



Project Details:

Project Title - CrowdCount-People Counting Using Video Analytics

Project Purpose -

- Detect, track, and count people in real time from live or recorded video feeds.
- Help organizations and event managers monitor crowd density and ensure safety compliance.
- Provide smart alerts, visual dashboards, and live statistics for better crowd management and decision-making.

Tools and Technologies - Python, Flask, OpenCV, YOLOv8, PostgreSQL, JavaScript, Chart.js

Mentor - Ms.Umme Asma S

Batch Number – 3

Start Date - 22-September-2025

Team Members- U Surya Sasikanth

Tushar Dayma

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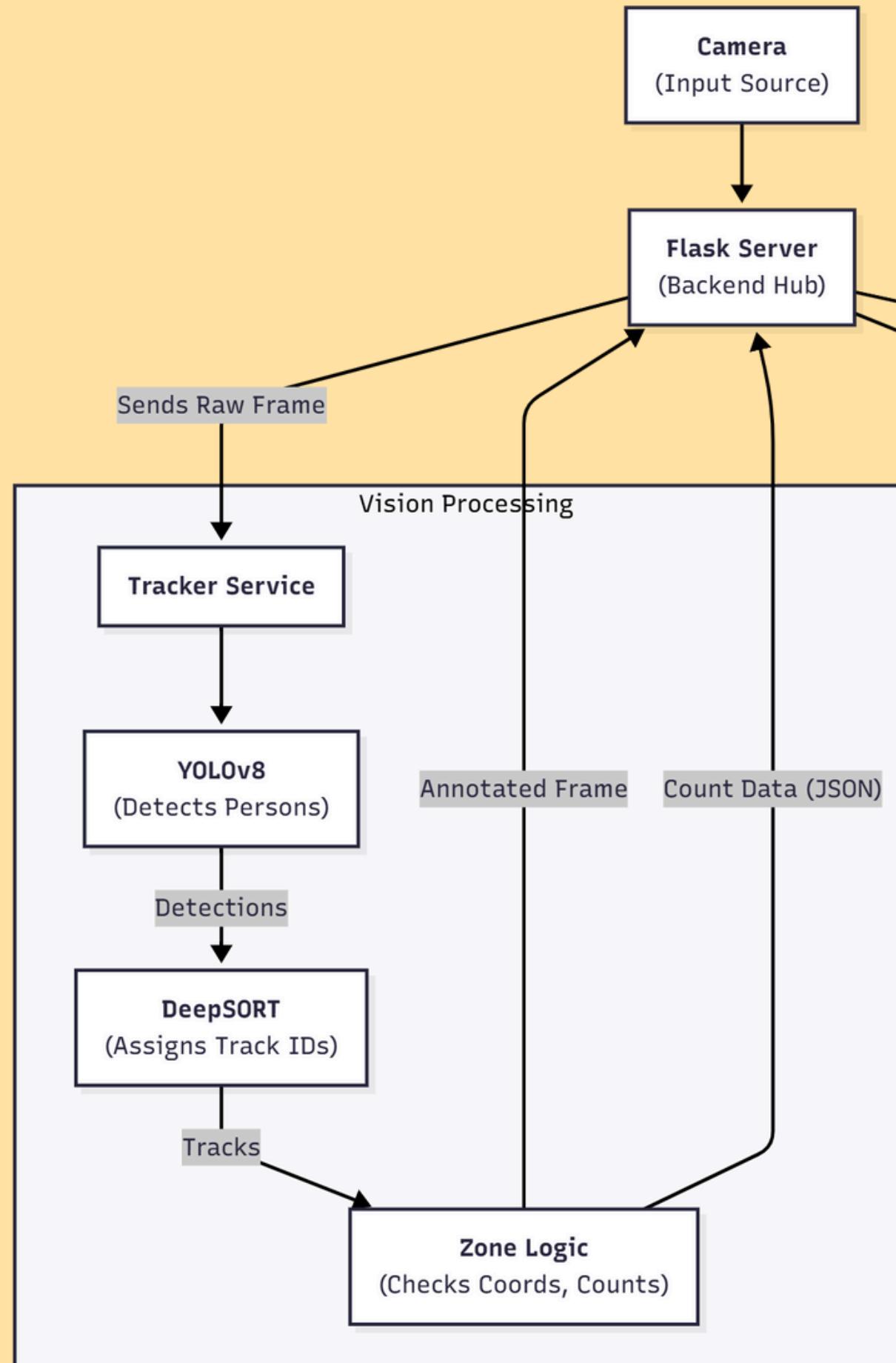
Veer Prathap Yadav

Harini Sayani

Problem Statement

- **⚠ Manual crowd monitoring is inefficient and labor-intensive.**
- **⌚ Lack of real-time data leads to delayed safety actions.**
- **👁 No accurate way to track occupancy dynamically in public or closed spaces.**
- **💰 High cost and human error in traditional crowd management systems.**
- **🔒 Limited integration with smart surveillance networks reduces scalability.**





Proposed Solution

- Automated detection and counting using **YOLOv8**.
- Real-time tracking with **Byte Track**.
- Smart dashboard for live **stats** and **alerts**.

