User Guide for Face Recognition Security System

Table of Contents

Below is a concise **step-by-step guide** that walks you through setting up and using your Streamlit-based Face Recognition Security System in VS Code.

Prerequisites

- **Windows 10/11 (64-bit)**, or macOS/Linux with minor path tweaks
- **Python 3.13.3** installed and added to your PATH
- **Webcam** (built-in or USB)
- **VS Code** with the **Python** extension installed

Project Structure

Project/
├── app.py # Main Streamlit application
├── requirements.txt # Python dependencies
├── yolov8n-face.pt # YOLOv8 face-detection weights
└── face_database.pkl # (auto-created) face encodings database

Setup in VS Code

1. **Open the Project**
   In VS Code: **File → Open Folder…** → select your Project folder.
2. **Create & Activate Virtual Environment**
   - Open the integrated terminal: **Terminal → New Terminal**

Create an env named "venv": python -m venv venv

Activate it: .\venv\Scripts\Activate

Very important step:

After you have created you environment run the following command:

pip install https://github.com/omwaman1/dlib/releases/download/dlib/dlib-19.24.99-cp313-cp313-win_amd64.whl

Just copy paste in your vs code terminal, it will download and install dlib.

Install other Dependencies:

pip install -r requirements.txt

Running the App

In the activated env, run: *streamlit run app.py*

- Your browser will open at http://localhost:8501/.
- If it doesn't open automatically, copy-paste that URL into your browser.

How to Use the System

Authentication Methods

Face Recognition

1. Select **Authenticate** mode in the sidebar.
2. Click **Start Authentication**.
3. Follow on-screen instructions:
    - Face straight into camera
    - Hold still
4. On success, access is granted and the home panel appears.

PIN Access

1. Select **PIN Access** mode.
2. Enter the 6-digit PIN.
3. Click **Authenticate with PIN**.
4. On correct PIN, access is granted.

RFID Access: Demo mode

Face Registration (Admin Only)

1. Select **Register Face (Admin Only)**.
2. Enter **Admin Password**.
3. Provide a **username** for registration.
4. Click **Start Face Scan** and follow lighting and framing instructions.
5. On completion, the new face encoding is saved to the database.

Home Control Panel

Overview

After authentication, the main panel displays:

- **Uptime**, **Battery Backup Status**, **System Faults** metrics
- **Simulation/Real Mode** indicator

Appliance Controls

- **Living Room Lights** toggle
- **Alarm System** toggle
- **Smart TV** toggle

State changes trigger real or simulated actions, logged automatically.

Status Display

- Visual indicators for each appliance (ON/OFF, ARMED/DISARMED)
- **Access Logs** — latest 10 events shown in a table
- **Active Alerts** — unacknowledged warnings and critical notifications
- **Logout** button to end the session

Admin Tools (Sidebar)

Simulation Mode Toggle: Switch between **Simulation Mode** and **Real Device Mode** for appliance controls.

System Simulation Controls

- **Simulate Power Outage**: Activates battery backup and disables non-essential devices.
- **Restore Power**: Returns to main power, re-enables devices.
- **Trigger Self-Healing**: Resets fault counters and attempts recovery.

Database Management

- **Clear Database**: Deletes all registered faces (admin password required).
- **Export Access Logs**: Download complete log as CSV.

Logging & Alerts

- **Access Logs**: Stored in access_log.csv, record all authentication and control events.
- **Alerts**: Real-time toasts and alert panel entries with levels:
    - **info** (system updates)
    - **warning** (non-critical issues)
    - **critical** (security breach or faults)
- **Acknowledgement**: Alerts remain active until manually acknowledged in the panel.

Self-Healing & Fault Tolerance

- **Automatic camera fault detection** triggers self-healing after 3 consecutive failures.
- **Battery backup simulation** provides up to 5 minutes of operation on main power failure.
- **Self-Healing** restores battery mode and clears fault counters.

Troubleshooting

Symptom	**Fix**
No camera detected	Close other apps using the webcam; ensure webcam drivers are installed
dlib installation errors	Make sure your python version is python 3.13.3 and while after creating the environment in vs code run:

	pip install https://github.com/omwaman1/dlib/releases/download/dlib/dlib-19.24.99-cp313-cp313-win_amd64.whl
Pickle load/save errors	Delete face_database.pkl and retry registration
“Running scripts is disabled”	Run Set-ExecutionPolicy RemoteSigned -Scope CurrentUser in PowerShell
Poor face detection or low quality	Improve lighting; remove glasses; ensure face is centered and not too small in frame