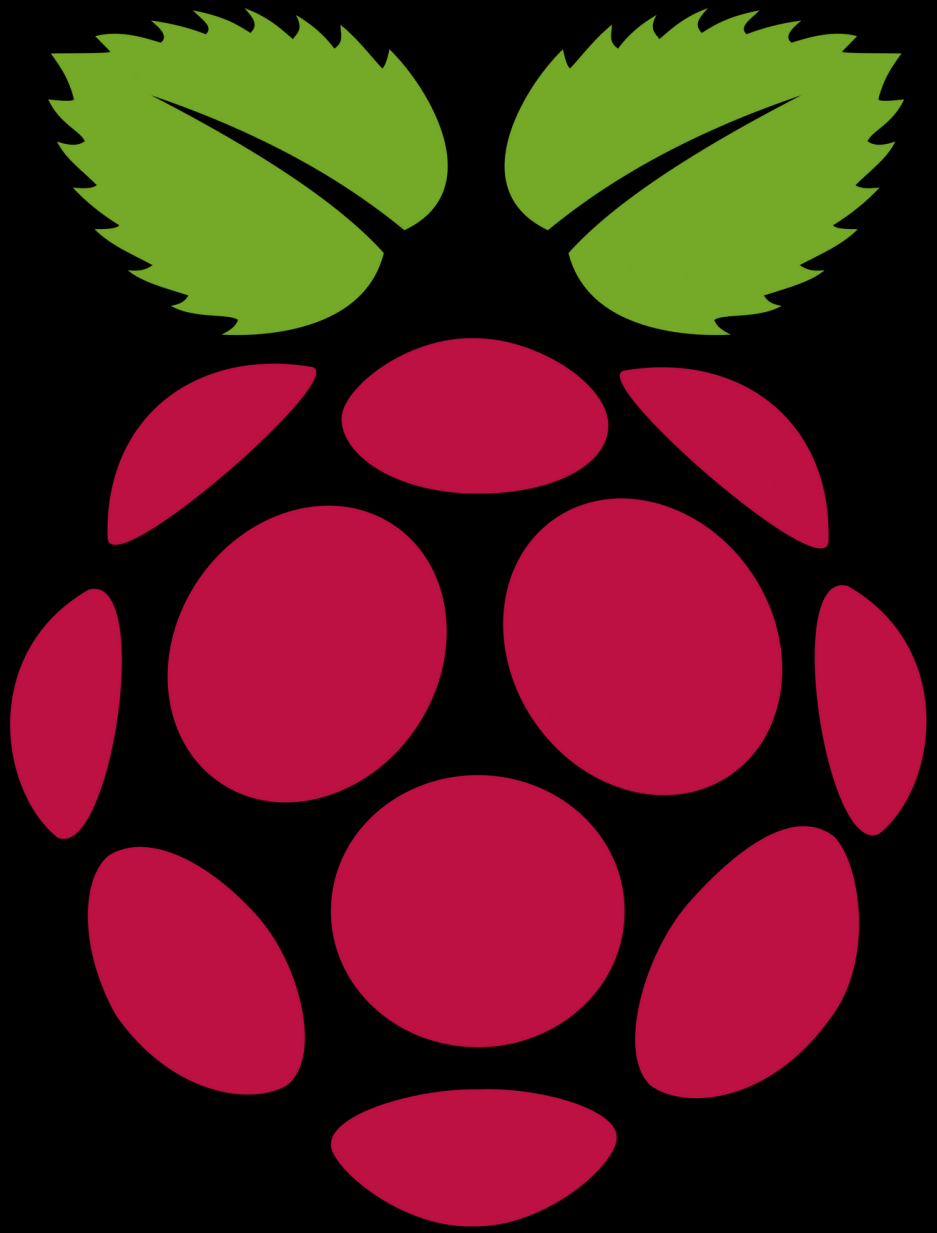

Face Recognition based CCTV Camera using PiCamera

B A Saran(22011102012)
Jabin Joshua S(22011102027)
Madhavv Arul(22011102053)

Introduction

The face recognition based CCTV camera system is designed to enhance security and surveillance in various environments by accurately identifying individuals through facial recognition technology.

The key benefits are:

1) Improved security and crime prevention

2) Efficient monitoring and tracking of individuals

3) Reduction in manual surveillance efforts

4) Real-time alerts and notifications

Requirements

Requirement	Description
Raspberry Pi 4	Single-board computer for running the CCTV camera system.
picamera2	Python library for accessing the Raspberry Pi camera module.
opencv	Open-source computer vision library for face detection and recognition.
smtp	Simple Mail Transfer Protocol for sending email notifications.
flask app	Web framework for building the user interface and controlling the CCTV camera system.

Face Recognition Algorithm

The camera frames are analyzed to detect human faces using algorithms like Haar cascades.

The extracted facial features are encoded into a mathematical representation called a faceprint.

The detected face is analyzed to extract unique facial features like eyes, nose, mouth patterns.

The extracted faceprint is compared against a database of known faceprints to identify the person.

If a match is found, the person is identified. If not, the face is flagged as unknown.

Alert System

Face Recognition

- The CCTV camera system uses face recognition technology to identify known individuals.
- Each person's face is stored in a database along with their name and other relevant information.

Unknown Person Detection

- When an unknown person is detected by the CCTV camera, the system compares their face with the faces in the database.
- If there is no match, an alert is triggered.

Alert Generation

- Once an alert is triggered, the system generates an alert message.
- The message includes can details such as the location of the camera and the timestamp of the detection.

Alert Notification

- The alert message is sent to designated recipients, such as security personnel or system administrators.
- The notification can be sent via email, SMS, or through a mobile application.

HTML Interface

Design and Layout

The HTML code defines a responsive interface for a Smart CCTV system with face recognition. Key features include:

- Live camera feed as the background.
- Minimalistic design with a fixed bottom navbar.
- Simple JavaScript script to toggle content visibility.

The design prioritizes user-friendly navigation and responsiveness.

Conclusion

Enhanced security

The system uses face recognition to identify threats and alert security.

Real-time monitoring

The system monitors people in real-time and alerts for threats.

User-friendly interface

The HTML interface allows easy access to the system.

Automated alerts

The system automatically detects threats and sends alerts.

In summary, the key benefits of the face recognition CCTV system are enhanced security, real-time monitoring, easy interface, and automated alerts.

Source

PiCamera2 (datasheets.raspberrypi.com/camera/picamera2-manual.pdf)

OpenCV(docs.opencv.org/4.x/index.html)

SMTP(docs.python.org/3/library/smtplib.html)

Flask(flask.palletsprojects.com/en/3.0.x/)

ChatGPT(chat.openai.com)

Google(google.com)

StackExchange(stackexchange.com)

Raspberry Pi Forums(forums.raspberrypi.com)