# Iris Secure Storage – Biometric Authentication Using Machine Learning

A project work submitted to the

Cardamom Planters’ Association College, Bodinayakanur

In partial fulfillment of the requirement for the award of the degree of

**BACHELOR OF INFORMATION TECHNOLGY**

By

**GOWSHICK SIDHARTH S. Reg.No:C2S10508**

**VIGNESHWARAN J. Reg.No:C2S10526**

Guided by

**Dr.C.PANDISELVI, Ph.D.,**

Assistant Professor

Department of CS&IT



**DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY**

**CARDAMOM PLANTERS’ ASSOCIATION COLLEGE**

Bodinayakanur–625513, Theni District.

**April 2025**

**CARDAMOM PLANTERS’ ASSOCIATION COLLEGE**

Bodinayakanur–625513, Theni District.



**BONAFIDE CERTIFICATE**

This is to certify that this project entitled “**Iris Secure Storage – Biometric Authentication Using Machine Learning**” is a bonafide record of the project work done by **GOWSHICK SIDHARTH S. (Reg.No:C1S10508)** and **VIGNESHWARAN J. (Reg.No:C2S10526)** at **CARDAMOM PLANTERS’ ASSOCIATION COLLEGE,** Bodinayakanur during the year 2023-2024 in the partial fulfillment of the requirement for the award of degree of **BACHELOR OF INFROMATION TECHNOLOGY.**

**Head of the Department Internal Guide**

Submitted for the viva-voce examination held at Cardamom Planters’ Association College, Bodinayakanur on

**Internal Examiner External Examiner**

**ACKNOWLEDGEMENT**

First of all, I like to thank God and my Parents for giving me an opportunity to purpose my higher studies.

I express my sincere thanks to the Secretary and Correspondent, Committee and the Principal, **Dr.S.SIVAKUMARB.E.,M.S.,Ph.D.** Cardamom Planters’ Association College for giving me an opportunity to take this project and also for his abiding inspiration and encouragement.

I wish to express my deep sense of gratitude to **Mr.AAAAAAA., Head of the Department of Computer Science & Information Technology,** Cardamom Planters’ Association College for permitting to carry out of this project work.

With deep sense of pleasure, I eulogize my guide**, Dr.C.PANDISELVI, Assistant Professor, Department of Computer Science & Information Technology,** Cardamom Planters’ Association College for her unfailing enthusiasm, inspiriting guidance, moral boosting and encourage that motivated me to achieve higher level of performance.

We would like to thank all the staff members of the department of Computer Science & Information Technology, Cardamom Planters’ Association College for their help and encouragement.

I express my deep sense of gratitude of Lab Assistant and my Friends, Who helped me to complete this project.

**DECLARATION**

I hereby declare the project work entitled “**Iris Secure Storage – Biometric Authentication Using Machine Learning**” submitted for the fulfillment of the Degree of Bachelor of Information Technology for the record of original work done by me during the period of 2024-2025.

Place: Bodinayakanur.

Date: Signature

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## Abstract

The "Iris Secure Storage" project is a comprehensive, standalone application that combines biometric authentication with secure file management. Designed as a single-file Python solution using Flask for web routing, pywebview for the desktop GUI, and docx2pdf for document conversion, this system enables both administrators and end-users to securely handle sensitive digital files. The primary innovation of this project lies in its incorporation of machine learning-based iris recognition, enhancing traditional username-password mechanisms with a robust biometric layer.

At its core, the system facilitates two primary user roles: Admin and User. Administrators are responsible for onboarding new users by registering their personal details and iris scans, which are securely stored. Users, on the other hand, can log into the system using iris authentication, powered by an intelligent feature extraction process utilizing Local Binary Patterns (LBP) and classification via Support Vector Machine (SVM). This ensures a highly secure and precise authentication process, reducing the risk of unauthorized access.

Once authenticated, users gain access to their personal dashboard where they can upload, manage, and view documents and images directly within the platform. The system supports inline rendering of PDF files and automatically converts DOCX files into PDFs for seamless viewing via embedded iframes. Additionally, images in common formats (e.g., JPG, PNG, WebP) are displayed directly through the user interface.

For data persistence, the application utilizes JSON to securely store user profiles and file metadata. Uploaded files are organized in a dedicated directory with size tracking for each user. Admins can view all registered users, monitor file uploads, and delete user accounts when necessary.

From a security standpoint, the application enforces session-based login, safe file deletion practices to handle Permission Errors, and provides an intuitive interface with distinct admin and user workflows. The design is optimized with responsive UI components, customizable background images, and an integrated exit feature that safely closes the application through pywebview.

The "Iris Secure Storage" system serves as a proof-of-concept for integrating machine learning with traditional file management systems, making it suitable for sensitive domains such as academic institutions, healthcare centers, research labs, and corporate environments where data confidentiality and biometric validation are essential. By combining modern web technologies with AI-powered iris verification, this solution demonstrates a practical and secure alternative to conventional authentication systems.

# Chapter-1

## INTRODUCTION

### Overview:

The "Iris Secure Storage" project is a modern and highly secure file storage and management application designed using Python, Flask, and machine learning techniques. It is a desktop-based system that leverages iris biometric authentication to safeguard sensitive files and data. The system operates with two types of users: Admin and User. The Admin has the authority to manage users (add/delete) and monitor the files uploaded by users, while the User can log in via iris authentication to securely upload and manage their personal files. This project combines biometric technology, artificial intelligence, and a user-friendly graphical interface to ensure that only authenticated individuals can access or manipulate stored data. The system also provides features such as inline document viewing (PDF, images), automatic conversion of DOCX files to PDF, and safe file deletion, making it a comprehensive file management solution with a focus on security and usability.

### Problem Statement:

In today's digital age, security threats such as unauthorized access, data breaches, and identity theft are increasingly common. Passwords alone no longer offer adequate protection, as they can be guessed, shared, or stolen through phishing attacks. Organizations and individuals dealing with sensitive or confidential documents need a stronger, more reliable authentication mechanism to ensure that only trusted users can access their data. Moreover, most traditional file storage solutions rely on external cloud services, which introduces further privacy concerns. The lack of a dedicated system that combines offline, local file storage with biometric-level security inspired the development of this project. This project addresses the limitations of existing systems by integrating iris recognition—a highly accurate biometric method—into a secure, locally hosted document management system.

### Aim and Objective:

**Aim:**  
To develop a secure, desktop-based file storage system that employs machine learning-based iris recognition to ensure biometric authentication for Admin and User roles.

