FACE RECOGNITION FOR SECURE AND EFFICIENT PATIENT RECORD ACCESS

A PROJECT REPORT SUBMITTED TO

SRM INSTITUTE OF SCIENCE & TECHNOLOGY

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

AWARD OF THE DEGREE OF

MASTER OF SCIENCE IN APPLIED DATASCIENCE

BY

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BONAFIDE CERTIFICATE

This is to certify that the project report titled **"Face Recognition for Secure and Efficient Patient Record Access**" is a bonafide work carried out by **NATHIPRIYA V (RA2232014010062), VINODHINI D (RA2232014010091), KAVIYA SHREE C (RA2232014010094)**, **SUHASINI V (RA22320140110101)** under my supervision for the award of the Degree of Master of Science in Applied Data Science. To my knowledge the work reported herein is the original work done by this student.

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Internal Examiner

External Examiner

Declaration of Association of Research Project with SDG Goals

This is to certify that the research project entitled "**Face recognition for secure and efficient patient recognition for Secure and Efficient Patient Record Access"** carried out by Mr / Miss NATHIPRIYA V (RA2232014010062) under the supervision of Dr/Mr./Ms. P CHANDHINI (Designation) **Assistant Professor** , of (Department) **Computer Application** in partial fulfilment of the requirement for the award of Under Graduation/Post Graduation/ Diploma/ Ph.D. program has been significantly or potentially associated with SDG Goal No **SDG 9** titled **Industry, Innovation, Infrastructure**. This study has clearly shown the extent to which its goals and objectives have been met in terms of filling the research gaps, identifying needs, resolving problems, and developing innovative solutions locally for achieving the above-mentioned SDG on a National and/or on an international level.

Signature of the Student **Guide and Supervisor**

Head of the Department

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TABLE OF CONTENT

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CHAPTER – 1

Abstract

Face recognition technology has the potential to significantly improve hospital security and efficiency in healthcare, where precision and speed are vital. Traditional patient identification methods can be both error-prone and time-consuming, making the introduction of face recognition a practical solution for quick and accurate access to patient records. Implementing a secure face recognition system in healthcare is a pivotal modernization step. This biometric authentication system enhances patient identification accuracy and reduces the risk of medical errors. By capturing and analysing unique facial features, healthcare facilities can create a database of patient facial images linked directly to medical records. This enables instant facial scans and record cross-referencing, aided by a user-friendly interface for streamlined access by healthcare staff. In conclusion, integrating face recognition technology in healthcare offers a transformative solution to the challenges of traditional patient identification methods. This innovation guarantees increased accuracy, reduces error risks, streamlines patient check-in, bolsters data security, and fosters an environment for quality care while safeguarding patient information.

1.1 Introduction

In today's modern hospitals, providing efficient and personalized care to patients is a top priority. One innovative way hospitals are improving their services is through the use of face detection technology. Imagine a system that recognizes patients by their faces, ensuring accurate and secure access to their medical records.

Face detection technology has become an invaluable tool in the healthcare sector. This technology functions as a digital key, helping hospital staff instantly identify and authenticate patients as they enter the facility. By simply looking into a camera, patients can be swiftly recognized, allowing healthcare providers to access their records promptly. This not only saves time but also enhances the overall patient experience.

The integration of face detection technology in healthcare is a significant advancement. It operates by using specialized algorithms and cameras to capture and analyze the unique facial features of individuals. These features are then compared with a database of known patients, ensuring a reliable and secure match.

The benefits of this technology are multifaceted. Firstly, it streamlines the patient check-in process. Traditionally, patients would have to go through the cumbersome process of providing identification, verifying their details, and filling out paperwork upon each visit to a healthcare facility. Face detection simplifies this by allowing patients to be identified almost instantly, reducing wait times and administrative overhead.

Furthermore, face detection enhances the efficiency of healthcare providers. With instant access to a patient's medical records, doctors and nurses can make well-informed decisions promptly. They can review the patient's medical history, allergies, medications, and any critical information that might impact their treatment. This not only improves the quality of care but also helps in situations where a patient may not be able to communicate their medical history effectively, such as during emergencies or when dealing with non-verbal patients.

Moreover, the security of patient data is a paramount concern in healthcare, and face detection technology plays a pivotal role in this regard. By using facial recognition as a secure authentication method, patient data remains protected. This reduces the risk of unauthorized access to sensitive medical information, ensuring that only authorized personnel can retrieve and update the records. It also helps in maintaining compliance with strict privacy regulations like the Health Insurance Portability and Accountability Act (HIPAA) in the United States.

The seamless integration of face detection technology into the realm of healthcare is transforming the way patient records are managed. It simplifies patient identification, making the hospital experience safer and more efficient. Patients can feel more confident in the security of their sensitive information, knowing that cutting-edge technology is safeguarding their records effectively.

In conclusion, face detection technology is revolutionizing healthcare by improving patient identification, streamlining administrative processes, enhancing the quality of care, and ensuring the security of patient data. This innovative tool is a key player in the journey towards a safer, more efficient, and ultimately more patient-friendly healthcare experience.

CHAPTER – 2

SYSTEM CONFIGURATION

2.1 Hardware Requirements

=> Computer/Server:

=> Processor: Intel core i5 or higher

=> RAM : 8 GB RAM

=> Webcam

=> Internet connection

2.2 Software Requirements

=> Operating System: Window

=> Programming languages: Html, CSS, Java script, Python, SQLite(Database)

=>Integrated Development Environment: Anaconda Prompt, Visual studio code, Sqlite.

2.3 Software Descriptions

Operating System: Windows

Description: Windows is the chosen operating system for running the face detection system. It provides a user-friendly interface and supports a wide range of software applications, making it suitable for both development and operational phases.

Programming Languages: HTML, CSS, JavaScript, Python

HTML (Hypertext Markup Language):

Description: HTML is used for creating the structure and content of web pages. It defines the layout and elements of the user interface.

CSS (Cascading Style Sheets):

Description: CSS is used for styling the web interface. It controls the visual presentation of HTML elements, ensuring a consistent and appealing design.

JavaScript:

Description: JavaScript is a scripting language used to add interactivity to web pages. It enhances user experience by enabling dynamic features and user interactions.

Python:

Description: Python is a versatile programming language utilized for various system functionalities, including data processing, facial recognition, and integration with databases.

Database: Sqlite

Description: Sqlite is a SQL database management system used for storing and managing patient data, including facial images, medical records, and access permissions. It offers scalability and flexibility, making it suitable for healthcare record management.

Integrated Development Environments: Anaconda Prompt, Visual Studio Code, Sqlite.

Anaconda Prompt:

Description: Anaconda Prompt is an interactive development environment used primarily for Python programming. It is well-suited for data analysis, machine learning, and developing algorithms, making it a valuable tool for facial recognition and data processing.

Visual Studio Code:

Description: Visual Studio Code is a versatile code editor with powerful extensions and customization options. It supports multiple programming languages, including HTML, CSS,

JavaScript, and Python. It is an ideal environment for developing and debugging software components, offering an efficient development experience.

In summary, the chosen software components, including the Windows operating system, a combination of programming languages, Sqlite as the database system, and integrated development environments like and Anaconda Prompt, Visual Studio Code, form a robust technology stack for developing and running the face detection system in a hospital setting. These tools collectively provide the capabilities needed for web development, data processing, security, and interactivity, ensuring the system's efficiency and effectiveness.

CHAPTER – 3

SYSTEM ANALYSIS

3.1 Existing System

The existing system for face detection in hospitals for patients' records primarily relies on advanced facial recognition technology to enhance the efficiency and security of patient management. This system incorporates cameras and software capable of capturing and analysing facial features accurately. When a patient arrives at the hospital, their face is scanned, and the system identifies them based on unique facial characteristics.

Upon identification, the patient's records are automatically retrieved from the hospital database. These records include essential information such as medical history, allergies, previous diagnoses, prescribed medications, and other relevant details. By automating the identification process through facial recognition, hospital staff can quickly access a patient's records, ensuring that the right medical information is readily available for accurate diagnosis and treatment. Only authorized personnel, whose identities have been verified, are granted access, thereby ensuring the safety and privacy of patients and hospital resources.

Patients can simply stand in front of a designated camera, and their identity is confirmed within seconds. This not only improves the overall efficiency of hospital operations but also enhances the patient experience by making the admission process quicker and more convenient.

In summary, the existing face detection system in hospitals plays a vital role in streamlining patient management processes and providing a higher level of convenience for both patients and medical staff.

3.2 Proposed System

In response to the growing need for efficient and accurate patient record management in hospitals, we propose the implementation of a face detection system. This innovative solution of computer vision technology to streamline the process of patient identification and record management. By integrating facial recognition algorithms into the hospital's database system, this proposed system will enable seamless identification of patients.

Upon arrival at the hospital, patients' faces will be captured by system camera strategically placed at key checkpoints, such as reception areas and entrances. The captured facial data will then be processed and capable of identifying individuals. This automation eliminates the manual entry of patient information, reducing the chances of errors and significantly improving the efficiency of the registration process.

Additionally, the system can be further enhanced by integrating it with Electronic Health Record (EHR) systems. This integration will enable real-time updates of patient records, ensuring that healthcare providers have access to the most current and accurate information, thereby improving the quality of care. Furthermore, the system can generate alerts for staff, such as allergies or specific medical conditions, ensuring that the medical team is well-informed and can provide personalized care promptly.

In conclusion, the implementation of this face detection system in hospitals not only optimizes the patient registration process but also revolutionizes the way healthcare providers manage patient records. By this, hospitals can enhance efficiency and accuracy in patient identification and record management, ultimately leading to improved patient care and satisfaction.

3.3 Feasibility study

A feasibility study for implementing face detection technology in a hospital for managing patients' records is essential to assess the viability and potential benefits of such a system. This innovative approach aims to enhance the efficiency and accuracy of managing patients' data within the healthcare facility.

Firstly, the technical feasibility of implementing face detection technology needs to be evaluated. This includes assessing the available facial recognition software, hardware requirements, and compatibility with existing hospital systems.

Secondly, the economic feasibility of the project must be considered. This involves estimating the initial costs of acquiring the necessary hardware and software, as well as the costs associated with system integration and staff training. A cost-benefit analysis should be conducted to compare the investment with the potential savings and efficiency gains the hospital can achieve over time. This analysis should consider factors such as reduced administrative workload, improved accuracy in patient identification, and potential cost savings related to decreased paperwork and manual data entry.