Tech Stack

Category	Tools & Technologies Used
Programming Language	Python, JavaScript
Backend Framework	Flask
Frontend Technologies	HTML5, CSS3, Chart.js, Canvas API
Machine Learning / AI Model	YOLOv8 (Object Detection), Byte Track (Tracking)
Database	PostgreSQL
Visualization & UI	Chart.js, Flask Templates (Jinja2)
Libraries & Packages	OpenCV, Ultralytics, ReportLab, JWT, Werkzeug, Numpy
Version Control & Deployment	Git, Render / Local Server
Environment	Python Virtual Environment (venv)

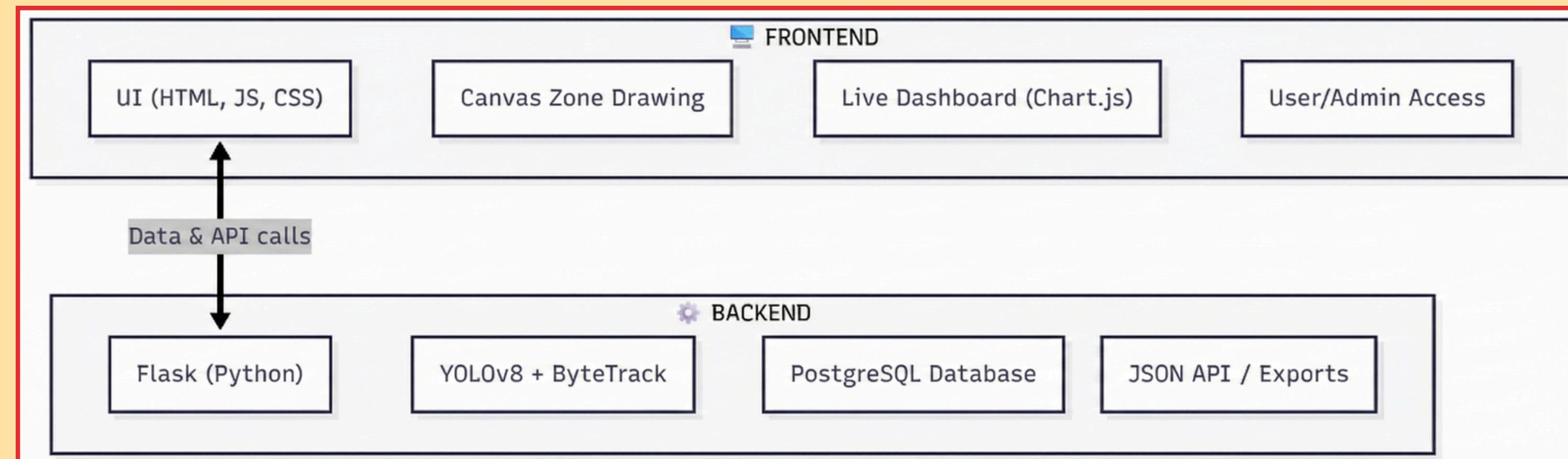
Project Architecture

Frontend

- Built using **HTML, CSS, and JavaScript** for an interactive user interface.
- **Canvas API** used for drawing and managing detection zones.
- **Chart.js** visualizes real-time crowd data and alerts.
- Provides user dashboards and admin panels for control and monitoring.