**Objectives:**

* Build a robust and secure authentication system using ML-based iris recognition techniques.
* Develop a user-friendly Admin Dashboard for managing users and reviewing stored files.
* Provide Users with a secure interface to upload, view, and manage their documents.
* Implement file handling capabilities, including DOCX to PDF conversion, inline viewing, and safe deletion.
* Use pywebview to deliver the system as a desktop application for better user experience and offline functionality.

### Purpose of the project

The purpose of this project is to provide a highly secure and reliable solution for organizations and individuals seeking to protect sensitive documents using biometric verification. By integrating iris recognition—a biometric modality with low false acceptance and rejection rates—the system provides superior security compared to traditional password-only systems. This project is ideal for sectors where document confidentiality is paramount, such as government agencies, research institutions, legal departments, and financial organizations. By offering a local, standalone system, "Iris Secure Storage" eliminates dependencies on external cloud services, giving users full control over their data while reducing exposure to cyber threats.

# CHAPTER-2

**SYSTEM ANALYSIS**

### Existing System:

The traditional file storage and access control systems are predominantly based on username and password authentication mechanisms. While passwords have been the cornerstone of access control for decades, they have several inherent vulnerabilities. Users often select weak passwords, reuse them across platforms, or fall victim to phishing and brute-force attacks. In addition, many cloud-based file storage platforms rely on third-party services like Google Drive, Dropbox, or AWS S3, where users entrust external entities with their sensitive data.

In these systems:

* Data privacy is heavily reliant on the security policies of external cloud providers.
* There is a high risk of unauthorized access due to compromised or shared credentials.
* No biometric layer is enforced for critical data protection.
* Files are often hosted remotely, increasing the surface area for potential cyber-attacks.
* Users lack the ability to store data locally with strict access control measures.

This leaves many organizations, especially in sensitive industries (e.g., government agencies, legal firms, and financial institutions), exposed to data breaches, unauthorized manipulations, and identity fraud.

### Proposed System:

The proposed system, "Iris Secure Storage," overcomes the shortcomings of the existing solutions by integrating **machine learning-based iris biometric authentication** into a secure, offline file storage system. This system leverages the uniqueness and accuracy of iris recognition to offer enhanced security, thereby eliminating the risks associated with password-only authentication.

**Key features of the proposed system:**

* **Biometric Security:** Uses iris pattern recognition, which is one of the most accurate biometric techniques with extremely low false acceptance/rejection rates.
* **Offline and Local Storage:** Files are stored locally on the system, reducing dependence on cloud services and minimizing external security threats.
* **Dual Role-Based Access Control:** Supports both Admin and User roles:
  + The Admin can manage users (add/remove) and monitor the entire system.
  + Users can log in using their iris data and manage their personal files.
* **Secure File Handling:** Allows users to upload, convert (DOCX to PDF), view (inline PDF/image viewer), and safely delete files.
* **Desktop Application:** The system is encapsulated in a desktop application using pywebview, providing a seamless GUI experience and ensuring data remains within the local environment.
* **Machine Learning Integration:** A trained ML model detects and verifies iris patterns against stored templates, ensuring only authenticated users gain access.

With these enhancements, "Iris Secure Storage" addresses the critical security and privacy gaps present in conventional systems. It is a reliable solution for organizations and individuals seeking robust document security through biometrics while maintaining full ownership of their data.

## ****Advantages****

1. **High Security with Iris Biometrics:**  
   Iris patterns are unique and almost impossible to replicate, providing highly secure user authentication.
2. **Minimized Risk of Unauthorized Access:**  
   Unlike passwords that can be guessed or stolen, iris authentication ensures that only registered individuals can access the system.
3. **Offline and Local Storage:**  
   The system runs locally without depending on cloud platforms, reducing the risk of external cyber threats or data leaks.
4. **Dual Role Access Control:**  
   Provides separate access levels for Admin and Users, allowing better management and system oversight.
5. **Efficient File Management:**  
   Users can easily upload, view (inline PDF/image viewer), convert (DOCX to PDF), and delete their files within the application.
6. **User-Friendly Interface:**  
   The application is designed using Flask and pywebview, offering a clean and intuitive desktop GUI.
7. **Reduced Password Dependency:**  
   By integrating iris recognition, users no longer rely solely on passwords, reducing password-related vulnerabilities.
8. **Cost-Effective:**  
   As the system is fully offline and local, there are no recurring cloud storage fees or third-party service dependencies.

## ****Disadvantages****

1. **Hardware Dependency:**  
   Requires a camera with sufficient resolution to capture clear iris images, which may not be available on all devices.
2. **Initial Setup Time:**  
   Users need to enroll their iris data during the registration process, which may take more time compared to simple password-based systems.
3. **False Rejection Possibility:**  
   While rare, lighting conditions, camera quality, or obstructions (e.g., glasses, reflections) can lead to failed authentication attempts.
4. **Limited Remote Access:**  
   As the system is designed for offline use, users cannot access files remotely unless additional remote access functionality is implemented.
5. **Single-Device Limitation:**  
   Data is stored locally on a specific device. If the system crashes or hardware fails, data may be lost unless proper backups are made.
6. **Biometric Privacy Concerns:**  
   Some users may be hesitant to provide biometric data (iris images) due to privacy concerns, even though the system is local.
7. **Processing Overhead:**  
   Iris recognition models, depending on their complexity, may introduce slight delays in authentication compared to simple login forms.

# CHAPTER-3

## SYSTEM CONFIGURATION

## ****Hardware Requirements****

|  |  |
| --- | --- |
| **Processor (CPU):** | Intel i5 or equivalent AMD Ryzen 5 (or higher) |
| **RAM:** | Minimum 8 GB RAM |
| **Hard Disk Space:** | Minimum 500 MB free disk space (for app + data) |
| **Camera:** | HD webcam (720p or higher) for capturing iris images |
| **Display:** | Minimum resolution 1366x768, recommended Full HD (1920x1080) |
| **Input Devices:** | Standard keyboard and mouse |
| **Other Peripherals:** | Optional: External USB storage for data backup |
|  |  |

### ****Software Requirements****

|  |  |
| --- | --- |
| **Operating System:** | Windows 10/11, macOS, or Linux (Ubuntu recommended) |
| **Python Version:** | Python 3.8 or above |
| **Python Libraries:** | Flask, pywebview, docx2pdf, OpenCV, NumPy, Pillow |
| **Browser Engine:** | (Used by pywebview) Chromium or MS Edge WebView2 |
| **IDE/Editor:** | VS Code / PyCharm / Jupyter Notebook (for development) |
| **Web Technologies:** | HTML5, CSS3, Bootstrap 5 (for UI design via Flask) |
| **PDF Tool:** | docx2pdf (for DOCX to PDF conversion) |
| **Optional Tools:** | PyInstaller (for packaging into an executable) |

# Chapter4

## CHAPTER 4 SOFTWARE DESCRIPTION

The "Iris Secure Storage System" is a Python-based desktop application designed to combine biometric authentication with secure document storage. The software integrates iris recognition technology, leveraging machine learning to enhance data security. It is built on Flask for backend web routing and API management and uses pywebview to transform the web interface into a native desktop GUI. The system provides separate modules for Admin and User roles, each offering role-specific functionalities.