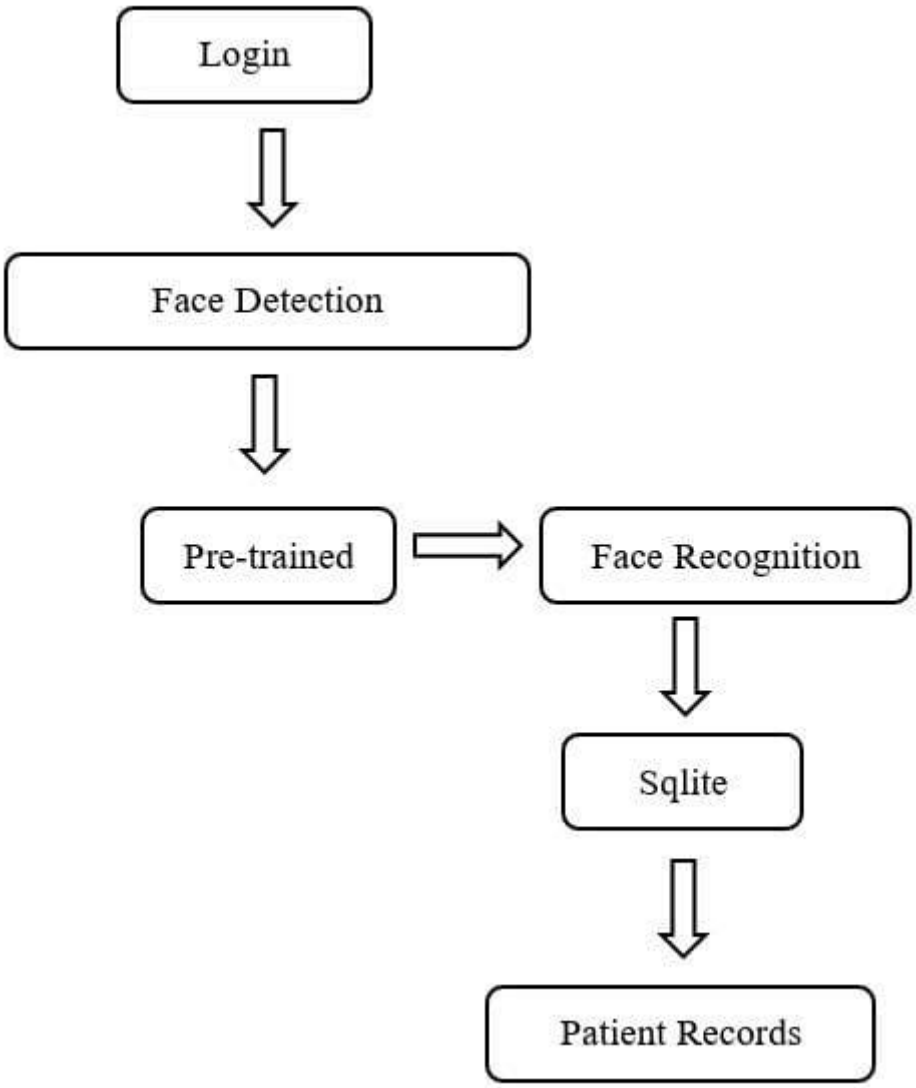
Furthermore, legal and regulatory aspects need to be thoroughly examined. Compliance with data protection laws, patient privacy regulations, and ethical considerations related to facial recognition technology must be ensured. This involves assessing how well the hospital staff can adapt to the new system. Adequate training programs and workshops should be organized to familiarize employees with the technology and its applications in managing patients' records. Feedback from the staff should be collected and analyzed to address any concerns and challenges they might face during the implementation process.

In conclusion, conducting a comprehensive feasibility study is essential before implementing face detection technology for managing patients' records in a hospital. By evaluating technical, economic, legal, and operational aspects, the hospital can make an informed decision about the viability of the project. If the study demonstrates that the benefits outweigh the costs and challenges, the hospital can proceed with the implementation, leading to improved efficiency and accuracy in managing patients' data, ultimately enhancing the overall quality of healthcare services provided.

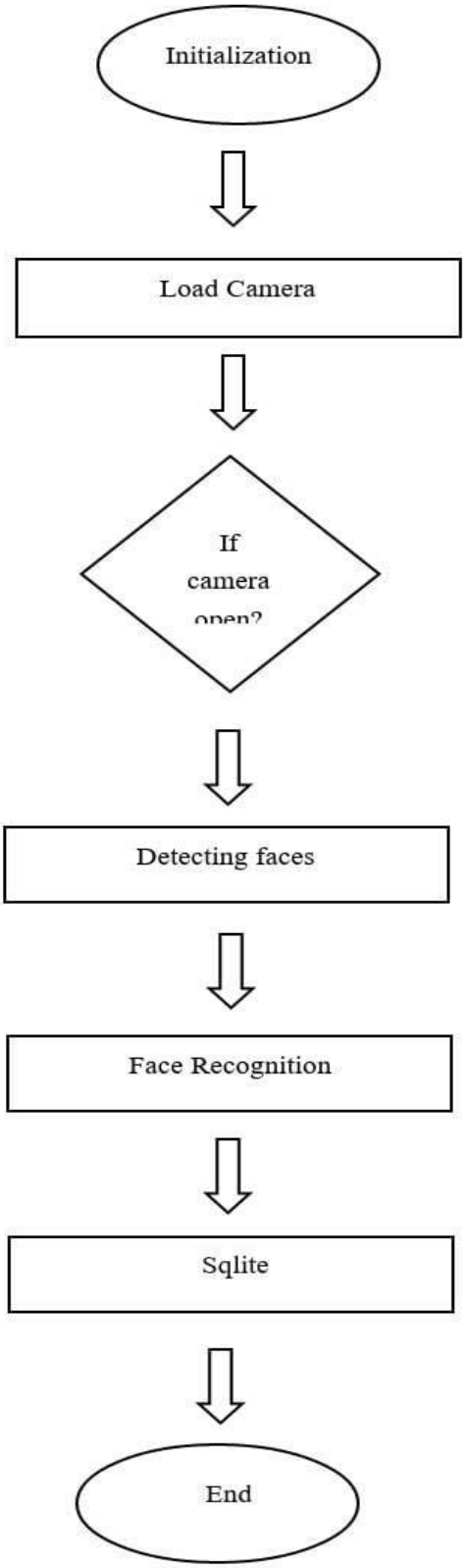
CHAPTER – 4

SYSTEM DESIGN

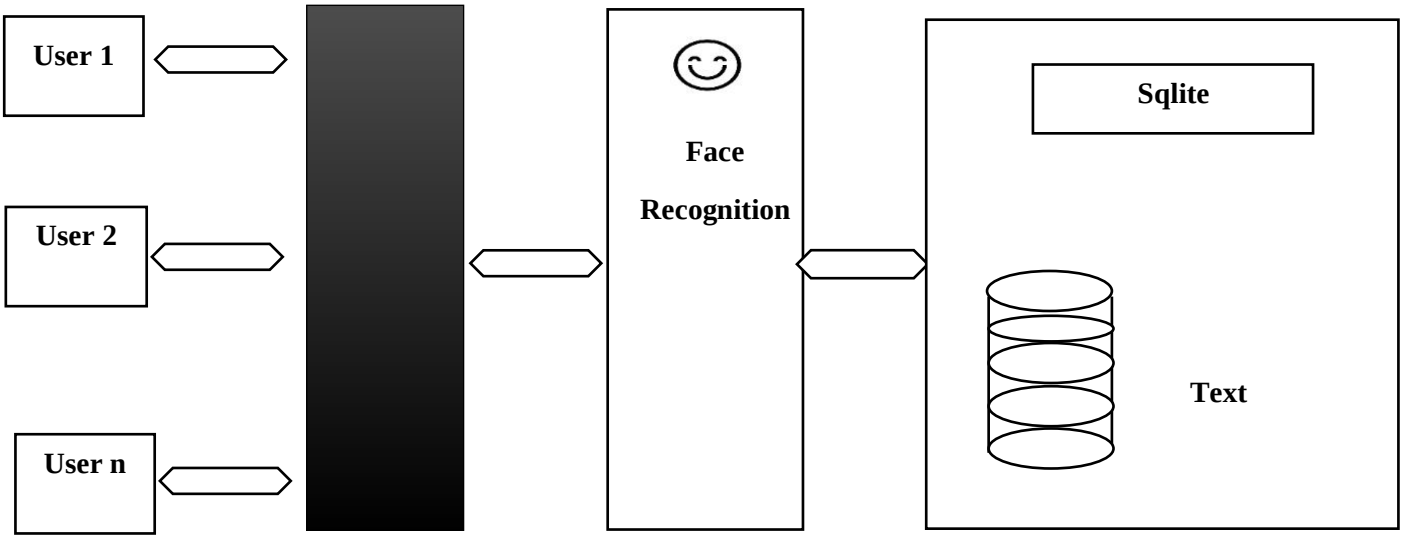
4.1 System Architecture



4.2 Data Flow Diagram



4.3 Database Design



CHAPTER – 5

SYSTEM IMPLEMENTATION

5.1 Modules and Description:

The patient records management system in hospitals consists of several key modules that work together to ensure efficient and secure handling of patient information. These modules are designed to streamline the process of capturing patient images, detecting and recognizing faces, and managing the associated data. Here's a detailed description of each module:

1. Image Capture Module:

The Image Capture Module is responsible for capturing high-resolution images of patients using cameras. These images serve as a critical input for the system as accurate face detection depends on the quality of the images. It ensures that the patient's face is clearly visible and well-lit, optimizing the subsequent stages of the process. The Image Capture Module is the initial step in the system, responsible for obtaining high-quality facial images of patients. It interfaces with cameras or image sensors to capture clear photographs. These images serve as the foundation for accurate facial recognition. The module ensures that patients' faces are well-illuminated, properly focused, and without significant noise or distortion. High-quality image capture is essential for subsequent processing steps. It's responsible for acquiring reliable visual data to be used for patient identification. The module provides the necessary input for the subsequent face detection and recognition stages. Accurate image capture contributes to the overall efficiency and accuracy of the system. The module plays a pivotal role in ensuring that the system has access to clear and consistent visual data for subsequent analysis. It's a critical component for reliable and precise facial recognition.

2. Preprocessing Module:

Once images are captured, the Preprocessing Module comes into play. It performs tasks such as filtering, normalizing pixel values, and enhancing image quality through grayscale conversion. By standardizing the input images, this module ensures that all subsequent processes work effectively, regardless of variations in lighting or image quality. The Preprocessing Module is responsible for enhancing the quality of captured facial images. It carries out tasks such as resizing, noise reduction, and contrast adjustment to optimize image quality. This preparation ensures that the subsequent face detection and recognition processes

work with clean and consistent data. By improving the visual data, the module contributes to the overall accuracy of the system. It acts as a vital step in preparing images for further analysis. Preprocessing increases the chances of accurate face detection and recognition. This module enhances the system's capability to handle a variety of image conditions, making it more robust in real-world scenarios. Its role is to ensure that the input data is of a consistently high quality, which is crucial for reliable facial recognition. In summary, the Preprocessing Module refines captured images, making them suitable for accurate facial feature extraction and recognition.

