

IOT-BASED SECURITY AND SURVEILLANCE SYSTEM



INTRODUCTION

This project aims to enhance security by integrating facial recognition, age and gender prediction, and real-time alerts using IoT. A Raspberry Pi with a camera captures images, processes them using machine learning models, and triggers alerts via a buzzer and email notifications in case of an imposter detection. Background:

Security concerns have grown significantly, necessitating the adoption of smart surveillance systems. IoT-based solutions provide real-time monitoring, automated alerts, and efficient identification methods to improve safety and reduce manual intervention.

LITERATURE REVIEW

Overview of IoT:

- IoT connects devices, sensors, and systems over the internet to facilitate automation and monitoring. In security applications, IoT enables real-time surveillance, remote access, and intelligent alerts.

End Users of the Application:

- Residential buildings
- Offices and workplaces
- Educational institutions
- Public security agencies

SYSTEM DESIGN AND ARCHITECTURE

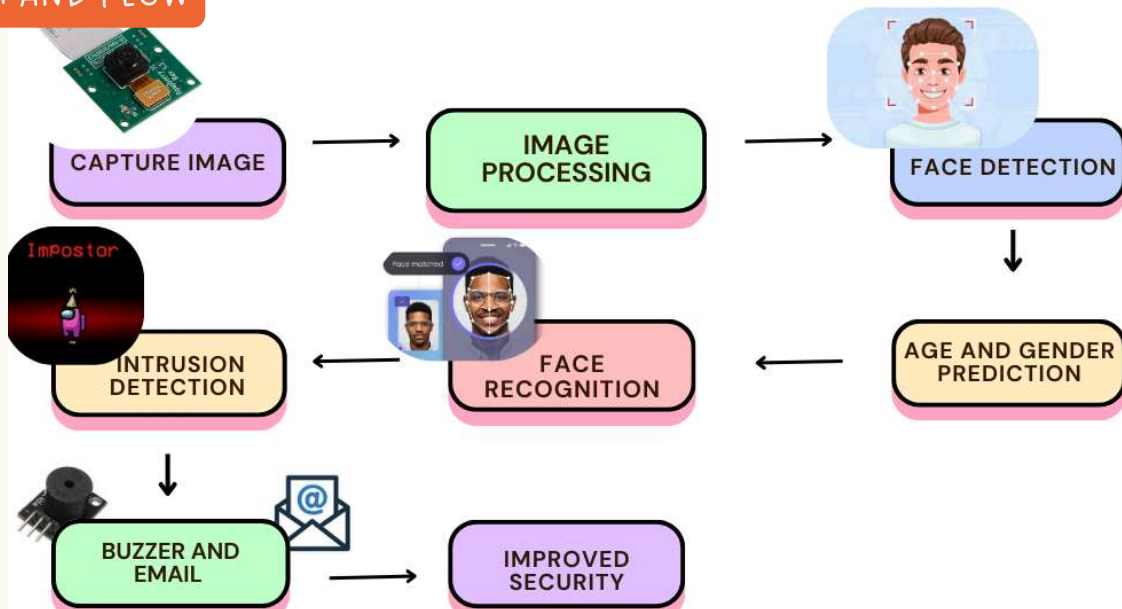
Hardware Components:

- Raspberry Pi: Main processing unit
- Pi Camera: Captures images
- Buzzer: Alerts on unauthorized entry
- GPIO Pins: Controls buzzer functionality

Software Components:

- OpenCV & Face Recognition Library: Detects and recognizes faces
- Deep Learning Models (Caffe): Predicts age and gender
- Python & RPi.GPIO: Controls hardware components
- SMTP Protocol: Sends email alerts

SYSTEM AND FLOW



IMPLEMENTATION AND TESTING

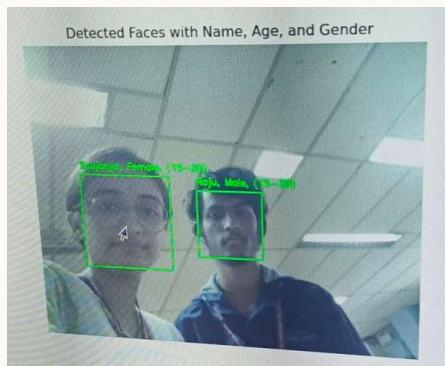
Implementation Details:

1. **Preprocessing:** Capturing and storing images
2. **Face Recognition:** Matching detected faces with known faces
3. **Age & Gender Prediction:** Using deep learning models
4. **Alert Mechanism:** Activating the buzzer and sending email notifications
5. **GUI Display:** Showcasing detected faces with relevant information

Testing and Validation:

- Tested with multiple faces for recognition accuracy
- Evaluated age and gender prediction models on diverse datasets
- Conducted real-time validation of buzzer and email alerts

TEST RESULTS



An imposter has been detected. See the attached image.

One attachment • Scanned by Gmail



RESULTS

- Accurate face recognition with a confidence threshold
- Reliable age and gender estimation
- Real-time alerts and notifications

DISCUSSION

- The system successfully identified known faces and flagged unknown ones
- Buzzer activation provided immediate audio alerts
- Email notifications ensured remote security updates

CONCLUSION

- This project successfully integrates IoT with AI-based facial recognition to enhance security. The system effectively detects faces, predicts age and gender, and provides real-time alerts.

FUTURE WORK

- Integration with cloud storage for data logging
- Multi-camera support for large-scale surveillance
- Adding motion detection for enhanced monitoring