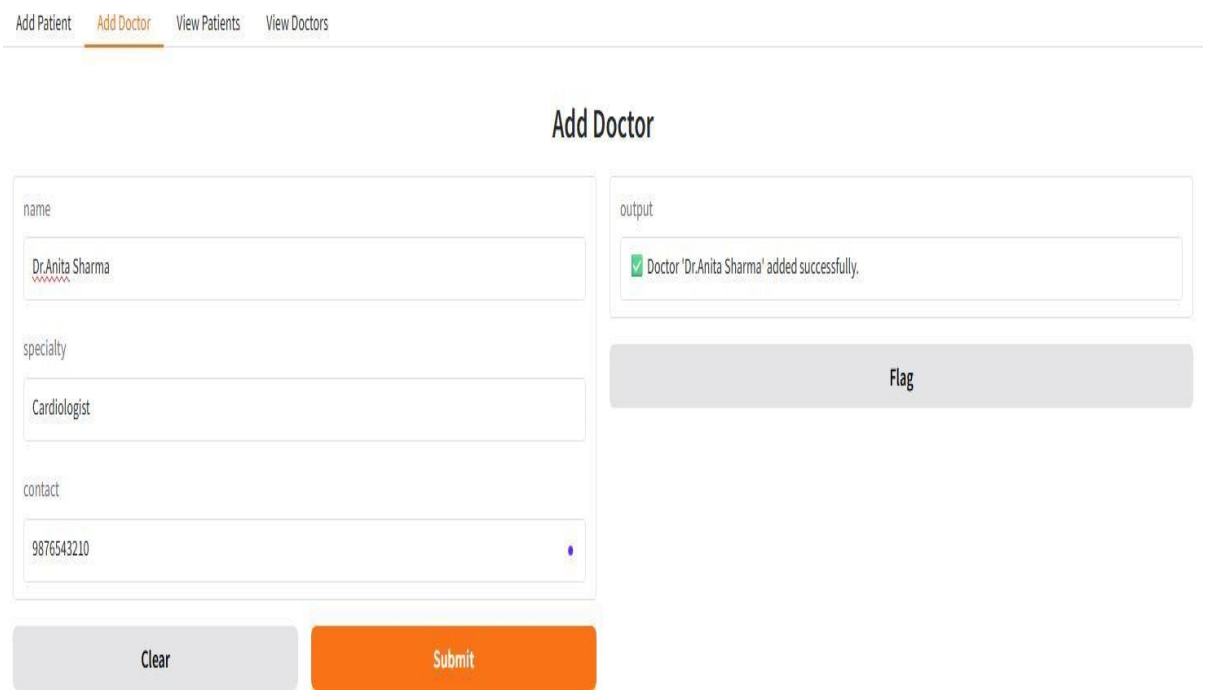
```
# View Patients view_patients_interface =
gr.Interface(
    fn=view_patients, inputs=[], outputs="text",
    title="View Patients"
)

# View Doctors view_doctors_interface =
gr.Interface(

    fn=view_doctor
    s, inputs=[],
    outputs="text",
    title="View
    Doctors"
)

# Launch All
Tabs
gr.TabbedInterf
ace(
    [add_patient_interface, add_doctor_interface, view_patients_interface,
view_doctors_interface],
    ["Add Patient", "Add Doctor", "View Patients", "View Doctors"]
).launch()
```