3. Face Detection Module:

This module uses a pre-trained face detection model, such as the Cascade Classifier from libraries like OpenCV or PIL, to identify and locate faces within the pre-processed images. It plays a pivotal role in pinpointing the regions of interest for face recognition, enabling further actions related to patient records. The Face Detection Module utilizes specialized algorithms to identify and locate human faces within pre-processed images. Its primary function is to recognize key facial features, including eyes, nose, and mouth. By identifying and isolating these facial regions, it prepares the image for further analysis. The module is a crucial initial step in the facial recognition process, narrowing down the region of interest within the image. It plays a pivotal role in identifying the presence of a face within a given image and extracting relevant facial features. Accurate face detection is essential for subsequent face recognition, as it defines the area for analysis and comparison. The module enhances the system's ability to identify and focus on human faces, streamlining the facial recognition process. In summary, the Face Detection Module identifies and isolates faces within pre-processed images, serving as a crucial component in the system's ability to recognize and verify individuals.

4. Face Recognition Module:

The Face Recognition Module represents a pivotal component in the seamless integration of face detection technology into modern healthcare systems. Its primary purpose is to establish a direct link between detected faces and specific patient records. This is achieved through a sophisticated process of comparison and analysis, which relies on techniques like facial feature analysis or deep learning. When a patient enters a healthcare facility and looks into the camera, the Face Recognition Module comes into play. It captures the facial features of the individual and then meticulously compares these features with a database of known patients. This database includes a comprehensive record of patients, with their unique facial

features securely stored. The comparison process is highly intricate, as it takes into account the nuances and variations in each person's facial characteristics, such as the arrangement of facial landmarks and the proportions of different features.

If the comparison reveals a match, the system swiftly and accurately identifies the patient and establishes a direct link to their medical records. This is a crucial step in the healthcare process, as it ensures that healthcare providers have immediate access to the right patient's information, allowing them to deliver timely and tailored care. The Face Recognition Module not only streamlines the patient identification process but also enhances data security. By linking patients to their records through facial recognition, it minimizes the risk of unauthorized access, contributing to data privacy and compliance with healthcare regulations. In summary, the Face Recognition Module is a sophisticated and essential component of the face detection system in healthcare, ensuring accurate and secure access to patient records while preserving data integrity and privacy.

5. Database Module:

The Database Module is crucial for storing patient records, including their images and other relevant information. In many cases, a SQL database management system like Sqlite is employed to efficiently store and retrieve patient data. It ensures data integrity, quick access, and scalability for managing vast amounts of patient information. The Database Module is the backbone of the system, serving as the central repository for all patient-related data. It securely stores an extensive range of information, including not only facial images but also patient identification details, medical records, treatment histories, and access permissions. This module is essential for ensuring data integrity and accessibility. The Database Module incorporates advanced data management features, allowing for efficient retrieval, storage, and organization of patient information. It enables healthcare providers to quickly access comprehensive patient records, facilitating timely and well-informed medical decisions. Security is paramount in this module, as it implements robust access control mechanisms, encryption, and data backup strategies to protect sensitive patient data from unauthorized access and potential breaches. It aligns with data protection regulations to safeguard patient privacy and confidentiality. The Database Module streamlines data access for authorized users, ensuring that healthcare staff can promptly retrieve patient records, review medical histories, and access pertinent information during patient care. The module supports a user-friendly interface for data management, making it easier for healthcare providers to navigate and

interact with the system. Scalability is another important aspect of the Database Module. It is designed to handle an ever-expanding volume of patient data, accommodating the growth of the healthcare facility and its increasing record management needs. The module's robust architecture allows for efficient data storage, retrieval, and updates, even as the patient database continues to expand. In summary, the Database Module acts as the secure, efficient, and scalable storage hub for patient data, ensuring that critical medical information is readily accessible to healthcare providers, safeguarded against unauthorized access, and compliant with privacy regulations.

6. Authentication and Authorization Module:

Security is of utmost importance when handling sensitive patient records. The Authentication and Authorization Module ensures that only authorized personnel can access patient records using login credentials. It verifies the identity of users, providing an additional layer of protection to prevent unauthorized access to sensitive medical data. The Authentication and Authorization Module is a critical component of the system responsible for ensuring secure and controlled access to patient data. It consists of two core processes: authentication, which verifies the identity of users, and authorization, which determines the level of access and actions they can perform.

Authentication:

User Identity Verification: Authentication verifies the identity of users, ensuring that they are who they claim to be. In the context of the system, this module authenticates patients seeking access to their medical records through facial recognition.

Multi-Factor Authentication: It may employ multi-factor authentication methods to enhance security, combining facial recognition with other authentication factors like passwords, smart cards, or tokens.

Security Protocols: Robust security protocols, such as encryption and secure communication channels, are often used to protect the authentication process from external threats.

Authorization:

Access Control: Authorization determines what actions and data a user is allowed to access. For patients, it specifies the extent of their access to their own medical records.

Role-Based Access: It can implement role-based access control, granting different permissions to healthcare staff and patients based on their roles and responsibilities.

Data Segmentation: The module can partition patient data to ensure that users only access information relevant to their role or the scope of their care.

Security:

Security Policies: The Authentication and Authorization Module enforces security policies, which include defining who can access patient data, what actions they can perform, and when they can access the data.

Audit Trails: It often includes audit trail features, tracking user activities and access attempts for accountability and compliance purposes.

Protection Against Unauthorized Access: The module ensures that only authorized users can access patient data and takes measures to prevent unauthorized access or data breaches.

User Experience:

User-Friendly Access: Despite stringent security measures, the module strives to provide a user-friendly experience for patients. It simplifies the process of accessing their records through facial recognition, minimizing the need for complex authentication steps.

Streamlined Access: For healthcare staff, the module streamlines the process of accessing patient data according to their roles, reducing the time and effort required.

Compliance:

Regulatory Compliance: The Authentication and Authorization Module adheres to data protection and healthcare regulations to safeguard patient privacy and ensure legal compliance. In summary, the Authentication and Authorization Module plays a pivotal role in securing patient data and controlling access, providing a seamless and secure experience for both healthcare staff and patients while maintaining regulatory compliance. It combines robust authentication and authorization measures with user-friendly interfaces to ensure that the right individuals access the right data at the right time.

7. User Interface Module:

The User Interface Module provides a user-friendly interface for hospital staff to interact with the system. It offers features like viewing patient records, searching for specific patients, and performing actions related to patient data, such as updating medical information or adding new patients. This module plays a critical role in making the system accessible and user-friendly. The User Interface Module is the user-facing component of the system, providing an interactive and user-friendly platform for healthcare staff and patients to interact with the facial recognition system.

Patient Interface:

Facial Recognition Initiator: For patients, the module includes a straightforward facial recognition initiation process. Patients simply need to look at a camera, which captures their facial image for verification. This reduces the need for complex login procedures and enhances the overall user experience.

Feedback and Guidance: It offers real-time feedback and guidance to patients during the facial recognition process. Visual and auditory cues may be provided to assist users in capturing high-quality images.

Access to Medical Records: Once successfully authenticated, patients can easily access their medical records through an intuitive and patient-friendly interface. This interface typically allows patients to review their medical histories, test results, and treatment plans, enhancing their participation in their healthcare decisions.

Healthcare Staff Interface:

Facial Recognition Monitoring: Healthcare staff can monitor the facial recognition process through this interface. It provides real-time feedback on patient authentication, allowing staff to ensure a smooth and efficient process.

Access Control: Healthcare staff can use this interface to control and manage user access. They can grant or revoke access permissions and adjust authorization levels as needed.

Patient Record Management: The module offers healthcare staff the ability to efficiently manage patient records, update medical information, and review patient histories, contributing to well-informed decision-making.

User-Friendly Design:

-Intuitive Navigation: The User Interface Module is designed with a user-friendly, intuitive navigation system. This ensures that users can easily interact with the system, reducing the learning curve.

Responsive Design: The interface is often designed to be responsive, adapting to different devices and screen sizes, making it accessible on various platforms.

Multilingual Support: It may include multilingual support to accommodate diverse user populations, ensuring inclusivity and accessibility.

Visual Aids: The interface may use visual aids and simple graphics to enhance user understanding, ensuring that patients and healthcare staff can efficiently navigate and interact with the system.

Data Presentation:

Clear and Organized Information: The User Interface Module presents patient data in a clear and organized manner, making it easy for healthcare staff to review and analyze medical records. Customizable Views: Healthcare staff may have the option to customize views based on their roles and preferences, ensuring a personalized and efficient workflow.

In summary, the User Interface Module is a crucial component that bridges the gap between users and the facial recognition system. It offers an accessible, user-friendly, and intuitive platform for patients and healthcare staff to initiate facial recognition, access medical records, and efficiently manage patient data. Its design elements enhance user experience, making the system more efficient and user-friendly.

8. Maintenance and Updates Module: Regular maintenance and updates are essential to keep the system secure and up-to-date with the latest advancements in face detection technology. This module ensures that the system remains reliable, efficient, and compliant with evolving security standards. It manages tasks such as software updates, database maintenance, and system optimization.

Maintenance and Updates Module:

The Maintenance and Updates Module is an integral part of the system, dedicated to ensuring the long-term functionality, security, and adaptability of the facial recognition system in a hospital environment.

Ongoing Maintenance:

Regular Updates: The module is responsible for continuously monitoring the system for updates and patches. It ensures that the system remains up-to-date with the latest advancements in technology and security.

Bug Fixes: Identifying and addressing software bugs and issues is a core function of this module. Regularly releasing bug fixes maintains system reliability.

Performance Optimization: It seeks to enhance system performance by fine-tuning algorithms, improving response times, and streamlining data processing.

Security Enhancements:

Security Patches: This module plays a vital role in deploying security patches and updates to address new threats and vulnerabilities. It ensures that the system is protected against emerging risks.

Cybersecurity Measures: The module implements advanced cybersecurity measures, including encryption, intrusion detection, and data protection, to safeguard patient data and system integrity.

Security Auditing: Regular audits of the system's security protocols are conducted to identify and rectify potential vulnerabilities.

Data Management:

Data Backup and Recovery: The module establishes robust data backup and recovery mechanisms, ensuring data resilience in the event of system failures, data loss, or unforeseen incidents.