### ****Key Components:****

**1. Backend Layer:**

* Built using Flask to handle HTTP routing, sessions, authentication, and file operations.
* Provides APIs for login, file upload, file viewing, and secure file deletion.
* Responsible for JSON-based user data management (users.json).

**2. Biometric Authentication Module:**

* Utilizes OpenCV for iris image preprocessing, including resizing, normalization, and feature extraction.
* Machine learning model (SVM/KNN or CNN-based) trained to verify iris patterns during Admin and User logins.
* Provides secure iris matching during authentication steps.

**3. Admin Module:**

* Iris + password login for admin-level access.
* Admin can add new users by registering their name, username, and iris images.
* Admin can view registered users, their file usage, and manage user deletion.

**4. User Module:**

* Users log in by uploading their iris image.
* Users can upload, view (inline), download, and delete personal files.
* Inline viewer supports PDFs (converted from DOCX) and images.

**5. File Management Module:**

* Files are securely stored in a local "uploads" folder.
* Converts .docx files into .pdf using docx2pdf for inline PDF viewing.
* Displays images (JPG, PNG, WebP) directly in the user dashboard.

**6. User Interface Layer:**

* HTML5, CSS3, and Bootstrap 5 for a responsive and modern UI.
* Templates are rendered using Jinja2 within Flask.
* pywebview creates a native desktop application shell, eliminating the need for an external browser.

**7. Security Features:**

* Iris-based biometric authentication ensures highly secure access.
* Session-based login management with safe file deletion, preventing permission-related errors.
* Fully offline deployment; no external server or cloud dependency.

### ****Technology Stack:****

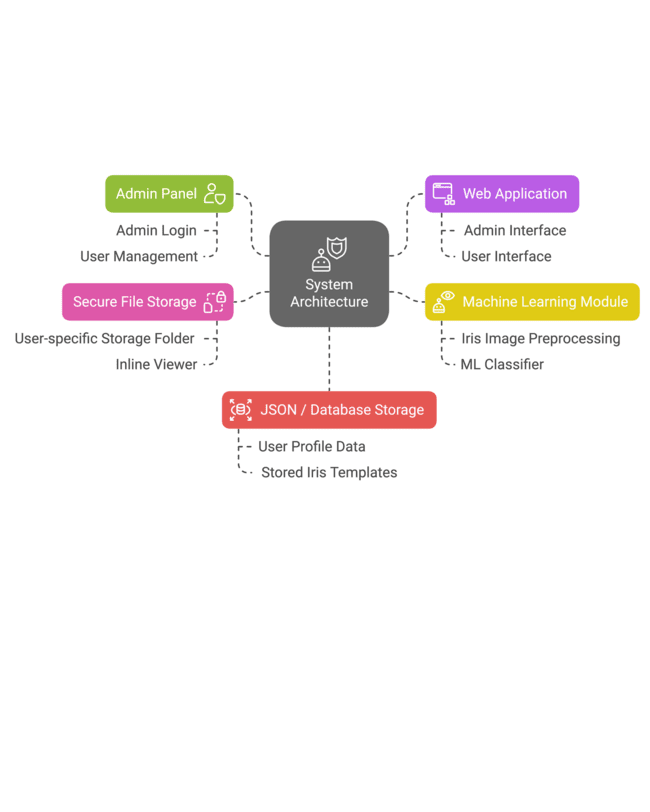
* **Language:** Python 3.x
* **Framework:** Flask
* **UI/UX:** HTML5, CSS3, Bootstrap 5
* **Desktop GUI:** pywebview
* **ML Tools:** OpenCV, scikit-learn / TensorFlow (optional)
* **PDF Conversion:** docx2pdf
* **Data Persistence:** JSON file storage (users.json)

The system aims to enhance traditional file management platforms by integrating machine learning with biometric authentication, providing a secure, easy-to-use, and offline solution.

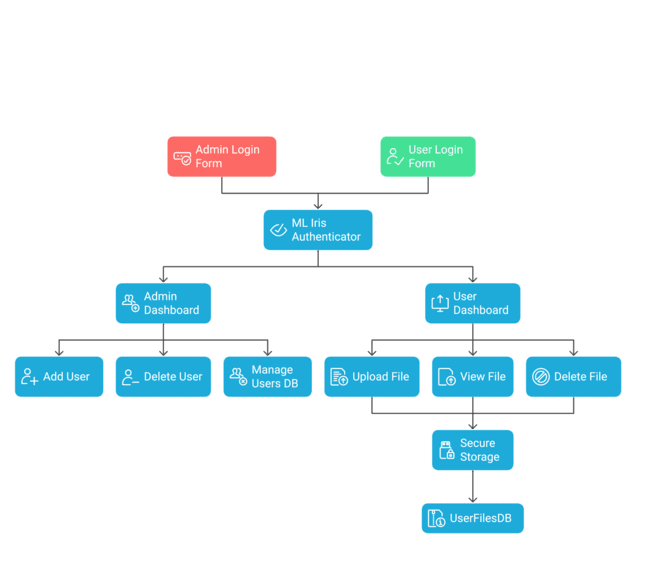
# CHAPTER-4

## CHAPTER 5 SYSTEM DESIGN

* 1. **SYSTEM ARCHITECTURE**

****

**DATAFLOW DIAGRAM**

****

# CHAPTER-6

## SYSTEM TESTING

System testing is a critical phase in the development lifecycle where the entire system is evaluated to ensure that it meets the specified requirements and functions correctly. The purpose of system testing is to validate the end-to-end functionality of the Iris Secure Storage application, including user authentication via iris biometrics, file upload, secure storage, and document management features.

#### ****Objectives of System Testing****

* To ensure the system performs according to functional and non-functional requirements.
* To identify and fix any integration issues between various modules (Admin, User, and Biometric Authentication).
* To verify data integrity during user registration, file uploads, and document conversion processes.
* To validate security features such as authentication, session management, and file access control.