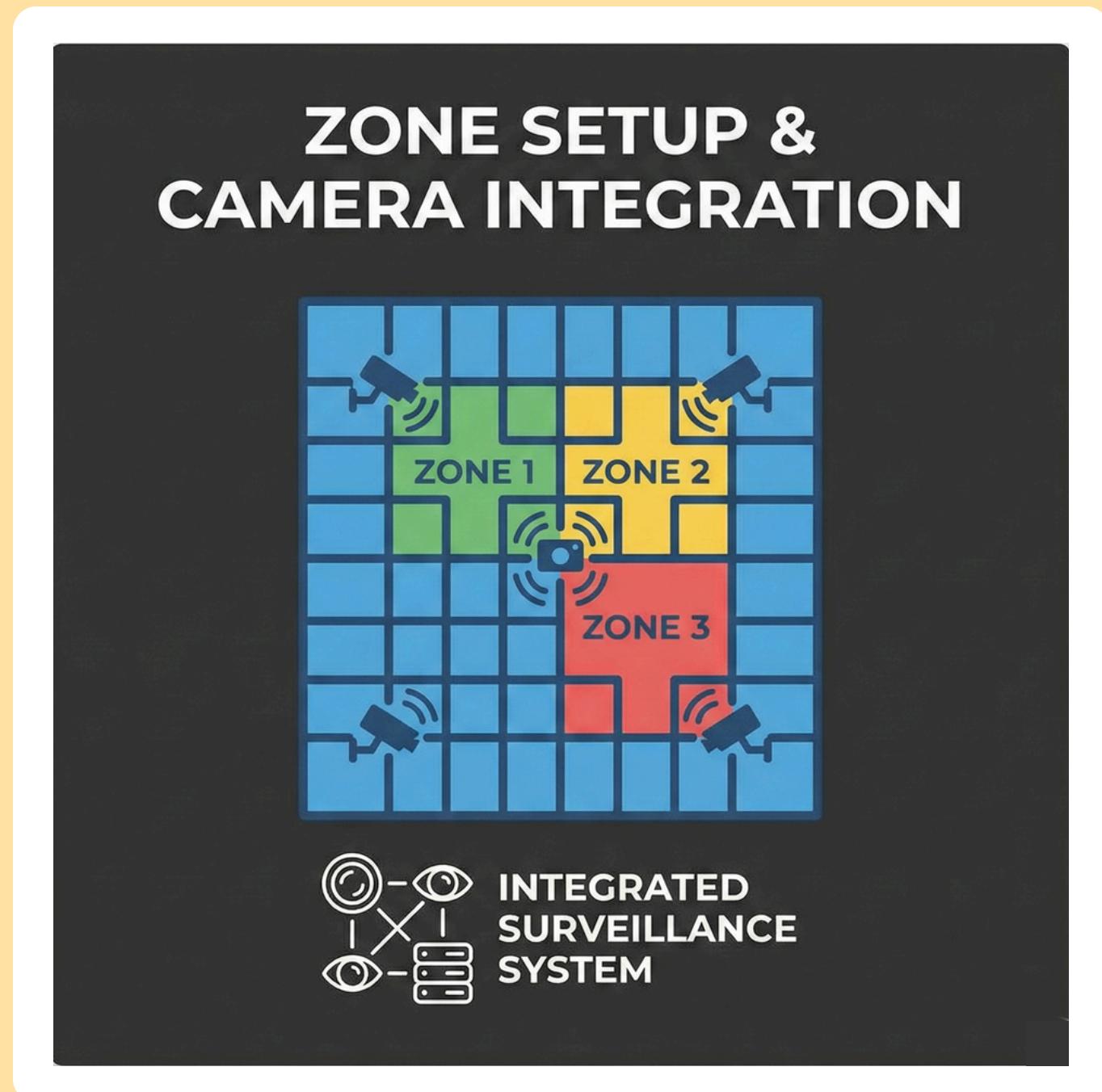
Backend

- Developed using **Flask (Python)** as the main web server.
- Handles video stream processing and model inference (**YOLOv8 + ByteTrack**).
- Communicates with **SQLite3** database to save zones, logs, and user data.
- Provides **REST APIs** for uploading videos, tracking, exporting reports, etc.