Data Archiving: It may manage data archiving processes to meet legal requirements for data retention, ensuring that patient records are securely preserved.

Data Integrity: Regular checks and validations are performed to maintain data accuracy and consistency.

System Adaptability:

Technology Upgrades: The module explores and integrates emerging technologies to keep the system aligned with evolving healthcare data management needs.

Scalability: Ensuring the system can accommodate the growth of patient records and increasing demands as the healthcare facility expands is a critical responsibility.

Compatibility: It ensures that the system remains compatible with various hardware and software components, providing a seamless and integrated experience.

User Training and Support:

User Training: The Maintenance and Updates Module often includes user training programs to keep healthcare staff and users informed about system enhancements and updates.

Technical Support: It offers technical support services to address user queries, provide assistance, and troubleshoot issues, ensuring a smooth user experience.

In summary, the Maintenance and Updates Module is essential for the long-term success of the system. It focuses on regular maintenance, security enhancements, data management, adaptability to evolving technologies, and ongoing support for users. This module is crucial for ensuring the system's reliability, security, and compliance with healthcare data management standards.

CHAPTER – 6

SYSTEM TESTING

System Testing for face detection in a hospital setting, particularly for patient records, plays a pivotal role in guaranteeing the effectiveness, precision, and security of healthcare operations. This rigorous testing process involves the thorough evaluation and validation of the face detection system, focusing on several critical aspects.

The foremost objective of system testing is to ensure the system's ability to accurately identify patients using facial recognition technology. This accuracy assessment involves validating the system's capacity to match a patient's facial features with the records in the database correctly. By measuring the system's precision and reliability, healthcare providers can confidently rely on the technology to streamline the patient record-keeping process. Accurate identification not only saves time but also reduces the likelihood of medical errors.

Given the highly sensitive nature of patient data, testing must encompass an evaluation of the system's capacity to safeguard patient privacy and prevent unauthorized access. This aspect of testing is critical for maintaining patient record confidentiality and ensuring compliance with stringent healthcare data protection regulations. A robust security framework must be in place to protect against data breaches, and rigorous testing helps identify vulnerabilities that may compromise patient data security.

System testing also includes assessing the system's speed and responsiveness. A swift and responsive face detection system is essential for minimizing wait times during patient check-ins and ensuring prompt access to medical records. Performance testing measures the system's ability to efficiently handle a high volume of requests, as well as its response time in recognizing patients. These metrics are vital in maintaining operational efficiency and providing a positive patient experience.

The integration of the face detection system with the hospital's existing IT infrastructure is another critical component of system testing. This ensures that the system seamlessly works with other hospital systems and applications. Integration testing helps identify any compatibility issues and ensures that data flows seamlessly between the face detection system and the broader hospital information ecosystem.

In conclusion, system testing for face detection in a hospital setting, especially for patient records, is a multifaceted process encompassing accuracy validation, security assessments, performance evaluations, and integration testing. Through thorough and comprehensive testing, hospitals can deploy a reliable and effective face detection system that not only enhances operational efficiency and patient experiences but also upholds the highest standards of data privacy and security in healthcare operations.

CHAPTER – 7

APPENDIX

7.1 Source Code

HTML:

```
<!doctype html>
<html lang="en">
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rel="stylesheet"href="C:\Users\suhas\OneDrive\Documents\miniprojectsrm\style.css">
      <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/6.4.2/css/all.min.css">


   </head>
   <body>
      <!--header section starts-->
      <header class="header">
         <a href="#" class="logo"><i class ="fas fa-heartbeat"></i>SRM Med-FaceView</a>
         <nav class="navbar">
            <a href="#home">Home</a>
```

```
            <a href="#services">services</a>
            <a href="#about">About</a>
            <a href="#doctors">Doctors</a>
            <a href="#helpus">HelpUs</a>
            <a href="#signin">SignIn</a>
            <a href="#signup">Face Detection</a>
        </nav>
         <div id=".menu-btn" class="fas fa-bars"></div>
    </header>
    <!--header section ends-->
    <!--home section starts-->
    <section class="home" id="home">
        <div class="image">
            <img src="CT scan-amico.svg" alt="">
        </div>
        <div class="content">
            <h3>stay safe,stay healthy</h3>
            <p>SRM Global Hospitals, renowned as the top-rated healthcare institution in Kattankulathur, Chennai, stands as a prominent super-specialty hospital with an outstanding history of achievements. With extensive experience spanning more than three decades, our utmost dedication lies in offering unparalleled medical services.</p>
            <a href="#" class="btn">Contact us</us> <span class="fas fa-chevron-right"></span> </a>
 </div>
    </section>
```

```
<!--home section ends-->

<!--icons section starts-->

<section class="icons-container">

    <div class="icons">

        <i class="fas fa-user-md"></i>

        <h3>140+</h3>

        <p>doctors at work</p>

    </div>

    <div class="icons">

        <i class="fas fa-users"></i>

        <h3>1800+</h3>

        <p>satisfied patients</p>

    </div>

    <div class="icons">

        <i class="fas fa-procedures"></i>            <!--bed,doctors.. available category -->

        <h3>800+</h3>

        <p>bed facility</p>

    </div>

    <div class="icons">

        <i class="fas fa-hospital"></i>

        <h3>1040+</h3>

        <p>avaliable hospitals</p>

    </div>

</section>
```

```
<!--icons section ends-->

<!--services section starts-->

<section class="services" id="services">

   <h1 class="heading"> our <span>services</span></h1>

      <div class="box-container">

         <div class="box">

            <i class="fas fa-notes-medical"></i>

            <h3>free checkups</h3>

            <p>There is a hospital in the campus itself called SRM general hospital where you will get free checkup and you can buy the meds the doc prescribes you.</p>

            <a href="#" class="btn" >learn more<span class="fas fa-chevron-right"></span></a>

         </div>

         <div class="box">

            <i class="fas fa-ambulance"></i>

            <h3>24/7 ambulance</h3>

            <p>Call our Ambulance for any emergency (Toll Free No : 044-4743-2350)</p>

            <a href="#" class="btn" >learn more<span class="fas fa-chevron-right"></span></a>

         </div>

         <div class="box">

            <i class="fas fa-user-md"></i>

            <h3>expert doctors</h3>

            <p>With highly skilled physicians and experienced doctors, we specialize in treating disorders of the digestive tract,cancer,tumor ...</p>
```

```
            <a href="#" class="btn" >learn more<span class="fas fa-chevron-right"></span></a>
        </div>
        <div class="box">
            <i class="fas fa-pills"></i>
            <h3>medicines</h3>
            <p>SRMC has a professional team of general physicans & general medicine doctors, internal medical specialist, having faculty with experienced and expertise in their field.</p>
            <a href="#" class="btn" >learn more<span class="fas fa-chevron-right"></span></a>
        </div>
        <div class="box">
            <i class="fas fa-procedures"></i>
            <h3>bed facility</h3>
            <p>his Hospital has more than 1600 beds and also has six fully equipped intensive care units, 23 state of the art operating theatres, 24/7 Pharmacy, Radiology, Dialysis, Laboratory Facilities and several others.</p>
            <a href="#" class="btn" >learn more<span class="fas fa-chevron-right"></span></a>
        </div>
        <div class="box">
            <i class="fas fa-heartbeat"></i>
            <h3>total care</h3>
            <p>SRMC has over 750 faculties and three thousand students; it touches the lives of over 3500 patients each day; through its telemedicine network it reaches over 10
```

centres in the country; through its international wing SRHI, it is reaching out to the global village

learn more

</section>

<!--services section ends-->

<!--about section starts-->

<section class="about" id="about">

<h1 class="heading"> about us</h1>

<img src="Hospital wheelchair-amico.svg" alt="">

<h3>we take care of your healthy life</h3>

SRM Medical Hospital And Research Centre, Kattankulathur has 1590 beds providing tertiary care along with 24x7 emergency and trauma care. They provide treatments across 52 departments including Superspeciality departments like Cardiology, Nephrology, Urology, Neurosurgery, etc

learn more

</section>

```
<!--about section ends-->
<!-- doctors section starts-->
<section class="doctors" id="doctors">
   <h1 class="heading"> our <span>doctors </span></h1>
   <div class="box-container">
      <div class="box">
         <img src="img.jpg/images1.jpg" alt="">
         <h3>vinodhini</h3>
         <span>expert doctors</span>
         <div class="share">
            <a href="#" class="fab fa-facebook-f"></a>
            <a href="#" class="fab fa-twitter"></a>
            <a href="#" class="fab fa-instagram"></a>
            <a href="#" class="fab fa-linkedin"></a>
         </div>
      </div>
      <div class="box">
         <img src="img.jpg/images2.jpg" alt="">
         <h3>vijay</h3>
         <span>expert doctors</span>
         <div class="share">
            <a href="#" class="fab fa-facebook-f"></a>
            <a href="#" class="fab fa-twitter"></a>
            <a href="#" class="fab fa-instagram"></a>
```

```
        <a href="#" class="fab fa-linkedin"></a>
    </div>
</div>
<div class="box">
    <img src="img.jpg/images3.jpg" alt="">
    <h3>kaviya</h3>
    <span>expert doctors</span>
    <div class="share">
        <a href="#" class="fab fa-facebook-f"></a>
        <a href="#" class="fab fa-twitter"></a>
        <a href="#" class="fab fa-instagram"></a>
        <a href="#" class="fab fa-linkedin"></a>
    </div>
</div>
<div class="box">
    <img src="img.jpg/images4.jpg" alt="">
    <h3>dhanush</h3>
    <span>expert doctors</span>
    <div class="share">
        <a href="#" class="fab fa-facebook-f"></a>
        <a href="#" class="fab fa-twitter"></a>
        <a href="#" class="fab fa-instagram"></a>
        <a href="#" class="fab fa-linkedin"></a>
    </div>
```

```
            </div>
        </div>
    </section>
    <!-- doctors section starts-->
    <!--custom js file link-->
    <script src="js/script.js">
    </script>
  </body>
</html>
```