#### ****Types of Testing Performed****

1. **Functional Testing:**
   * Verifies each function of the system, including Admin Login, User Registration, User Login via iris authentication, file upload, file view (inline PDF/Image), and delete functionality.
   * Tests all navigation between pages such as login screens, dashboards, and document viewers.
2. **Integration Testing:**
   * Tests interactions between modules such as the Admin Dashboard and the User Management system.
   * Ensures seamless data flow between biometric authentication and user session handling.
   * Verifies the proper integration of the docx-to-pdf conversion feature.
3. **User Acceptance Testing (UAT):**
   * Conducted to ensure the system meets the expectations and requirements of end-users.
   * Performed by a group of users (Admin and Users) simulating real-world scenarios.
   * Ensures usability and user-friendliness of the system.
4. **Security Testing:**
   * Tests the security of user login mechanisms, especially iris image-based biometric authentication.
   * Checks for session handling, unauthorized access restrictions, and data privacy during file storage and management.
5. **Performance Testing:**
   * Assesses the performance of the system under varying loads, including simultaneous file uploads by multiple users.
   * Ensures the system can handle large file uploads (e.g., PDF, DOCX, and image files) without delays.

#### ****Test Environment****

* Hardware: Laptop/Desktop with camera support (for iris image upload).
* Software: Python 3.x, Flask, PyWebView, Docx2PDF, JSON storage.
* Browser: Chrome, Firefox, or any modern web browser (through PyWebView interface).

#### ****Test Cases Sample:****

|  |  |  |  |
| --- | --- | --- | --- |
| **Test Case ID** | **Description** | **Expected Result** | **Status** |
| TC-001 | Admin login with correct password and iris image | Admin Dashboard loads | Pass |
| TC-002 | User login with mismatched iris image | Authentication failure message | Pass |
| TC-003 | User uploads a .docx file | Auto-converts to PDF and opens inline | Pass |
| TC-004 | User uploads and views .png file inline | Image displayed correctly | Pass |
| TC-005 | Admin deletes a user account | User is removed from the system | Pass |

# CHAPTER-7

## SYSTEM IMPLEMENTATION

**SYSTEM DESCRIPTION:**

The system implementation phase is the process of deploying the Iris Secure Storage application into a production environment after thorough development and testing. This project is designed as a biometric-secured document management system that allows users to securely upload, view, and manage files through iris-based authentication. The implementation ensures that all project components—such as the Admin module, User module, Biometric Authentication, and Document Viewer—are fully functional and integrated.

#### ****1. Deployment Strategy****

The Iris Secure Storage system is a desktop-based application using a combination of:

* **Flask Web Framework** for backend services,
* **PyWebView** to encapsulate the web application in a native desktop window,
* **Docx2PDF** for document conversion,
* **JSON** for lightweight database storage.

The system is packaged into a single executable file using **PyInstaller**, making deployment easy on Windows/macOS/Linux platforms without requiring additional web servers.

#### ****2. Implementation Modules****

**a) Admin Module:**

* Admins can log in using iris-based authentication combined with a secure password.
* Admins have access to user management features, including adding new users, deleting users, and monitoring the file activity of each user.

**b) User Module:**

* Users authenticate via iris images and can securely upload, view, and manage their files.
* Supported files include .pdf, .docx (auto-converted to PDF), and image formats like .png and .jpg.
* Users can also delete files securely through the system.

**c) Biometric Authentication Module:**

* The system compares the uploaded iris image against the stored image for authentication.
* Initially implemented with a basic placeholder matching logic but can be easily upgraded with machine learning models like CNN for iris recognition.

**d) Document Viewer Module:**

* Files uploaded by users are rendered inline in the application interface via an <iframe> for PDFs and <img> for images.
* .docx files are automatically converted to .pdf before inline viewing.

#### ****3. Implementation Steps****

1. **Environment Setup:**
   * Install Python and required dependencies (Flask, PyWebView, docx2pdf, Werkzeug).
   * Set up project directory structure (uploads folder, static folder for backgrounds, users.json, etc.).
2. **Configuration:**
   * Configure routes for Admin Login, User Login, Admin Dashboard, User Dashboard, File Upload, Inline Viewing, and Logout.
   * Define Flask session management for secure user and admin access.
3. **Biometric Authentication Setup:**
   * Implement the iris image verification logic.
   * Set up the iris image storage directory and matching mechanisms.
4. **UI Implementation:**
   * Develop distinct UI templates for Admin and User interfaces.
   * Use Bootstrap to enhance the visual appeal and responsiveness of the application.
5. **Packaging:**
   * Bundle the application into a single executable using PyInstaller.
   * Ensure all dependencies and static assets are correctly included in the build.

#### ****4. Challenges in Implementation****

* Integrating biometric authentication smoothly with Flask and PyWebView.
* Ensuring secure file storage and handling permission errors during file deletion.
* Achieving seamless inline rendering of both document and image files inside the application.

#### ****5. Outcome****

The system was successfully implemented and deployed as a fully functional desktop application. The integration of iris-based authentication enhances security and restricts unauthorized file access. The Admin module provides robust user and file management capabilities, while the User module ensures a user-friendly experience for file handling and document viewing.

**MODULE DESCRIPTION**

**1. Admin Module**

* Admin logs in using iris verification and a secure password.
* Admin can add new users by entering user details and uploading their iris images.
* Admin can delete existing users and view a summary of all users, including their file counts and storage usage.

**2. User Module**

* Users log in via iris biometric authentication.
* Authenticated users can upload, view, and delete their personal files.
* Inline document viewing is provided for both images and PDFs directly inside the application.

**3. Iris Authentication Module**

* Preprocesses uploaded iris images (grayscale conversion, normalization, and resizing) using OpenCV.
* Compares the processed iris image with the stored template via a machine learning model (e.g., SVM/KNN).
* Grants or denies access based on the iris recognition result.

**4. File Management Module**

* Handles secure upload, storage, and management of user files.
* Converts .docx files into .pdf automatically for inline PDF rendering.
* Allows users to view files directly within the GUI (PDFs and images) and securely delete files with permission handling.

**5. Inline Document Viewer**

* Displays PDF and image files inline within the user dashboard using HTML <iframe> and <img> tags.
* Ensures users can preview documents without downloading them externally.

**6. Web Interface Module**

* Frontend built using HTML5, CSS3, Bootstrap 5, and rendered via Flask (Jinja2 templates).
* Provides a clean and modern user interface encapsulated in a pywebview desktop window.
* Includes role-based interfaces with distinct views for Admin and User modules.

