# Face Recognition Home Surveillance and Control System using MATLAB and Arduino

This project demonstrates a home security and automation system that uses face recognition for surveillance and access control. The system is implemented using MATLAB for face detection/recognition and Arduino to control physical components like relays, door locks, or alarms.

## 🚀 Features

- Face recognition using MATLAB

- Door unlocking/locking mechanism

- Intruder alert via buzzer/light

- Camera capture and monitoring

- Arduino-MATLAB serial communication

## 🔧 Hardware Requirements

- Arduino UNO

- USB Camera

- Relay Module

- Servo Motor or Magnetic Door Lock

- Buzzer

- LEDs (optional)

- Breadboard, jumpers, resistors

## 🧠 Software Requirements

- MATLAB with Image Processing Toolbox

- Arduino IDE

- MATLAB Support Package for Arduino Hardware

## 🔌 How it Works

1. \*\*Face Capture\*\*: MATLAB captures video feed and detects faces.

2. \*\*Recognition\*\*: If the face is recognized, a signal is sent to Arduino.

3. \*\*Control\*\*: Arduino activates a servo or relay to open the door.

4. \*\*Intrusion Detection\*\*: Unknown face triggers an alarm or LED.

## 📂 Project Structure

├── MATLAB/

│ ├── face\_capture.m

│ ├── train\_model.m

│ ├── recognize\_face.m

│ └── serial\_control.m

├── Arduino/

│ └── face\_control.ino

├── Docs/

│ └── system\_diagram.png

│ └── presentation\_slides.pdf

├── Media/

│ └── demo\_video.mp4

│ └── screenshots/

│ └── gui.png

├── README.md

└── LICENSE

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## 💡 Future Improvements

- Replace MATLAB with Python (OpenCV + TensorFlow) for better scalability

- Add remote monitoring via IoT (NodeMCU or Raspberry Pi)

- Add face database management GUI

## 📸 Demo

![Screenshot](Media/screenshots/gui.png)

Watch the [demo video](Media/demo\_video.mp4).

## 📜 License

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