CSS:

```
@import
url('https://fonts.googleapis.com/css2?family=Poppins:ital,wght@0,100;0,400;0,600;0,700;1,
300&display=swap');
:root{
  --violet:#d056f1;
  --black:#444;
  --light-color:#777;
  --box-shadow:.5rem .5rem 0 rgba(22,160,133,.2);
  --box-shadow:.4rem .4rem 0 rgba(0,0,0,.2);
  --border:.2rem solid var(--violet);
}
*{
  font-family: 'Poppins', sans-serif;
  margin:0;
  padding: 0;
```

```
    box-sizing: border-box;
    outline: none;
    border: none;
    text-transform: capitalize;
    transition: all .2s ease-out;
    text-decoration: none;
}
/svg img h3 ,p/
section{
    padding:2rem 9%;
}
/bed,available category starts/
section:nth-child(even){
    background: #f5f5f5;
}
/our services starts/
.heading{
    text-align: center;
    padding-bottom: 2rem;
    text-shadow: var(--text-shadow);
    text-transform: uppercase;
    color: var(--black);
    font-size: 5rem;
    letter-spacing: .4rem;
```

```
}
.heading span{
    text-transform: uppercase;
    color: var(--violet);
}
/our services ends/

/bed,available category ends/
.btn{
    display: inline-block;
    margin-top: 1rem;
    padding: .5rem;
    padding-left: 1rem;
    border:var(--border);
    border-radius: .5rem;
    box-shadow: var(--box-shadow);
    color:var(--violet);
    cursor:pointer;
    font-size: 1.7rem;
}
.btn span{
    padding: .7rem 1rem;
    border-radius: .5rem;
    background: var(--violet); /contact us button/
```

```
    color:#fff;
    margin-left: .5rem;
}
.btn:hover{
    background-color: var(--violet);
    color: #fff;
}
.btn:hover span{
    color: var(--violet);
    background-color: #fff;
    margin-left: 1rem;
}
/ends/
html{
    font-size: 62.5%;
    overflow-x: hidden;
    scroll-padding-top: 7rem;
    scroll-behavior: smooth;
}
.header{
    padding:.2rem 9%;
    position: fixed;
    top:0;left:0;right: 0;
    z-index: 1000;
```

```
    box-shadow: 0.5rem 1.5rem rgba(0,0,0,.2);
    display: flex;
    align-items: center;
    justify-content: space-between;
    background: #fff;
}
.header .logo{
    font-size: 3.5rem;
    color:var(--black)
}
.header .logo i{
    color:var(--violet);
}
.header .navbar a{
    font-size: 1.7rem;
    color:var(--light-color);
    margin-left: 2rem;
}
.header .navbar a:hover{
    color: var(--violet);
}
.menu-btn{
    font-size: 2.5rem;
    border-radius: .5rem;
```

```
    background: #eee;
    color:var(--violet);
    padding :1rem 1.5rem;
    cursor: pointer;
    display: none;
}
/* img display 1*/
.home{
    display: flex;
    align-items:center; /stsy...,h3,p,contactus in center css code/
    flex-wrap: wrap;
    gap:1.5rem;
    padding-top: 10rem;
}
.home .image{
    flex:1 1 45rem;
}
.home .image img{
    width:100%;
}
.home .content{
    flex:1 1 45rem;
}
.home .content h3{
```

```
    font-size: 4.5rem;
    color:var(--black);
    line-height:1.8;
    text-shadow: var(--text-shadow);
}
.home .content p{
    font-size: 1.7rem;
    color:var(--light-color);
    line-height:1.8;
    padding: 1rem 0;
}
/* bed,avaliable category css coding starts*/
.icons-container{
    display: grid;
    gap: 2rem;
    grid-template-columns: repeat(auto-fit,minmax(20rem,1fr));
    padding-top: 1rem;
    padding-bottom: 10rem;
}
.icons-container .icons{
    border:var(--border);
    box-shadow: var(--box-shadow);
    border-radius: .3rem;
    text-align: center;
```

```
    padding: 2.5rem;
}
.icons-container .icons i{
    font-size: 3.5rem;
    color:var(--violet);
    padding-bottom: .7rem;
}
.icons-container .icons h3{
    font-size: 4.5rem;
    color:var(--black);
    padding-bottom: .5rem 0;
    text-shadow: var(--text-shadow);
}
.icons-container .icons p{
    font-size: 1.7rem;
    color:var(--light-color);
}
/* bed,avaliable category css coding ends*/
/our services start/
.services .box-container{
    display:grid;
    grid-template-columns: repeat(auto-fit,minmax(27rem,1fr));
    gap:2rem;
}
```

```
.services .box-container .box{
    background: #fff;
    border-radius: 0.9rem;
    box-shadow: var(--box-shadow);
    border: var(--border);
    padding: 2.5rem;
}
.services .box-container .box i{
    color: var(--violet);
    font-size: 3rem;
    padding-bottom: .4rem;
}
.services .box-container .box h3{
    color: var(--black);
    font-size: 1.9rem;
    padding: 1rem 0;
}
.services .box-container .box p{
    color: var(--light-color);
    font-size: 1.1rem;
    line-height: 2;
}
/our services end/
/about section start about us/
```

```
.about .row{
    display:flex;
    align-items:center ;
    flex-wrap: wrap;
    gap: 2rem;
}
.about .row .image{
    flex:1 1 45rem;
}
.about .row .image img{
    width:100%;
}
.about .row .content{
    flex:1 1 45rem;
}
.about .row .content h3{
    color: var(--black);
    text-shadow: var(--text-shadow);
    font-size: 3rem;
    line-height: 1.8;
}
.about .row .content p{
    color: var(--light-color);
    padding: 1rem 0;
```

```
    font-size: 1.5rem;
    line-height: 1.8;
}
/about section end about us/
/doctors section starts/
.doctors .box-container {
    display:grid;
    grid-template-columns: repeat(auto-fit, minmax(27rem,1fr));
    gap:2rem;
}
.doctors .box-container .box{
    text-align: center;
    background: #fff;
    border-radius: .5rem;
    border:var(--border);
    box-shadow: var(--box-shadow);
    padding: 2rem;
}
.doctors .box-container .box img{
    height: 20rem;
    border: var(--border);
    border-radius: .5rem;
    margin-top: 1rem;
    margin-bottom: 1rem;
```

```
}
.doctors .box-container .box h3{
    color:var(--black);
    font-size: 2.5rem;
}
.doctors .box-container .box span{
    color:var(--violet);
    font-size: 1.5rem;
}
.doctors .box-container .box .share{
    padding-top:2rem;
}
.doctors .box-container .box .share a{
    height: 5rem;
    width: 5rem;
    line-height: 4.5rem;
    font-size: 2rem;
    color:var(--violet);
    border-radius: .5rem;
    border: var(--border);
    margin:.3rem;
}
.doctors .box-container .box .share a:hover{
    background: var(--violet);
```

```
    color: #fff;
    box-shadow: var(--box-shadow);
}
/*doctors section end */
/img display end/

/* media queries */
@media(max-width:991px){
    html{
        font-size: 55%;
    }
    .header{
        padding:2rem;
    }
}
@media(max-width:768px) {
    .menu-btn{
        display: initial;
    }
    .header .navbar{
        position:absolute;
        top: 115%;right: 2rem;
        border-radius: .5rem;
        box-shadow: var(--box-shadow);
```

```
        width:30rem;
        border:var(--border);
        background: #fff;
        transform: scale(0);
        opacity: 0;
        transform-origin: top right;
        transition: none;
    }
    .header .navbar .active{
        transform: scale(0);
        opacity: 1;
        transition: .2s ease-out;
    }
    .header .navbar a{
        font-size: 2rem;
        display: block;
        margin: 2.5rem;

    }
}
@media(max-width:450px){
    html{
        font-size: 50%;
    }
```

```
    }
```

Javascript:

```
let menu=document.querySelector('.menu-btn');

let navbar=document.querySelector('.navbar')


menu.onclick= () =>{
    menu.classList.toggle('fa-times');
    navbar.classList.toggle('active');
}
window.onscroll= () =>{
    menu.classList.remove('fa-times');
    navbar.classList.remove('active');
}
```

Face Recognition:

```
from flask import Flask, render_template, request, redirect, url_for,jsonify
import cv2
import os
import json
import numpy as np
import csv
import pandas as pd
from PIL import Image, ImageFont, ImageDraw
import datetime
from flask_cors import CORS
import time
import sqlite3

app = Flask(__name__)
```

```
CORS(app)

ALLOWED_EXTENSIONS = {'png', 'jpg', 'jpeg'}
REGISTER_PATH="./Register/"
TEMP_PATH="./Capturing_Images"
upload_path='./upload_face'
upload_path2='./upload_face2'
app.config['SEND_FILE_MAX_AGE_DEFAULT']=1
def allowed_file(filename):
    return '.' in filename and \
           filename.rsplit('.', 1)[1].lower() in ALLOWED_EXTENSIONS

conn = sqlite3.connect('db.sqlite3')
c = conn.cursor()
#alter_query = '''ALTER TABLE users
                 #ADD COLUMN ph TEXT'''
#c.execute(alter_query)
c.execute('''CREATE TABLE IF NOT EXISTS srm (
                name TEXT,
                Id TEXT,
                Gender TEXT,
                phonenumber TEXT,
                address TEXT,
                Email TEXT
            )''')

###c.execute('''(DESC users)''')
conn.commit()
conn.close()

@app.route('/patientreg', methods=['GET', 'POST'])

def upload_register():
```

```
    if request.method == 'POST':
        if 'file' not in request.files:
            return json.dumps({"status": "Error", "msg": "Image cannot be empty "})



    return "Registration successful!"


def is_number(s):
    try:
        float(s)
        return True
    except ValueError:
        pass

    try:
        import unicodedata
        unicodedata.numeric(s)
        return True
    except (TypeError, ValueError):
        pass

    return False

@app.route('/')
def index():
    return render_template('frontpage.html')

@app.route('/login', methods=['GET', 'POST'])
def login():
    email = request.form.get('email')
    password = request.form.get('password')
    print(email.lower())
    print(password)
```

```
    if (email.lower() == 'srm@gmail.com' and password == 'srm'):
        return json.dumps ({"status": "true","message": "User Registered Succesfully"})
    else:
        return json.dumps ({"status": "false","message": "User Not Registered"})




@app.route('/take_image', methods=['GET', 'POST'])
def TakeImages():
    name = request.form.get('name')
    print(name)
    Id = request.form.get('Id')
    Gender = request.form.get('gender')
    phonenumber = request.form.get('phonenumber')
    address = request.form.get('address')
    Email = request.form.get('email')
    print(Id)
    print(Gender)
    print(phonenumber)
    print(address)
    print(Email)

    conn = sqlite3.connect('db.sqlite3')
    c = conn.cursor()
        #c.execute("INSERT INTO users (username, email, password) VALUES (?, ?, ?)",
(username, email, password))
    c.execute("INSERT INTO srm (name, Id, Gender, phonenumber, address, Email)
VALUES (?, ?, ?, ?, ?, ?)",
              (name, Id, Gender, phonenumber, address, Email))
    conn.commit()
    conn.close()
```

```
    #Id='4123'
    #name='ghhwewewe'
    age='34'
    #gender='m'
    if(is_number(Id) and name.isalpha()):
        cam = cv2.VideoCapture(0)
        harcascadePath = "haarcascade_frontalface_default.xml"
        detector=cv2.CascadeClassifier(harcascadePath)
        sampleNum=0
        print("inside if cond")
        while(True):
            ret, img = cam.read()
            gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
            faces = detector.detectMultiScale(gray, 1.3, 5)
            for (x,y,w,h) in faces:
                cv2.rectangle(img,(x,y),(x+w,y+h),(255,0,0),2)
                #incrementing sample number
                sampleNum=sampleNum+1
                #saving the captured face in the dataset folder TrainingImage
                cv2.imwrite("Capturing_Images\ "+name +"."+Id +'.'+ str(sampleNum) + ".jpg",
gray[y:y+h,x:x+w])
                #display the frame
                cv2.imshow('frame',img)
            #wait for 100 miliseconds
            if cv2.waitKey(100) & 0xFF == ord('q'):
                break
            # break if the sample number is morethan 100
            elif sampleNum>60:
                break

        cam.release()
        cv2.destroyAllWindows()
```