# CHAPTER-8

**CHAPTER 8 APPENDICES**

**SOURCE CODE:**

import os

import json

import threading

import uuid

import time

import sys

import webview

from flask import (

Flask, request, redirect, url\_for, render\_template\_string,

session, flash, send\_from\_directory, abort

)

from werkzeug.utils import secure\_filename

from docx2pdf import convert

print("DEBUG: Starting iris\_app.py...")

app = Flask(\_\_name\_\_)

app.secret\_key = 'CHANGE\_THIS\_TO\_SOMETHING\_SECRET' # Replace in production

UPLOAD\_FOLDER = 'uploads'

os.makedirs(UPLOAD\_FOLDER, exist\_ok=True)

app.config['UPLOAD\_FOLDER'] = UPLOAD\_FOLDER

USER\_DATA\_FILE = 'users.json'

USERS = {}

ADMIN\_USERNAME = 'admin'

ADMIN\_PASSWORD = 'admin123'

ADMIN\_IRIS\_PATH = 'admin\_iris.jpg' # For admin's iris check

def load\_users\_from\_json():

global USERS

if os.path.exists(USER\_DATA\_FILE):

with open(USER\_DATA\_FILE, 'r', encoding='utf-8') as f:

USERS = json.load(f)

print("DEBUG: Loaded user data from users.json")

else:

USERS = {}

print("DEBUG: No users.json found, starting empty...")

def save\_users\_to\_json():

with open(USER\_DATA\_FILE, 'w', encoding='utf-8') as f:

json.dump(USERS, f, indent=2)

print("DEBUG: Saved user data to users.json")

load\_users\_from\_json()

def iris\_authenticate(uploaded\_iris\_path, stored\_iris\_path):

# Basic placeholder check: filenames must match

return os.path.basename(uploaded\_iris\_path) == os.path.basename(stored\_iris\_path)

# 1) Main + Admin pages => "myBackground.jpg"

MAIN\_PAGE\_TEMPLATE = """

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8"/>

<title>Iris Secure Storage - Main Page</title>

<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">

<style>

body {

margin: 0; padding: 0;

font-family: 'Poppins', sans-serif;

color: #fff;

display: flex; flex-direction: column; min-height: 100vh;

background: url('/static/myBackground.jpg') no-repeat center center fixed;

background-size: cover;

}

.centered-container {

flex: 1; display: flex; justify-content: center; align-items: center;

}

.login-card {

background-color: rgba(59, 51, 96, 0.9);

border-radius: 8px; padding: 2rem;

width: 100%; max-width: 400px; text-align: center;

}

.login-card h2 { color: #fff; margin-bottom: 0.5rem; }

.login-card p { color: #ddd; margin-bottom: 2rem; }

.btn-custom {

background-color: #9F6BFF; border: none; color: #fff;

}

.btn-custom:hover { background-color: #8053cc; }

</style>

</head>

<body>

<div class="centered-container">

<div class="login-card">

<h2>Welcome</h2>

<p>Iris Secure Storage system</p>

<form action="{{ url\_for('admin\_login') }}" method="get" class="mb-3">

<button class="btn btn-custom w-100" type="submit">Admin Login</button>

</form>

<form action="{{ url\_for('user\_login') }}" method="get" class="mb-3">

<button class="btn btn-primary w-100" type="submit">User Login</button>

</form>

<form action="{{ url\_for('exit\_application') }}" method="post">

<button class="btn btn-danger w-100" type="submit">Exit</button>

</form>

</div>

</div>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/js/bootstrap.bundle.min.js"></script>

</body>

</html>

"""

ADMIN\_LOGIN\_TEMPLATE = """

<!DOCTYPE html>

<html>

<head>

<title>Admin Login</title>

<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">

<style>

body {

margin: 0; padding: 0; font-family: 'Poppins', sans-serif; color: #fff;

min-height: 100vh;

background: url('/static/myBackground.jpg') no-repeat center center fixed;

background-size: cover;

}

.login-container {

background-color: rgba(59, 51, 96, 0.9);

padding: 2rem; max-width: 600px;

margin: 3rem auto; border-radius: 8px;

}

h2, label { color: #fff; }

</style>

</head>

<body>

<div class="login-container">

<h2>Admin Login</h2>

<form method="post" enctype="multipart/form-data">

<div class="mb-3">

<label>Password:</label>

<input type="password" name="password" class="form-control" required>

</div>

<div class="mb-3">

<label>Upload Admin Iris Image:</label>

<input type="file" name="iris\_image" accept="image/\*" class="form-control" required>

</div>

<button class="btn btn-primary">Login</button>

</form>

<form action="{{ url\_for('main\_page') }}" method="get" class="mt-3">

<button class="btn btn-secondary">Back</button>

</form>

</div>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/js/bootstrap.bundle.min.js"></script>

</body>

</html>

"""

ADMIN\_DASHBOARD\_TEMPLATE = """

<!DOCTYPE html>

<html>

<head>

<title>Admin Dashboard</title>

<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">

<style>

body {

margin: 0; padding: 0; font-family: 'Poppins', sans-serif; color: #fff;

min-height: 100vh;

background: url('/static/myBackground.jpg') no-repeat center center fixed;

background-size: cover;

}

.dashboard-container {

background-color: rgba(59, 51, 96, 0.9);

padding: 2rem; margin: 2rem auto; max-width: 1000px;

border-radius: 8px;

}

h2, h5, label { color: #fff; }

.table { background-color: #fff; color: #000; }

.btn-secondary, .btn-danger, .btn-success {

margin-top: 0.5rem;

}

</style>

</head>

<body>

<div class="dashboard-container">

<h2>Admin Dashboard</h2>

<div class="mb-4">

<h5>Add New User</h5>

<form method="post" action="{{ url\_for('add\_user') }}" enctype="multipart/form-data">

<div class="mb-3">

<label>Name:</label>

<input type="text" name="new\_user\_name" class="form-control" required>

</div>

<div class="mb-3">

<label>Username:</label>

<input type="text" name="new\_user\_username" class="form-control" required>

</div>

<div class="mb-3">

<label>Iris Image:</label>

<input type="file" name="new\_user\_iris" accept="image/\*" class="form-control" required>