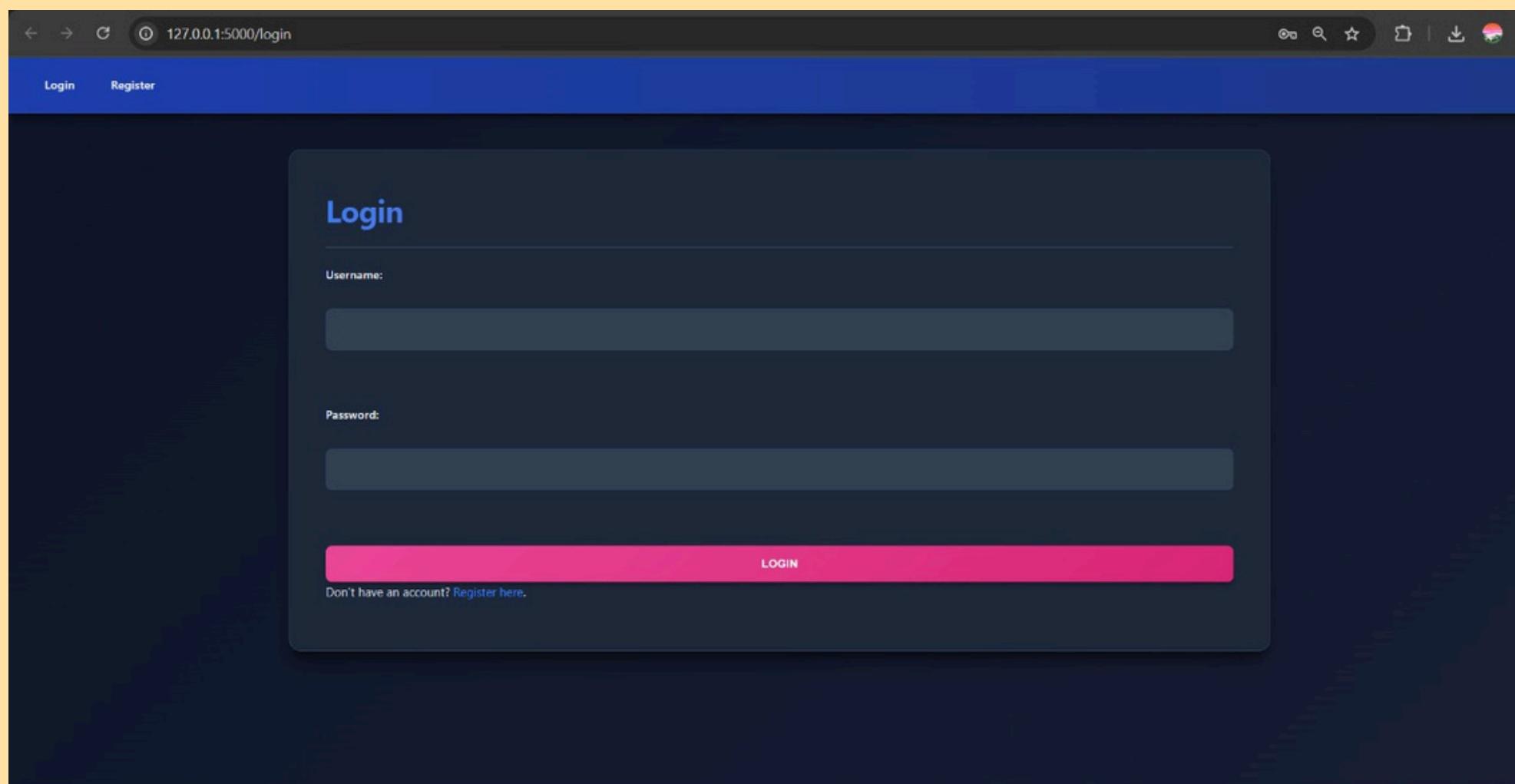
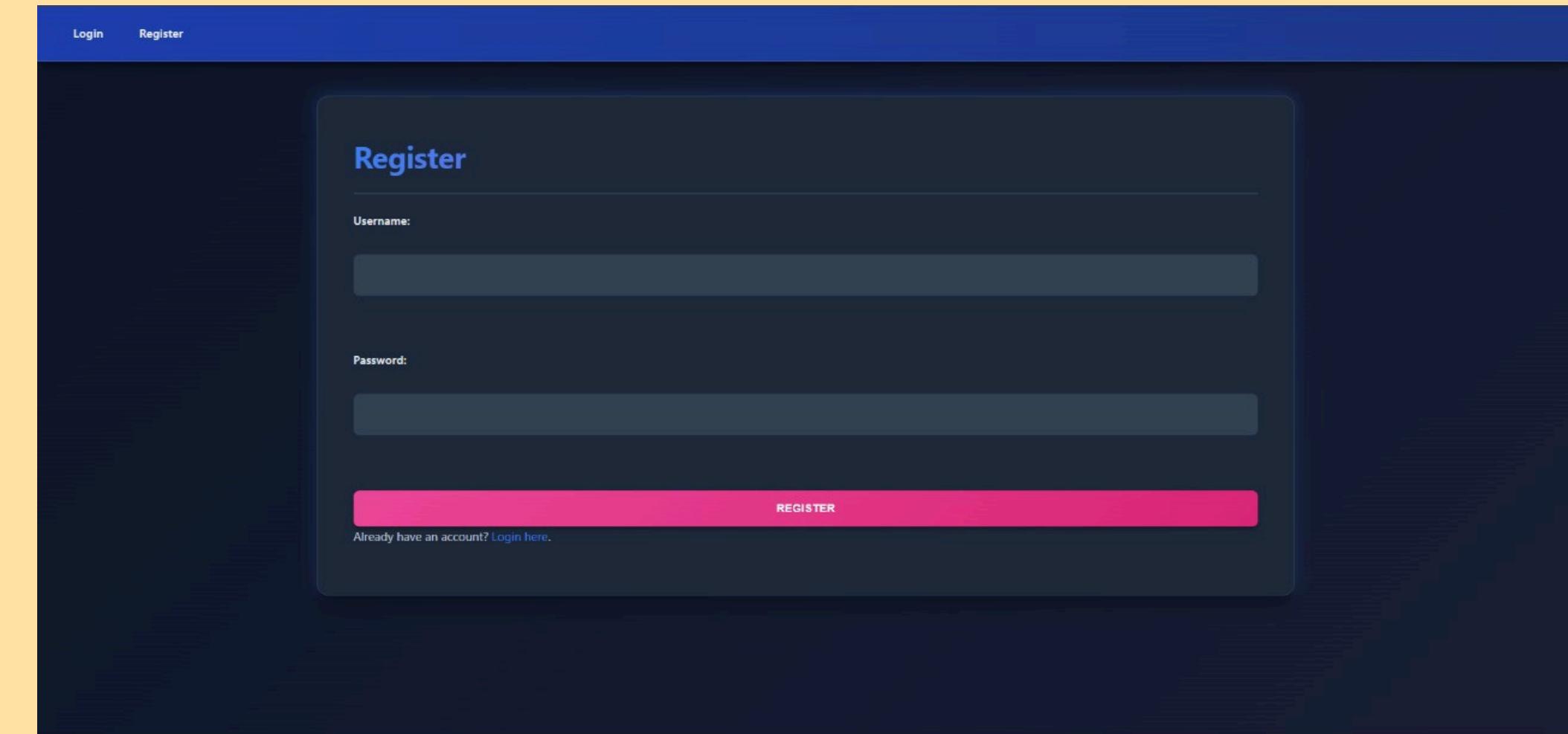


Milestone 1 - Zone Setup & Camera Integration

- Login And Registration.
- Connect to [webcam/IP camera](#).
- Draw and [save zones on video feed](#).
- Preview and edit zones.