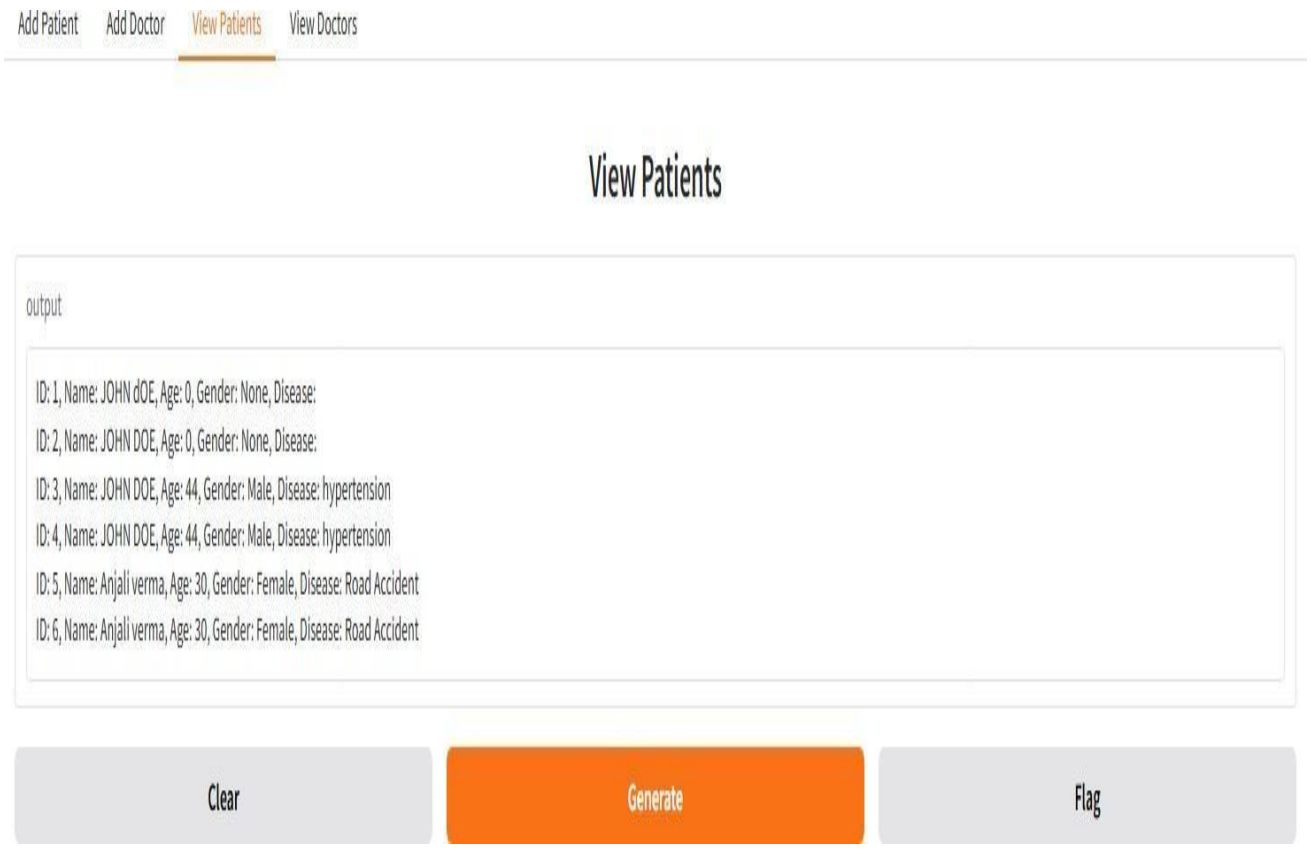
https://5da2d92887b688244f.gradio.liveS

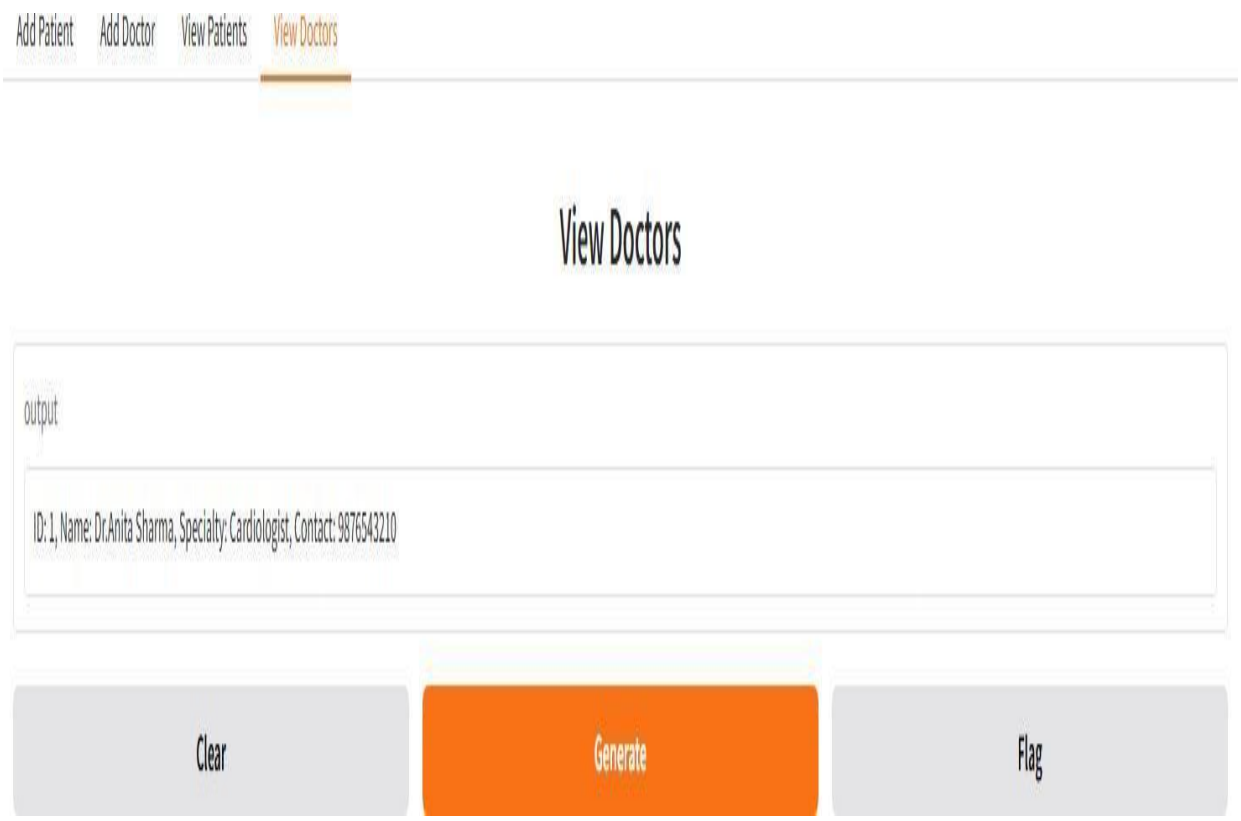
APPENDIX B - SCREENSHOTS






Add Patient
Add Doctor
View Patients
View Doctors
Add Doctor
name
Dr.Anita Sharma
specialty
Cardiologist
contact
9876543210
output
Doctor 'Dr.Anita Sharma' added successfully.
Flag
Clear
Submit


Add Patient
Add Doctor
View Patients
View Doctors
View Patients
output
ID: 1, Name: JOHN dOE, Age: 0, Gender: None, Disease:
ID: 2, Name: JOHN DOE, Age: 0, Gender: None, Disease:
ID: 3, Name: JOHN DOE, Age: 44, Gender: Male, Disease: hypertension
ID: 4, Name: JOHN DOE, Age: 44, Gender: Male, Disease: hypertension
ID: 5, Name: Anjali verma, Age: 30, Gender: Female, Disease: Road Accident
ID: 6, Name: Anjali verma, Age: 30, Gender: Female, Disease: Road Accident
Clear
Generate
Flag


Add Patient
Add Doctor
View Patients
View Doctors
View Doctors
output
ID: 1, Name: Dr.Anita Sharma, Specialty: Cardiologist, Contact: 9876543210
Clear
Generate
Flag

REFERENCES

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