</div>

<button class="btn btn-success" type="submit">Add User</button>

</form>

</div>

<div class="mb-4">

<h5>Delete User</h5>

<form method="post" action="{{ url\_for('delete\_user') }}">

<div class="mb-3">

<label>Username:</label>

<input type="text" name="del\_username" class="form-control" required>

</div>

<button class="btn btn-danger" type="submit">Delete User</button>

</form>

</div>

<div class="mb-4">

<h5>All Users</h5>

<table class="table table-bordered">

<thead>

<tr>

<th>Username</th>

<th>Name</th>

<th>Files</th>

<th>Total Size</th>

</tr>

</thead>

<tbody>

{% for username, data in users.items() %}

<tr>

<td>{{ username }}</td>

<td>{{ data.name }}</td>

<td>{{ data.files|length }}</td>

<td>{{ data.files|sum(attribute='1') }} bytes</td>

</tr>

{% endfor %}

</tbody>

</table>

</div>

<form action="{{ url\_for('logout') }}" method="post">

<button class="btn btn-secondary">Logout</button>

</form>

</div>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/js/bootstrap.bundle.min.js"></script>

</body>

</html>

"""

# 2) User pages => "userLogin.jpg" for user login, "userDashboard.jpg" for user dashboard

USER\_LOGIN\_TEMPLATE = """

<!DOCTYPE html>

<html>

<head>

<title>User Login</title>

<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">

<style>

body {

margin: 0; padding: 0;

font-family: 'Poppins', sans-serif;

color: #fff; min-height: 100vh;

background: url('/static/userLogin.jpg') no-repeat center center fixed;

background-size: cover;

}

.login-container {

background-color: rgba(59, 51, 96, 0.9);

padding: 2rem; max-width: 600px; margin: 3rem auto;

border-radius: 8px;

}

h2, label { color: #fff; }

</style>

</head>

<body>

<div class="login-container">

<h2>User Login</h2>

<form method="post" enctype="multipart/form-data">

<div class="mb-3">

<label>Username:</label>

<input type="text" name="username" class="form-control" required>

</div>

<div class="mb-3">

<label>Upload Iris Image:</label>

<input type="file" name="iris\_image" accept="image/\*" class="form-control" required>

</div>

<button class="btn btn-primary">Login</button>

</form>

<!-- Back to main page -->

<form action="{{ url\_for('main\_page') }}" method="get" class="mt-3">

<button class="btn btn-secondary">Back</button>

</form>

</div>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/js/bootstrap.bundle.min.js"></script>

</body>

</html>

"""

USER\_DASHBOARD\_TEMPLATE = """

<!DOCTYPE html>

<html>

<head>

<title>User Dashboard</title>

<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">

<style>

body {

margin: 0; padding: 0;

font-family: 'Poppins', sans-serif;

color: #fff; min-height: 100vh;

background: url('/static/userDashboard.jpg') no-repeat center center fixed;

background-size: cover;

}

.dashboard-container {

background-color: rgba(59, 51, 96, 0.9);

padding: 2rem; margin: 2rem auto; max-width: 1000px;

border-radius: 8px;

}

h2, h5, label { color: #fff; }

.table { background-color: #fff; color: #000; }

.btn-secondary, .btn-danger, .btn-primary, .btn-success {

margin-top: 0.5rem;

}

</style>

</head>

<body>

<div class="dashboard-container">

<h2>User Dashboard</h2>

<div class="mb-4">

<h5>Upload File</h5>

<form method="post" action="{{ url\_for('user\_upload\_file') }}" enctype="multipart/form-data">

<div class="mb-3">

<label>Select File:</label>

<input type="file" name="file" class="form-control" required>

</div>

<button class="btn btn-success">Upload</button>

</form>

</div>

<div class="mb-4">

<h5>Your Files</h5>

<table class="table table-bordered">

<thead>

<tr><th>Filename</th><th>Size(bytes)</th><th>Actions</th></tr>

</thead>

<tbody>

{% for file\_info in user\_data.files %}

<tr>

<td>{{ file\_info[0] }}</td>

<td>{{ file\_info[1] }}</td>

<td>

<a class="btn btn-primary btn-sm" href="{{ url\_for('view\_file\_inline', filename=file\_info[0]) }}">

View

</a>

<a class="btn btn-danger btn-sm" href="{{ url\_for('delete\_file', filename=file\_info[0]) }}">

Delete

</a>

</td>

</tr>

{% endfor %}

</tbody>

</table>

</div>

<form method="post" action="{{ url\_for('logout') }}">

<button class="btn btn-secondary">Logout</button>

</form>

</div>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/js/bootstrap.bundle.min.js"></script>

</body>

</html>

"""

# 2) FLASK ROUTES

app.config['MAX\_CONTENT\_LENGTH'] = 100 \* 1024 \* 1024 # optional: 100MB upload limit

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

def main\_page():

return render\_template\_string(MAIN\_PAGE\_TEMPLATE)

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

def exit\_application():

def close\_app():

time.sleep(0.5)

windows = webview.windows

if windows:

windows[0].destroy()

sys.exit(0)

threading.Thread(target=close\_app, daemon=True).start()

return "<html><body><h4>Closing application...</h4></body></html>"

@app.route('/admin\_login', methods=['GET','POST'])

def admin\_login():

if request.method == 'GET':

return render\_template\_string(ADMIN\_LOGIN\_TEMPLATE)

else:

pw = request.form.get('password')

iris\_image = request.files.get('iris\_image')

if not pw or not iris\_image:

flash("Missing admin credentials or iris image!")

return redirect(url\_for('admin\_login'))

iris\_filename = secure\_filename(iris\_image.filename)

iris\_path = os.path.join(app.config['UPLOAD\_FOLDER'], iris\_filename)

iris\_image.save(iris\_path)

if pw == ADMIN\_PASSWORD and iris\_authenticate(iris\_path, ADMIN\_IRIS\_PATH):

session['admin\_logged\_in'] = True

return redirect(url\_for('admin\_dashboard'))

else:

flash("Admin authentication failed!")

return redirect(url\_for('admin\_login'))

@app.route('/admin\_dashboard')

def admin\_dashboard():

if not session.get('admin\_logged\_in'):

return redirect(url\_for('main\_page'))

return render\_template\_string(ADMIN\_DASHBOARD\_TEMPLATE,

users=convert\_users\_to\_template(USERS))

@app.route('/add\_user', methods=['POST'])

def add\_user():

if not session.get('admin\_logged\_in'):

return redirect(url\_for('main\_page'))

new\_user\_name = request.form.get('new\_user\_name')

new\_user\_username = request.form.get('new\_user\_username')

new\_user\_iris = request.files.get('new\_user\_iris')

if not (new\_user\_name and new\_user\_username and new\_user\_iris):

flash("All fields are required!")

return redirect(url\_for('admin\_dashboard'))

if new\_user\_username in USERS:

flash("User already exists!")