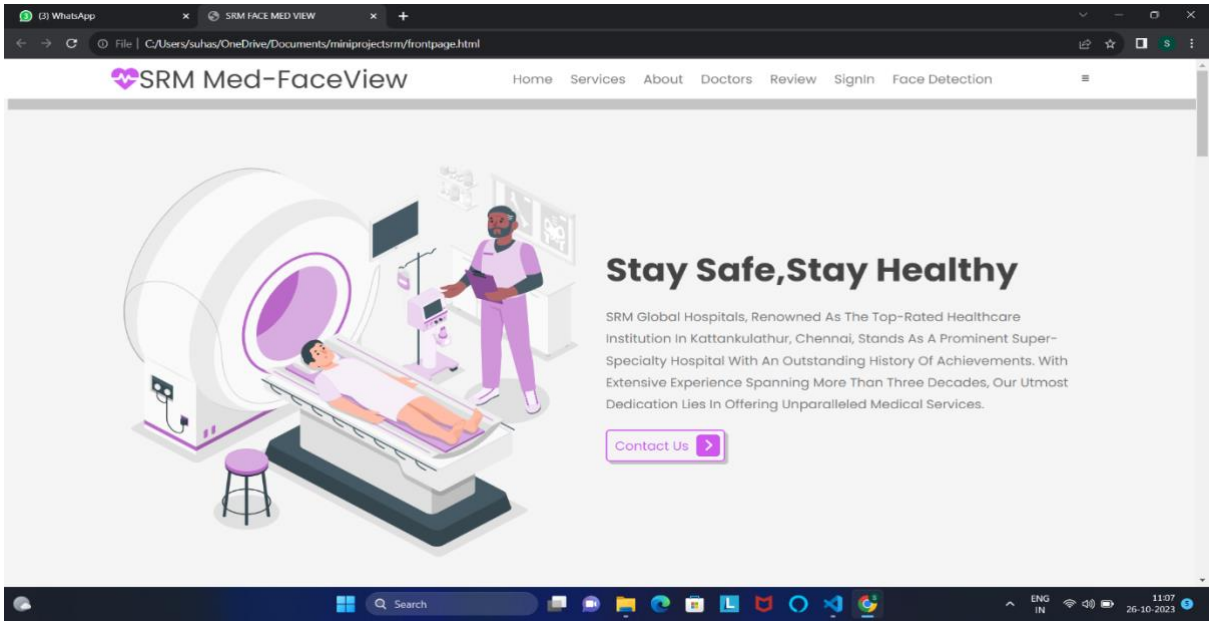
```
        res = "Images Saved for ID : " + Id +" Name : "+ name +"Age :" + age + "Gender:"
+Gender
        row = [Id , name,age,Gender]
        with open('patient_List\patient_List.csv','a+') as csvFile:
            writer = csv.writer(csvFile)
            writer.writerow(row)
        csvFile.close()

        #message.configure(text= res)
    else:
        if(is_number(Id)):
            res = "Enter Alphabetical Name"
            message.configure(text= res)
        if(name.isalpha()):
            res = "Enter Numeric Id"
            message.configure(text= res)
    recognizer = cv2.face_LBPHFaceRecognizer.create()#recognizer =
cv2.face.LBPHFaceRecognizer_create()#$cv2.createLBPHFaceRecognizer()
    harcascadePath = "haarcascade_frontalface_default.xml"
    detector =cv2.CascadeClassifier(harcascadePath)
    faces,Id = getImagesAndLabels("Capturing_Images")
    recognizer.train(faces, np.array(Id))
    recognizer.save("Models\Trainner.yml")
   # return json.dumps ({"status": "true","message": "User Registered Succesfully"})
    #res = "Image Trained"#+",".join(str(f) for f in Id)
    #message.configure(text= res)


def getImagesAndLabels(path):
    #get the path of all the files in the folder
    imagePaths=[os.path.join(path,f) for f in os.listdir(path)]
    #print(imagePaths)
    #print(imagePaths)
    #create empth face list
```

```
    faces=[]
    #create empty ID list
    Ids=[]
    #now looping through all the image paths and loading the Ids and the images
    for imagePath in imagePaths:
        #loading the image and converting it to gray scale
        pilImage=Image.open(imagePath).convert('L')
        #Now we are converting the PIL image into numpy array
        imageNp=np.array(pilImage,'uint8')
        #getting the Id from the image
        Id=int(os.path.split(imagePath)[-1].split(".")[1])
        # extract the face from the training image sample
        faces.append(imageNp)
        Ids.append(Id)
    return faces,Ids

# ... (previous code)
@app.route('/track_images', methods=['GET', 'POST'])
#@app.route('/track_images')
def TrackImages():

    recognizer = cv2.face.LBPHFaceRecognizer_create()#cv2.createLBPHFaceRecognizer()
    recognizer.read("Models\Trainner.yml")
    harcascadePath = "haarcascade_frontalface_default.xml"
    faceCascade = cv2.CascadeClassifier(harcascadePath);
    df=pd.read_csv("patient_List\patient_List.csv")
    cam = cv2.VideoCapture(0)
    font = cv2.FONT_HERSHEY_SIMPLEX
    col_names =  ['Id','Name','Date','Time','Location']
    attendance = pd.DataFrame(columns = col_names)

    while True:
        ret, im =cam.read()
        gray=cv2.cvtColor(im,cv2.COLOR_BGR2GRAY)
```

```
faces=faceCascade.detectMultiScale(gray, 1.2,5)
for(x,y,w,h) in faces:
    cv2.rectangle(im,(x,y),(x+w,y+h),(225,0,0),2)
    Id, conf = recognizer.predict(gray[y:y+h,x:x+w])
    print(conf)
    if(conf < 50):
        Location="College"
        ts = time.time()
        date = datetime.datetime.fromtimestamp(ts).strftime('%Y-%m-%d')
        timeStamp = datetime.datetime.fromtimestamp(ts).strftime('%H:%M:%S')
        aa=df.loc[df['Id'] == Id]['Name'].values
        tt=str(Id)+"-"+aa+"-"+"Student"
        name=""
        phonenumber=""
        gender=""
        address=""
        email=""
        attendance.loc[len(attendance)] = [Id,aa,date,timeStamp,Location]
        #break
        con = sqlite3.connect('db.sqlite3')
        #Id =4123
        #completion = False
        with con:
            cur = con.cursor()
            cur.execute("SELECT * FROM srm WHERE Id = ?",(Id,))
            #cur.execute("SELECT * FROM srm WHERE Id == :Id", {"Id": str(Id)})
            rows = cur.fetchone()
            #for row in rows:
            if rows:
                print(rows)
                name = rows[0]
                gender = rows[2]
                phonenumber = rows[3]
                address = rows[4]
```

```
                email = rows[5]
            else:
                print("rows not found")
            #con.commit()
            #row = cur.fetchone()
            #name = row[1]
            #gender = row[2]
            #phonenuber = row[3]
            #address = row[4]
            #email = row[5]
        #c.execute("SELECT * FROM srm WHERE Id=?",(Id))
        return json.dumps ({"status": "true","message": "face Detected","Id":
str(Id),"name": name,"gender": gender,"phonenumber": phonenumber,"address":
address,"email": email})
    else:
        Id='Not_MATCHED'
        tt=str(Id)
    if(conf > 75):
        noOfFile=len(os.listdir("Database"))+1
        cv2.imwrite("Database\Image"+str(noOfFile) + ".jpg", im[y:y+h,x:x+w])
    cv2.putText(im,str(tt),(x,y+h), font, 1,(255,255,255),2)
  attendance=attendance.drop_duplicates(subset=['Id'],keep='first')
  cv2.imshow('Face_Recognize',im)
  if ((cv2.waitKey(1)==ord('q'))):
    break
 return json.dumps ({"status": "false","message": "No face Detected"})
 #return redirect(url_for('result', message=message))
@app.route('/result/<message>')

def result(message):
 return render_template('result.html', message=message)
if __name__ == '__main__':
 app.run(debug=True)
```