Login And Registration



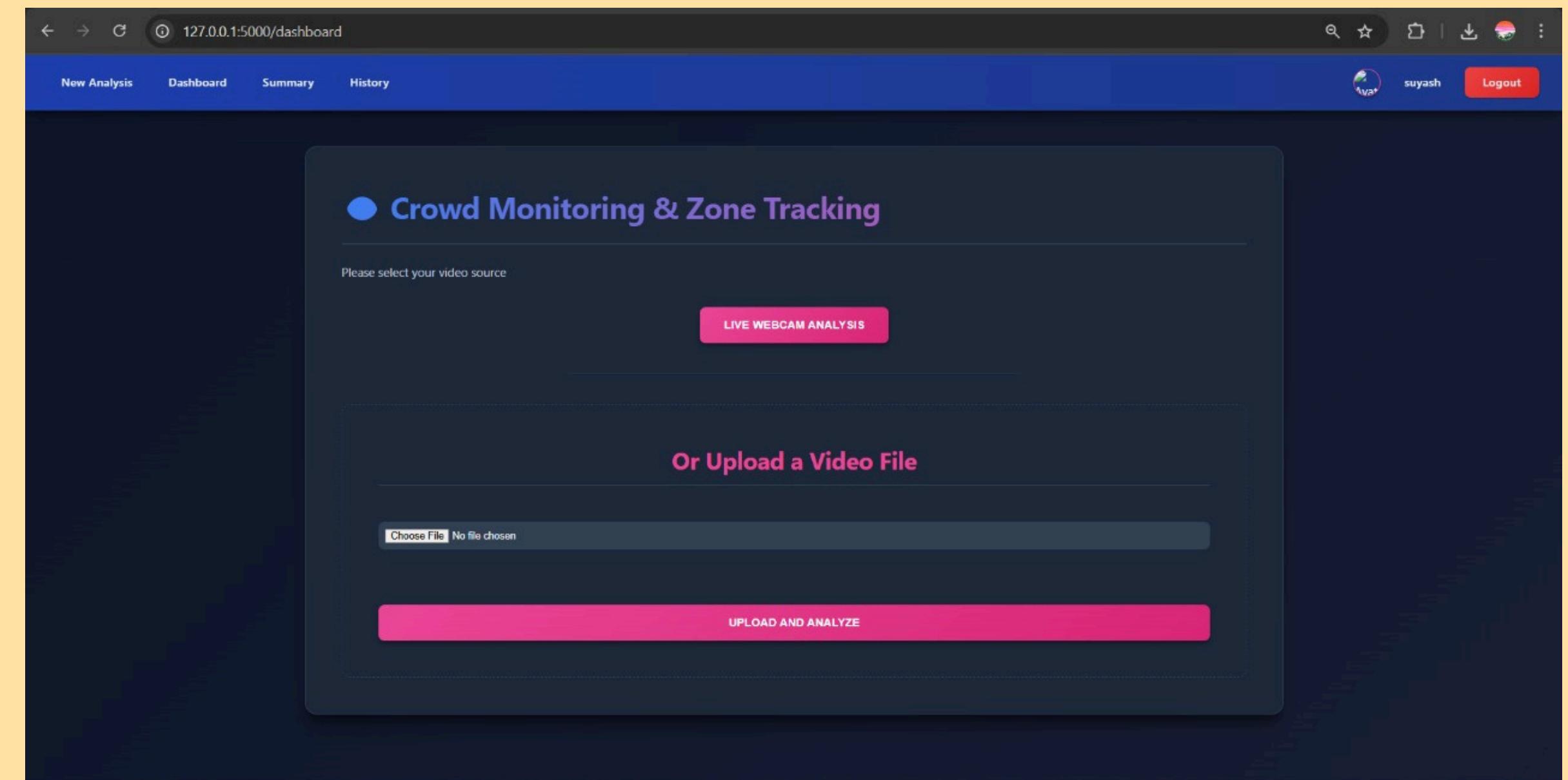
- Implemented secure user registration and login using hashed passwords.
- Added role-based access to ensure only authenticated users configure zones.

Camera Integration & Zone Creation

Connected to
webcam/IP camera for
real-time video preview

Enabled users to draw
and save custom
monitoring zones on the
live feed.

Provided instant zone
preview and editing for
accurate placement.