return redirect(url\_for('admin\_dashboard'))

iris\_filename = secure\_filename(new\_user\_iris.filename)

iris\_path = os.path.join(app.config['UPLOAD\_FOLDER'], iris\_filename)

new\_user\_iris.save(iris\_path)

USERS[new\_user\_username] = {

'name': new\_user\_name,

'iris\_path': iris\_path,

'files': []

}

save\_users\_to\_json()

flash(f"User '{new\_user\_username}' added.")

return redirect(url\_for('admin\_dashboard'))

@app.route('/delete\_user', methods=['POST'])

def delete\_user():

if not session.get('admin\_logged\_in'):

return redirect(url\_for('main\_page'))

del\_username = request.form.get('del\_username')

if del\_username in USERS:

del USERS[del\_username]

save\_users\_to\_json()

flash(f"User '{del\_username}' deleted.")

else:

flash(f"User '{del\_username}' not found.")

return redirect(url\_for('admin\_dashboard'))

@app.route('/user\_login', methods=['GET','POST'])

def user\_login():

if request.method == 'GET':

return render\_template\_string(USER\_LOGIN\_TEMPLATE)

else:

username = request.form.get('username')

iris\_image = request.files.get('iris\_image')

if not (username and iris\_image):

flash("Missing username or iris image!")

return redirect(url\_for('user\_login'))

if username not in USERS:

flash("No such user. Contact admin.")

return redirect(url\_for('user\_login'))

iris\_filename = secure\_filename(iris\_image.filename)

iris\_path = os.path.join(app.config['UPLOAD\_FOLDER'], iris\_filename)

iris\_image.save(iris\_path)

stored\_iris\_path = USERS[username]['iris\_path']

if iris\_authenticate(iris\_path, stored\_iris\_path):

session['user\_logged\_in'] = True

session['username'] = username

return redirect(url\_for('user\_dashboard'))

else:

flash("Iris authentication failed!")

return redirect(url\_for('user\_login'))

@app.route('/user\_dashboard')

def user\_dashboard():

if not session.get('user\_logged\_in'):

return redirect(url\_for('main\_page'))

username = session['username']

user\_data = USERS[username]

return render\_template\_string(USER\_DASHBOARD\_TEMPLATE, user\_data=user\_data)

@app.route('/user\_upload\_file', methods=['POST'])

def user\_upload\_file():

if not session.get('user\_logged\_in'):

return redirect(url\_for('main\_page'))

file = request.files.get('file')

if not file:

flash("No file selected!")

return redirect(url\_for('user\_dashboard'))

username = session['username']

user\_data = USERS[username]

filename = secure\_filename(file.filename)

file\_path = os.path.join(app.config['UPLOAD\_FOLDER'], filename)

file.save(file\_path)

file\_size = os.path.getsize(file\_path)

user\_data['files'].append((filename, file\_size))

save\_users\_to\_json()

flash(f"File '{filename}' uploaded.")

return redirect(url\_for('user\_dashboard'))

@app.route('/view/<filename>')

def view\_file\_inline(filename):

# Ensure user is logged in

if not session.get('user\_logged\_in'):

return redirect(url\_for('main\_page'))

full\_path = os.path.join(app.config['UPLOAD\_FOLDER'], filename)

if not os.path.exists(full\_path):

flash("File not found.")

return redirect(url\_for('user\_dashboard'))

ext = os.path.splitext(filename)[1].lower()

if ext == '.pdf':

# inline PDF

return render\_pdf\_inline(filename)

elif ext == '.docx':

# convert docx->pdf

converted\_name = f"{uuid.uuid4()}.pdf"

converted\_path = os.path.join(app.config['UPLOAD\_FOLDER'], converted\_name)

try:

convert(full\_path, converted\_path)

return render\_pdf\_inline(converted\_name)

except Exception as e:

flash(f"Conversion failed: {e}")

return redirect(url\_for('user\_dashboard'))

# If image => .jpg, .png, .webp, .gif, etc. => show in <img>

elif ext in ('.jpg', '.jpeg', '.png', '.gif', '.webp'):

return render\_image\_inline(filename)

else:

flash("Unsupported file for inline view.")

return redirect(url\_for('user\_dashboard'))

def render\_pdf\_inline(pdf\_filename):

pdf\_url = url\_for('inline\_pdf\_route', filename=pdf\_filename)

html = f"""

<!DOCTYPE html>

<html>

<head>

<title>View PDF Inline</title>

<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">

<style>

body {{

margin: 0; padding: 0; background-color: #000;

display: flex; flex-direction: column; height: 100vh;

}}

.top-bar {{

height: 3rem; background-color: #222;

display: flex; align-items: center; padding: 0 1rem;

}}

.back-btn {{ margin: 0; }}

iframe {{

width: 100%; height: calc(100vh - 3rem);

border: none;

}}

</style>

</head>

<body>

<div class="top-bar">

<a href="{url\_for('user\_dashboard')}" class="btn btn-secondary back-btn">Back</a>

</div>

<iframe src="{pdf\_url}"></iframe>

</body>

</html>

"""

return html

def render\_image\_inline(img\_filename):

# Serve the image via /inline-img/<filename>

img\_url = url\_for('inline\_img\_route', filename=img\_filename)

html = f"""

<!DOCTYPE html>

<html>

<head>

<title>View Image Inline</title>

<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css" rel="stylesheet">

<style>

body {{

margin: 0; padding: 0; background-color: #000;

display: flex; flex-direction: column; height: 100vh;

}}

.top-bar {{

height: 3rem; background-color: #222;

display: flex; align-items: center; padding: 0 1rem;

}}

.back-btn {{ margin: 0; }}

.img-container {{

flex: 1; display: flex; justify-content: center; align-items: center;

background-color: #000;

}}

img {{

max-width: 100%; max-height: 100%;

}}

</style>

</head>

<body>

<div class="top-bar">

<a href="{url\_for('user\_dashboard')}" class="btn btn-secondary back-btn">Back</a>

</div>

<div class="img-container">

<img src="{img\_url}" alt="inline image">

</div>

</body>

</html>

"""

return html

@app.route('/inline-pdf/<filename>')

def inline\_pdf\_route(filename):

fp = os.path.join(app.config['UPLOAD\_FOLDER'], filename)

if not os.path.exists(fp):

abort(404)

resp = send\_from\_directory(app.config['UPLOAD\_FOLDER'], filename, as\_attachment=False)

resp.headers["Content-Type"] = "application/pdf"

resp.headers["Cache-Control"] = "no-cache, no-store, must-revalidate"

resp.headers["Pragma"] = "no-cache"

resp.headers["Expires"] = "0"

return resp

# Serve inline images

@app.route('/inline-img/<filename>')

def inline\_img\_route(filename):

fp = os.path.join(app.config['UPLOAD\_FOLDER'], filename)

if not os.path.exists(fp):

abort(404)