7.2 Screen Shot


(3) WhatsApp
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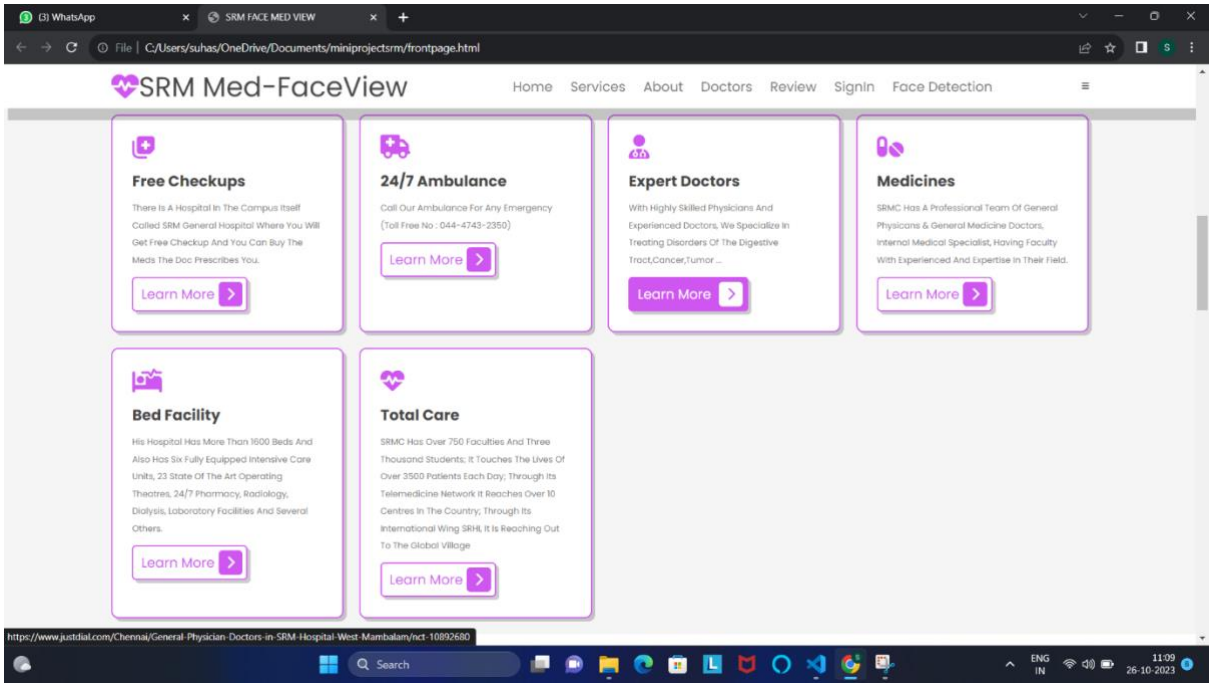
(3) WhatsApp
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24/7 Ambulance
Call Our Ambulance For Any Emergency (Toll Free No : 044-4743-2350)
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Expert Doctors
With Highly Skilled Physicians And Experienced Doctors, We Specialize In Treating Disorders Of The Digestive Tract,Cancer,Tumor ...
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SRMC Has A Professional Team Of General Physicans & General Medicine Doctors, Internal Medical Specialist, Having Faculty With Experienced And Expertise In Their Field.
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Bed Facility
His Hospital Has More Than 1600 Beds And Also Has Six Fully Equipped Intensive Care Units, 23 State Of The Art Operating Theatres, 24/7 Pharmacy, Radiology, Dialysis, Laboratory Facilities And Several Others.
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Total Care
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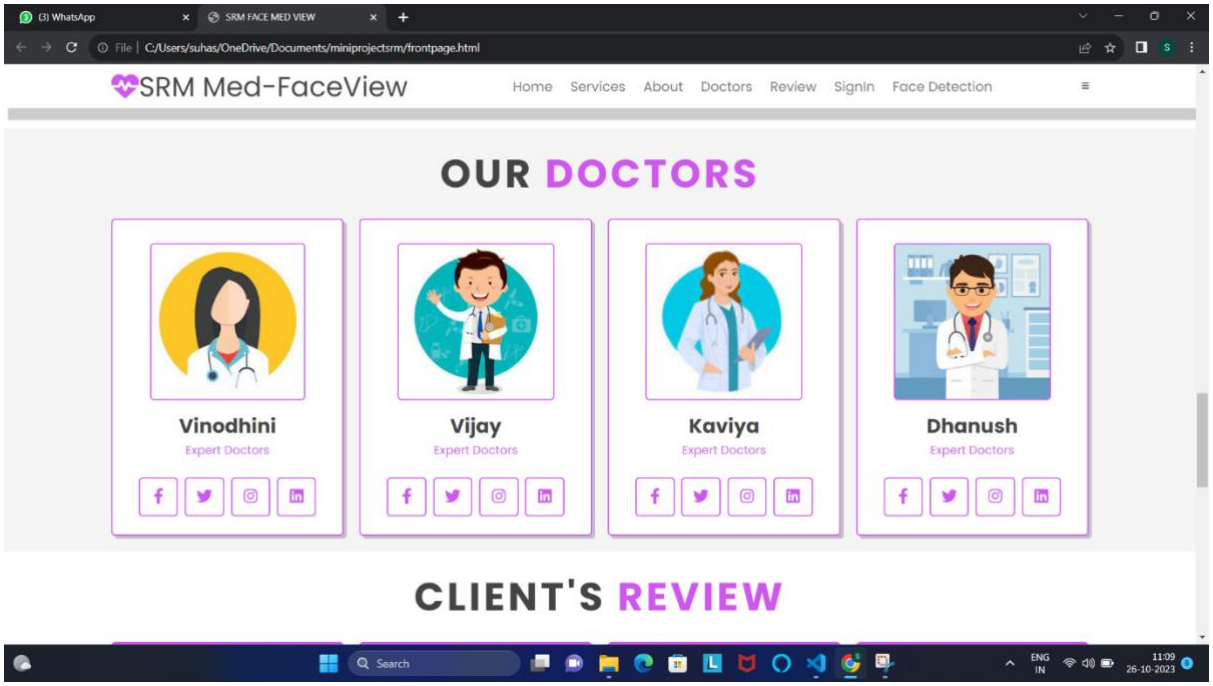
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Vinodhini
Expert Doctors
Vijay
Expert Doctors
Kaviya
Expert Doctors
Dhanush
Expert Doctors
CLIENT'S REVIEW