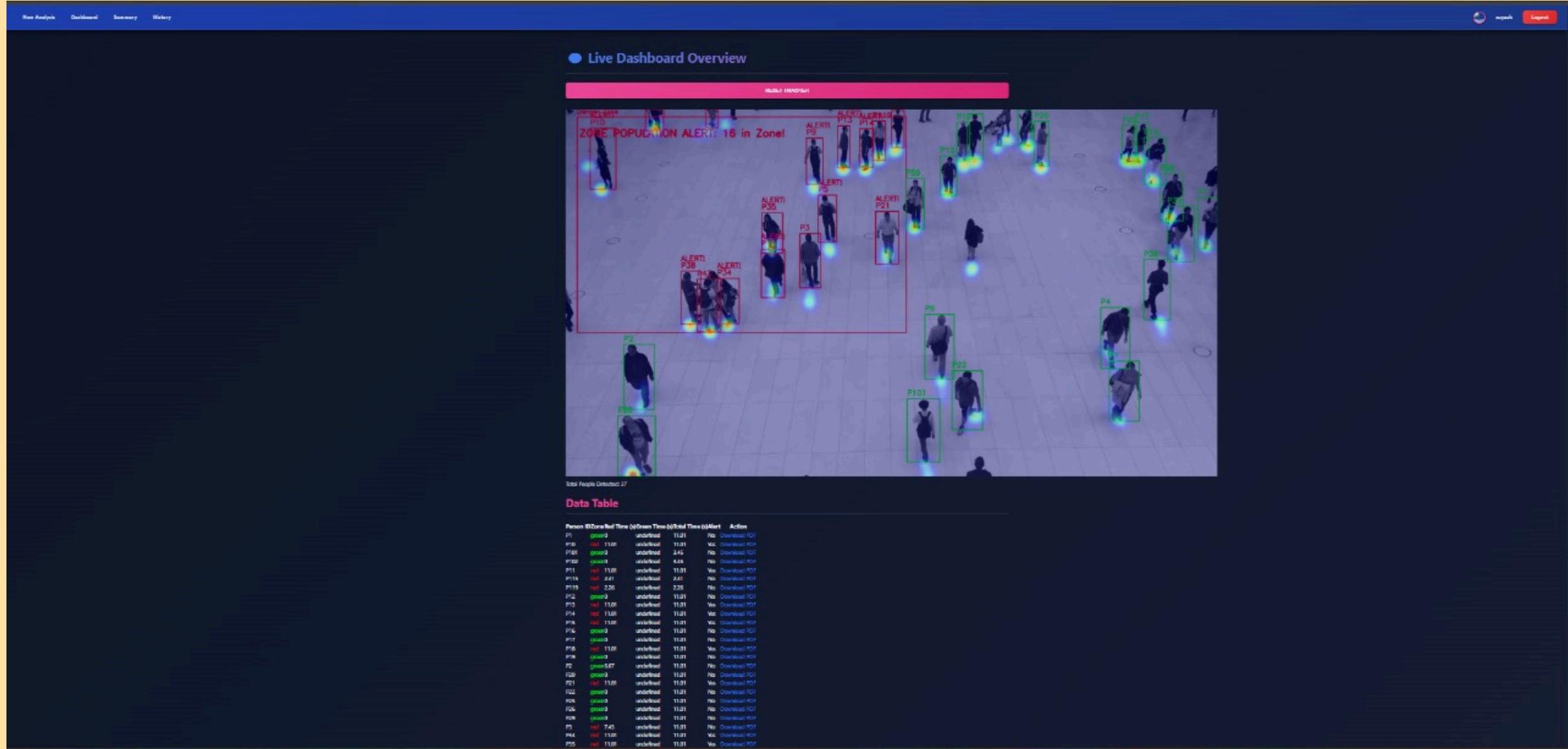


Milestone 2 – People Detection & Counting

- Integrate YOLOv8+DeepSORT/BYTETrack.
- Detect and track individuals.
- Count people per zone based on bounding box position.



Detection & Tracking



Integrated YOLOv8 with ByteTrack for robust real-time detection and ID tracking.

System assigns persistent IDs to each person and keeps per-person state across frames.

Zone-wise Counting & Analytics

New Analysis Dashboard Summary History Admin Panel

● Live Dashboard Overview

RESET TRACKER

No active analysis session.
Start a new analysis from the [New Analysis](#) page.

Total People Detected: 0

Data Table

Person ID	Zone	Red Time (s)	Green Time (s)	Total Time (s)	Alert	Action

Alerts

New Analysis Dashboard Summary History Admin Panel

■ Live Summary Dashboard

RESET TRACKER

Total People Detected: 0

Live Population Chart (Bar)