# Serve the image directly, no as\_attachment

return send\_from\_directory(app.config['UPLOAD\_FOLDER'], filename, as\_attachment=False)

@app.route('/delete\_file/<filename>')

def delete\_file(filename):

if not session.get('user\_logged\_in'):

return redirect(url\_for('main\_page'))

username = session['username']

user\_data = USERS[username]

new\_files = []

for f, sz in user\_data['files']:

if f == filename:

path = os.path.join(app.config['UPLOAD\_FOLDER'], f)

if os.path.exists(path):

try:

os.remove(path)

flash(f"File '{f}' deleted.")

except PermissionError:

flash(f"Cannot delete '{f}' because it's in use by another process.")

else:

new\_files.append((f, sz))

user\_data['files'] = new\_files

save\_users\_to\_json()

return redirect(url\_for('user\_dashboard'))

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

def logout():

session.clear()

return redirect(url\_for('main\_page'))

def convert\_users\_to\_template(users\_dict):

# For Jinja2 usage

result = {}

for uname, data in users\_dict.items():

result[uname] = type('Obj', (object,), {

'name': data['name'],

'files': data['files']

})()

return result

def run\_flask():

print("DEBUG: run\_flask() - starting Flask on 127.0.0.1:5000")

app.run(debug=False, port=5000, use\_reloader=False)

if \_\_name\_\_ == '\_\_main\_\_':

# Start Flask in a background thread

flask\_thread = threading.Thread(target=run\_flask, daemon=True)

flask\_thread.start()

# Create a pywebview window

webview.create\_window(

title="Iris Secure Storage (Images + PDFs Inline, Multiple BGs)",

url="http://127.0.0.1:5000",

width=1000,

height=700,

resizable=True

)

webview.start()

print("DEBUG: If you see this, the window closed or app ended.")

* 1. **SCREENSHOTS**
  2. **MAIN PAGE OF THE PROJECT :**
  3. A screenshot of a computer screen

     AI-generated content may be incorrect.

**ADMIN LOGIN PAGE**

**A screenshot of a login screen

AI-generated content may be incorrect.**

**ADMIN DASHBOARD**

**A screenshot of a computer

AI-generated content may be incorrect.**

**USER DASHBOARD**

**A screenshot of a computer

AI-generated content may be incorrect.**

**ADMIN DASHBOARD ADDING NEW USER**

**A screenshot of a computer

AI-generated content may be incorrect.**

**USER LOGIN PAGE**

**A screenshot of a computer screen

AI-generated content may be incorrect.**

**USER DASHBOARD VIEW**

**A screenshot of a computer

AI-generated content may be incorrect.**

**USER DASHWORD FILE VIEW**

**A screenshot of a computer

AI-generated content may be incorrect.**

# CHAPTER-9

## CHAPTER 9 BOTTOM LINE

**CONCLUSION:**

The Iris Secure Storage system has been successfully designed, developed, and implemented as a secure file management platform utilizing biometric authentication. This project effectively addresses the growing need for enhanced data protection and user-specific file access by incorporating iris recognition technology, ensuring that only authorized users can access, upload, and manage confidential documents.

Throughout the development of this project, the system has been structured to deliver a user-friendly experience while upholding the highest standards of data security. Admins are empowered with complete control over user management, enabling them to add or remove users, monitor file activities, and maintain overall system integrity. The users, on the other hand, benefit from a seamless and secure login process through iris authentication, ensuring their personal files remain protected.

The integration of core technologies such as Flask for the backend, PyWebView for the desktop GUI, and docx2pdf for document conversion has resulted in a comprehensive and fully operational desktop application. The implementation of inline file viewing—where PDFs, images, and converted DOCX files can be accessed within the application itself—contributes to an efficient and intuitive user experience.

Furthermore, the project sets the foundation for future enhancements. The placeholder biometric authentication logic can be upgraded with machine learning models, such as convolutional neural networks (CNNs), to provide robust and highly accurate iris recognition. This would further strengthen the system’s security and reliability.

Overall, the Iris Secure Storage project has successfully met its objectives of delivering a secure, efficient, and easy-to-use file management system. It ensures data privacy through biometric access control while simplifying the process of document handling for both users and administrators.

This project not only serves as a practical solution for secure document storage but also demonstrates the potential of integrating biometric authentication with modern software applications. The knowledge and experience gained from this implementation will be valuable in expanding the system’s capabilities and deploying similar security-focused applications in various domains.

**FUTURE ENHANCEMENT:**

To further strengthen and expand the capabilities of the Iris Secure Storage System, the following enhancements can be considered:

1. **Integration of Deep Learning-Based Iris Recognition**
   * Implement a CNN-based model or integrate a pre-trained iris recognition model to increase the accuracy and robustness of biometric authentication.
2. **Multi-Modal Biometric Authentication**
   * Combine iris recognition with additional biometric methods such as facial recognition or fingerprint scanning for multi-factor biometric security.
3. **Encryption of User Files**
   * Introduce file-level encryption (e.g., AES-256) to ensure that files stored in the system remain encrypted even if accessed directly from the local storage.
4. **Cloud Storage Integration**
   * Allow hybrid deployment where users can opt for cloud storage (AWS S3, Google Drive) along with local storage, offering scalability and remote access.
5. **OTP/2FA Implementation for Admins**
   * Add an additional layer of security by integrating One-Time Password (OTP) or two-factor authentication (2FA) for admin logins.
6. **Real-Time Iris Detection via Webcam**
   * Integrate live iris capture using a webcam instead of static iris image uploads, enabling real-time biometric verification.
7. **Audit Log & Activity Monitoring**
   * Implement a logging module that tracks all actions performed by users and admins (login attempts, file uploads/deletes) for security auditing.
8. **Role-Based Access for Users**
   * Introduce multiple user roles (e.g., standard user, premium user) with different permissions to limit or extend file management capabilities.
9. **Cross-Platform Mobile Application**
   * Develop a mobile version of the system (Android/iOS) to allow secure file access and management on mobile devices.
10. **Customizable User Interface Themes**
    * Provide Admins and Users with the ability to switch between light/dark themes or other color schemes to improve the user experience.

# CHAPTER-10

**CHAPTER 10 REFERENCES**

**JOURNAL REFERENCES**

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