

# Real-Time Person Detection and Alert System Using YOLOv8

## 1. Objective

The goal of this project is to develop a **real-time person detection and alert system** using the YOLOv8 object detection model. The system detects people via a webcam feed and triggers an **audio alert** and **email notification** upon detection.

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## 2. Tools and Technologies

- **Python** – Programming language used for development
  - **OpenCV** – Real-time computer vision and video processing
  - **Ultralytics YOLOv8** – Pre-trained object detection model
  - **gTTS (Google Text-to-Speech)** – Converts text to speech for audio alerts
  - **pygame** – Plays audio files for the alert system
  - **smtplib** – Sends email alerts using SMTP protocol
  - **Multithreading and Queue (optional)** – Can be used for non-blocking alerts and efficiency
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## 3. System Architecture

### 3.1. Input

- Real-time video feed captured using `cv2.VideoCapture(0)` (webcam).

### 3.2. Processing

- The `YOLOv8n.pt` model detects objects in each frame.
- Detected objects are filtered for `class_id == 0`, which corresponds to a **person**.
- Bounding boxes and labels are drawn for detected persons.

### 3.3. Output & Alerts

- **Audio Alert:**
  - `buzzer.mp3` is played using `pygame`.
  - A voice alert is generated via `gTTS` saying "Person detected".
- **Email Alert:**
  - An email is sent to a specified recipient informing them that a person has been detected.

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## 4. Key Functions

Function Name	Purpose
<code>play_alarm()</code>	Plays a buzzer sound when a person is detected
<code>say_person_detected()</code>	Converts text-to-speech and plays voice alert
<code>send_email()</code>	Sends an alert email using SMTP protocol

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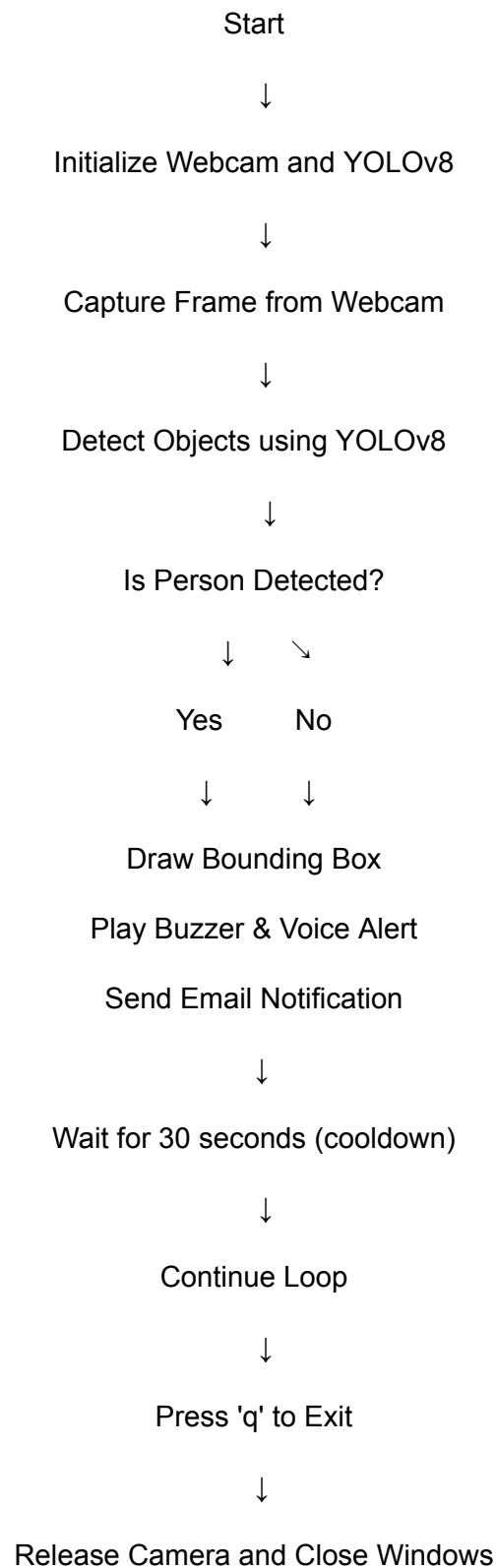
## 5. Email Configuration

- **Sender Email:** `your_email@gmail.com`
- **Password:** Application-specific password for Gmail (for secure access)
- **Recipient Email:** `recipient_email@example.com`

**Note:** It is recommended to use environment variables or a `.env` file to store sensitive data like email credentials.

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## 6. Flowchart



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## 7. Enhancements & Suggestions

- **Multithreading:** Use threads to run audio and email functions concurrently to prevent UI lag.
- **Database Logging:** Log detections in a database for future review and analysis.
- **GUI Integration:** Use Tkinter or PyQt for user-friendly interface.
- **Cloud Storage:** Upload snapshot/image to cloud (e.g., Firebase or AWS S3) and include link in email.
- **SMS Alerts:** Integrate with Twilio API for real-time SMS alerts.

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## 8. Conclusion

This system effectively demonstrates a practical application of object detection using **YOLOv8** integrated with real-time alert mechanisms. It can be deployed for **home security, restricted area monitoring, and surveillance systems**. With further improvements like cloud integration and GUI support, it can evolve into a complete commercial product.

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