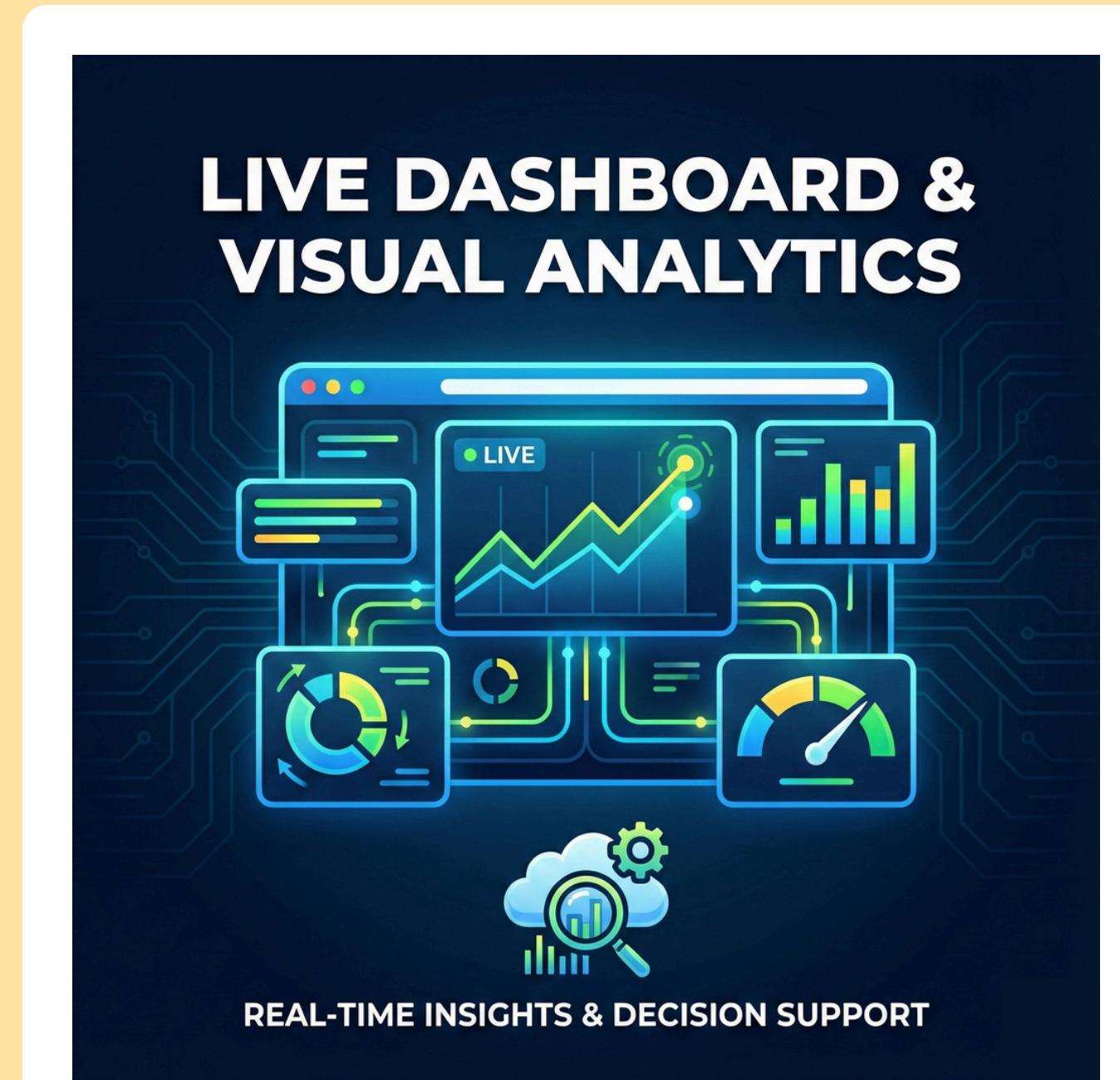
Zone	Current Population
Zone A	0.8
Zone B	0.1
Zone C	0.1
Zone D	0.0

Counts people per zone by checking each bounding-box position relative to zone polygons.

Generates live zone population metrics (instant alerts when thresholds exceeded) and sends counts to the dashboard.

Milestone 3 – Live Dashboard & Visual Analytics

- Real-time count updates on dashboard.
- Visualizations like bar/line chart for zone-wise population.
- Heatmap generation over live feed.
- Alert system when zone population exceeds threshold.



Real-Time Dashboard & Visuals



Live population count updates **streamed** directly to the dashboard every second.

Added **bar & line charts** for **zone-wise** population and overall crowd trends.

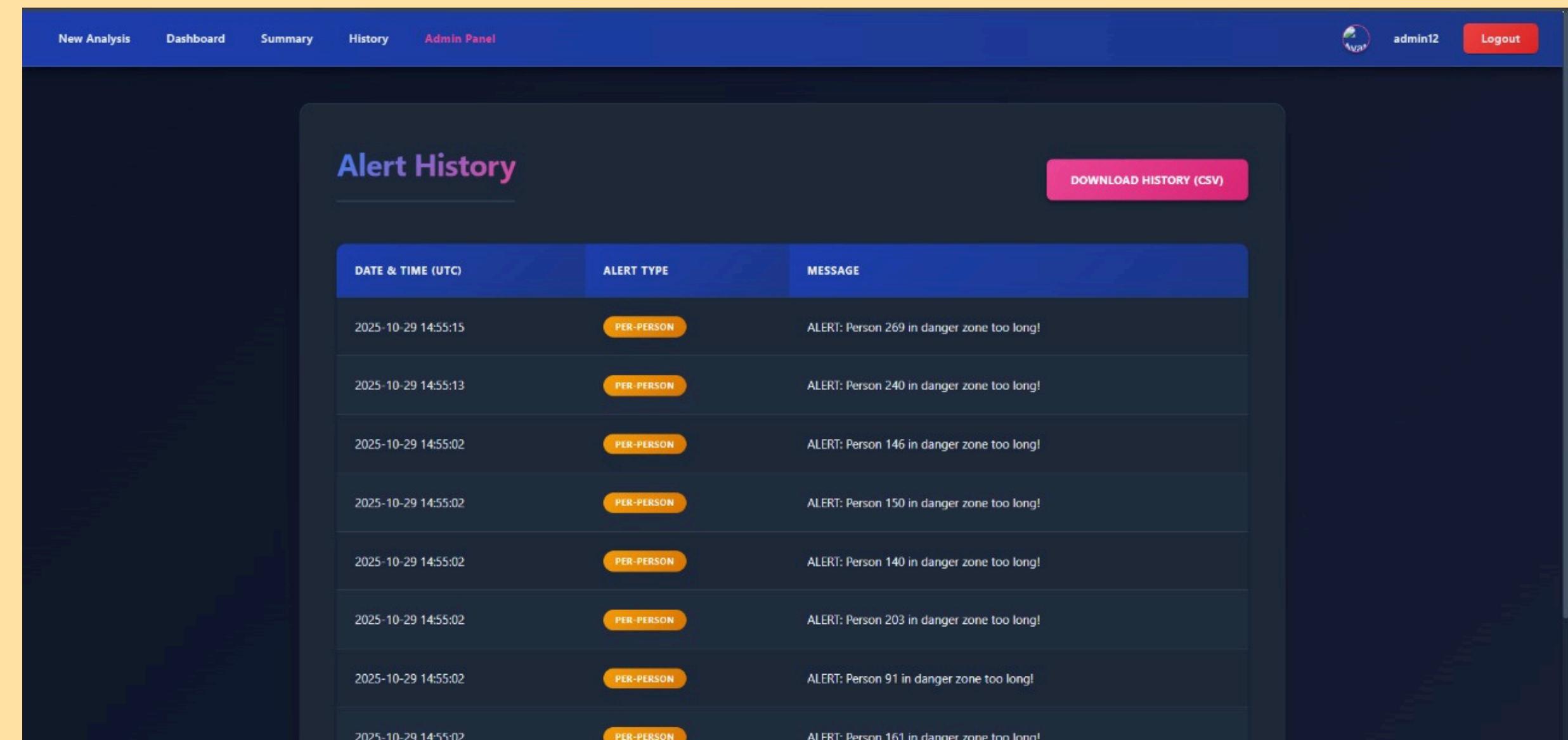
Integrated **heatmap** generation to visualize movement density on the live feed.