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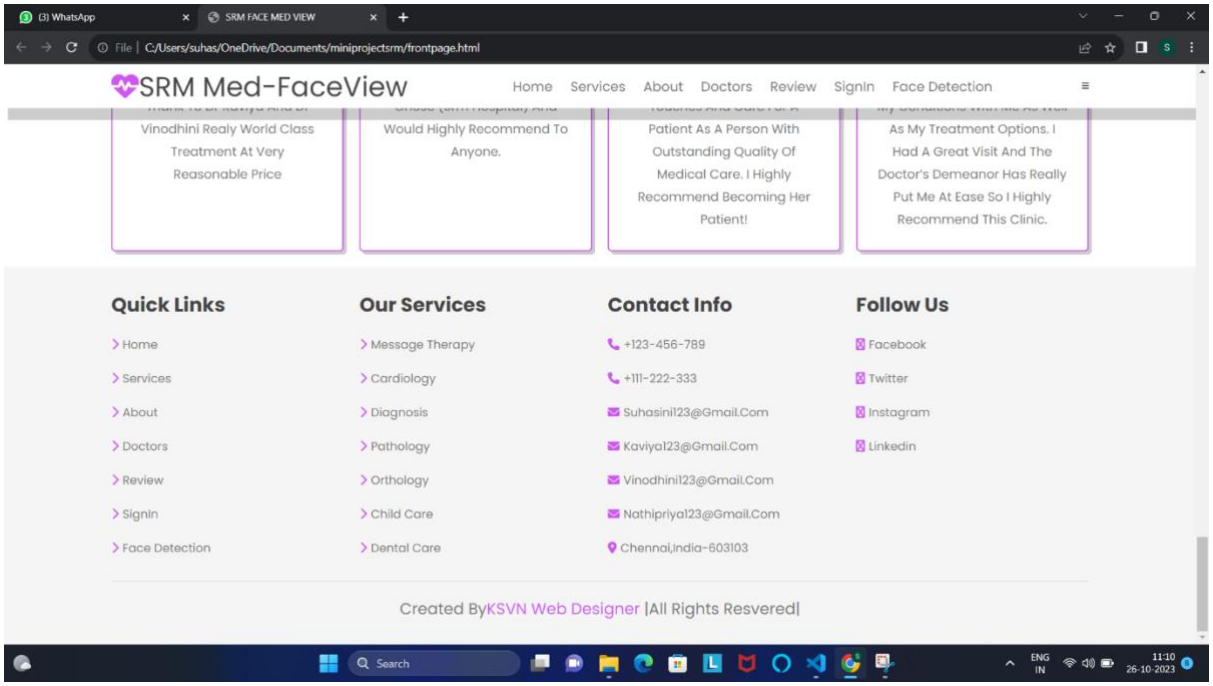
CLIENT'S REVIEW
Nathipriya
Very Excellent Hospital Good Dr And Very Genrouse Staff For Post Care My Dad Operated For Cancer And Flap Surgery Cost Wise Also Very Reasonable In Compare With Appollo Hospital My Special Thank To Dr Kaviya And Dr Vinodhini Realy World Class Treatment At Very Reasonable Price
Suhasini
Wonderful Experience With Srm Hospital.Dr Kumara Was A Wonderful Surgeon, And The Staff Was Always Helpful And Kind. They Ensured I Had A Smooth Prep, Surgery, And Follow-Up. I Am So Glad I Chose (Srm Hospital) And Would Highly Recommend To Anyone.
Kaviya
Dr.Suganthi Is Incredible. Not Only Has She Taken Great Care Of My Health, But Also She Is Lovely To Speak With At Every Appointment. It's Rare To Find A Doctor That Combines Such Personal Touches And Care For A Patient As A Person With Outstanding Quality Of Medical Care. I Highly Recommend Becoming Her Patient!
Vinodhini
Great Experience As A First Timer. I Barely Waited To Be Helped When I Checked In. The Staff And Dr.Suriya Were All Very Friendly And Helpful. I Especially Loved How Dr.Suriya Really Took His Time To Explain My Conditions With Me As Well As My Treatment Options. I Had A Great Visit And The Doctor's Demeanor Has Really Put Me At Ease So I Highly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Vinodhini Realy World Class Treatment At Very Reasonable Price
Would Highly Recommend To Anyone.
Patient As A Person With Outstanding Quality Of Medical Care. I Highly Recommend Becoming Her Patient!
As My Treatment Options. I Had A Great Visit And The Doctor's Demeanor Has Really Put Me At Ease So I Highly Recommend This Clinic.
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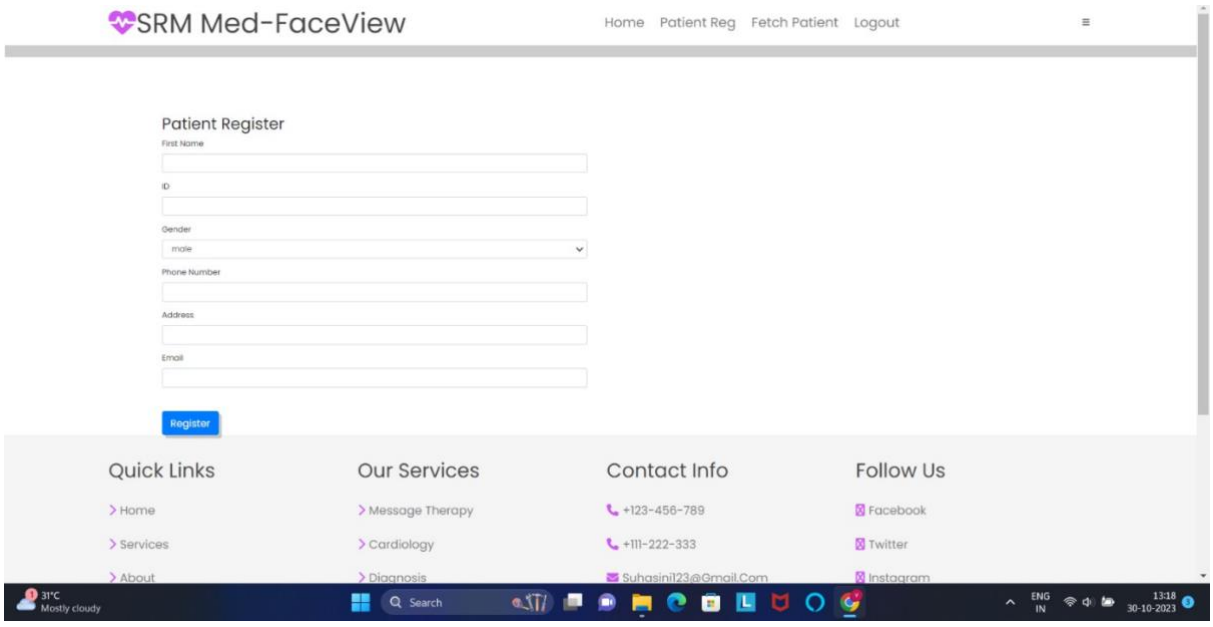
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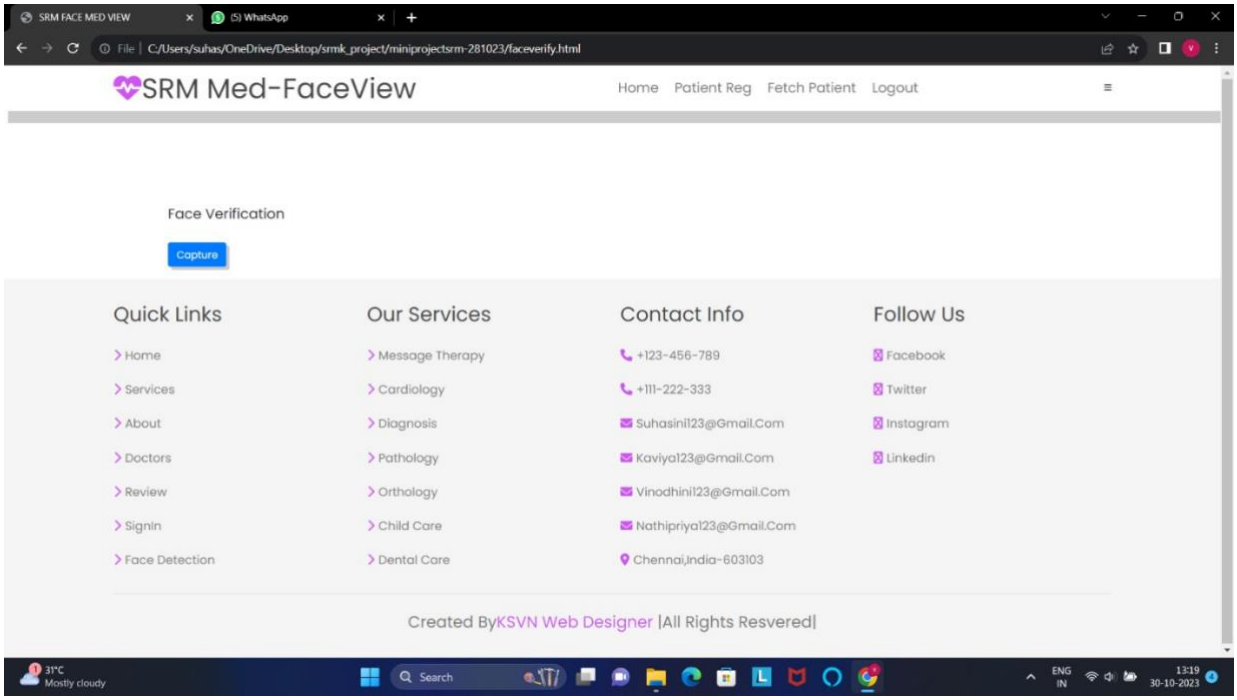
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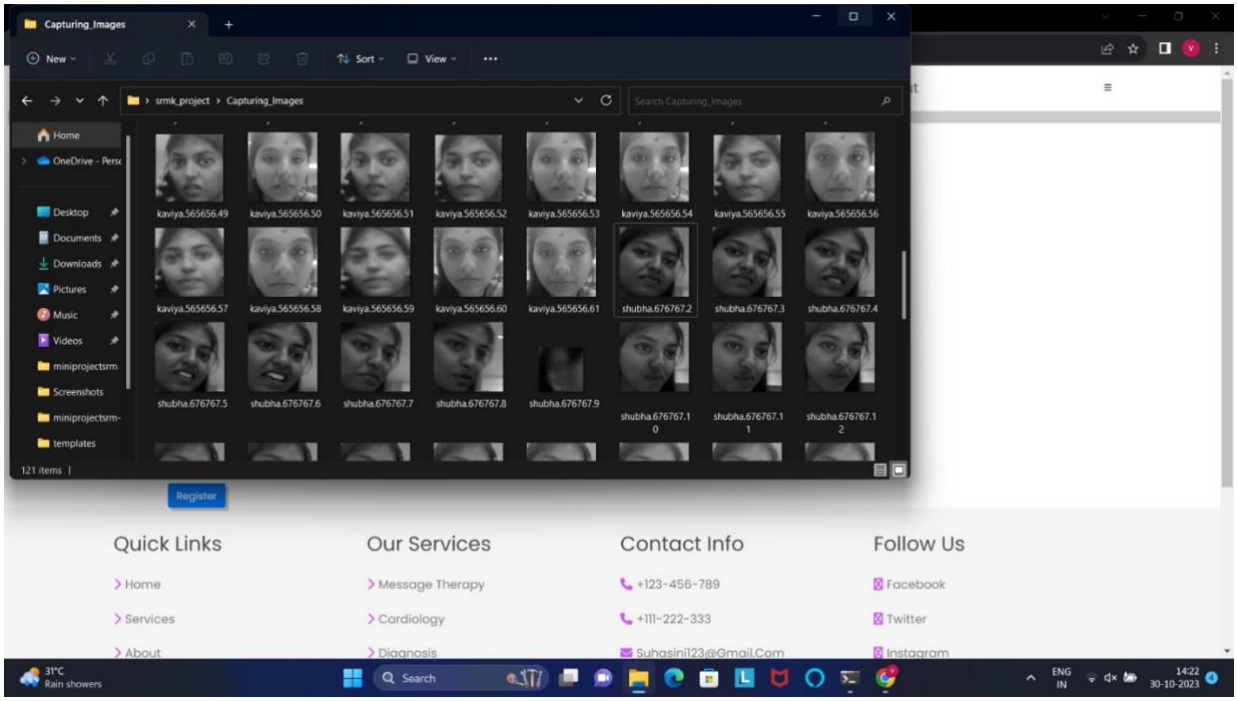
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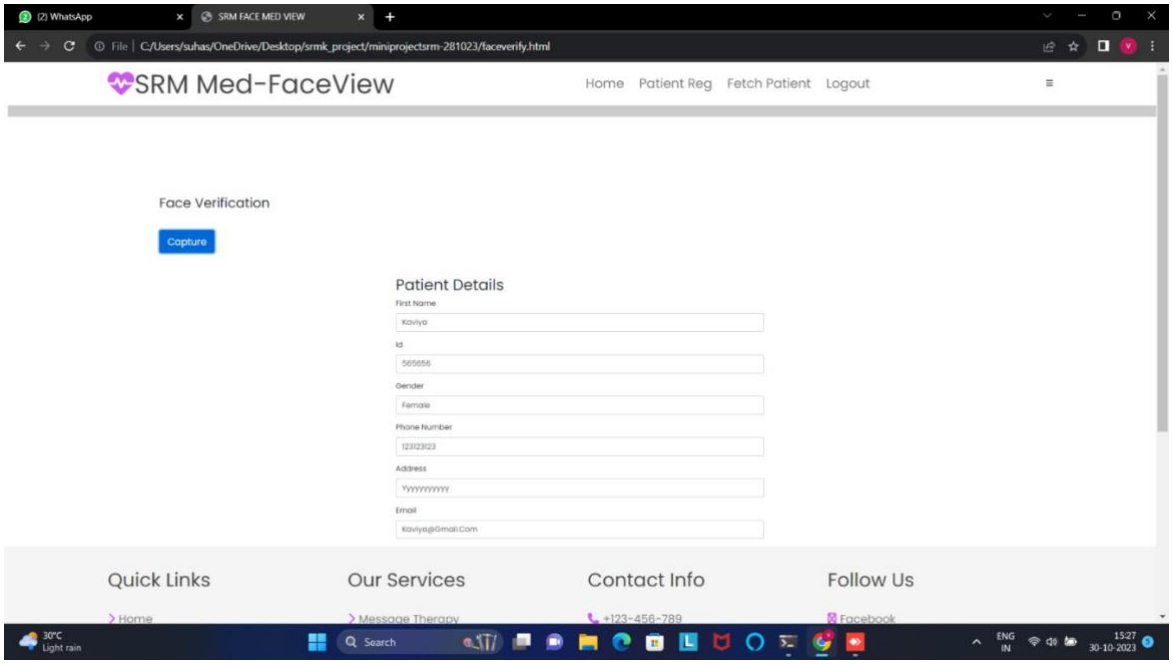

CHAPTER – 8

8.1 Conclusion and Future Enhancements

The integration of face detection technology into hospital patient records management has demonstrated considerable potential in enhancing efficiency and accuracy within healthcare systems. Through the utilization of facial recognition technology, hospitals have effectively streamlined the identification and access to patient records, resulting in both time and resource savings. Administrative burdens have been lessened, significantly improving the overall patient experience by reducing the need for paperwork and minimizing delays.

Looking ahead, the future of face detection in hospitals for patient records management lies in continuous refinement and enhancement. The accuracy of facial recognition algorithms must be continually improved to ensure the reliable and precise identification of patients. Additionally, the security and privacy of patient data remain paramount, necessitating ongoing efforts to strengthen safeguards and address ethical concerns. By remaining at the forefront of technological developments and maintaining a steadfast commitment to ethical considerations, healthcare institutions can harness the full potential of facial recognition systems. This will translate into even more efficient and secure patient care, fostering the advancement of healthcare services and ultimately benefiting patients and providers alike.

In summary, the integration of face detection technology in healthcare is a promising avenue for achieving enhanced efficiency and accuracy. The future of this technology within hospitals for patient records management will be shaped by a commitment to ongoing improvement in accuracy, data security, and privacy, with the aim of providing healthcare services that are not only more efficient but also more secure and respectful of patient confidentiality.

CHAPTER – 9

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