Automatic alerts triggered when zone population crosses the configured threshold

Alerts instantly appear on the dashboard for quick monitoring and response

System records all alerts for later viewing in History & Summary pages.

Intelligent Alert System



The screenshot shows a dark-themed web application interface. At the top, there is a blue header bar with navigation links: 'New Analysis', 'Dashboard', 'Summary', 'History', and 'Admin Panel'. On the far right of the header, there is a user profile icon labeled 'admin12' and a red 'Logout' button. Below the header, the main content area has a title 'Alert History' in purple. To the right of the title is a pink button labeled 'DOWNLOAD HISTORY (CSV)'. The main content is a table with three columns: 'DATE & TIME (UTC)', 'ALERT TYPE', and 'MESSAGE'. The table contains eight rows, each representing an alert. All alerts are of type 'PER-PERSON' and occurred at 2025-10-29 14:55:02. The messages for each alert are: 'ALERT: Person 269 in danger zone too long!', 'ALERT: Person 240 in danger zone too long!', 'ALERT: Person 146 in danger zone too long!', 'ALERT: Person 150 in danger zone too long!', 'ALERT: Person 140 in danger zone too long!', 'ALERT: Person 203 in danger zone too long!', 'ALERT: Person 91 in danger zone too long!', and 'ALERT: Person 161 in danger zone too long!'. The table has a dark blue header row and light gray rows for the data.

DATE & TIME (UTC)	ALERT TYPE	MESSAGE
2025-10-29 14:55:15	PER-PERSON	ALERT: Person 269 in danger zone too long!
2025-10-29 14:55:13	PER-PERSON	ALERT: Person 240 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 146 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 150 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 140 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 203 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 91 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 161 in danger zone too long!

Milestone 4 – Admin Panel & System Analytics

- JWT-based login for admin and users.
- Camera zone management and user activity logs.
- Export historical data to CSV/PDF.
- Admin settings for threshold values and alert rules.



The screenshot shows the Admin Panel interface. At the top, there's a navigation bar with links for New Analysis, Dashboard, Summary, History, Admin Panel, and a user icon labeled 'admin12' with a 'Logout' button. Below the navigation is a dark sidebar with 'Admin Panel' in blue. The main content area has a title 'Total Alerts Per User'. A bar chart displays the number of alerts for five users: suyash (approx. 78), admin12 (approx. 10), user12 (0), rajas (0), and Krish (User) (0). The y-axis is labeled 'Number of Alerts' from 0 to 80.

User	Number of Alerts
suyash	78
admin12	10
user12	0
rajas	0
Krish User	0

Admin Controls & User Management

Implemented JWT-based login with role separation (Admin / User).

Admin panel enables zone configuration, managing user accounts, and reviewing activity logs.

Provides full visibility into system usage and alert behavior.

Data Export & System Settings

The screenshot shows a dark-themed web interface for an alert history system. At the top, there's a navigation bar with links for 'New Analysis', 'Dashboard', 'Summary', 'History', and 'Admin Panel'. On the right side of the header is a user profile icon labeled 'admin12' and a 'Logout' button. Below the header, a large card titled 'Alert History' displays a table of recent alerts. The table has three columns: 'DATE & TIME (UTC)', 'ALERT TYPE', and 'MESSAGE'. The 'ALERT TYPE' column consistently shows 'PER-PERSON'. The 'MESSAGE' column lists repeated alerts for different person IDs. A pink 'DOWNLOAD HISTORY (CSV)' button is located at the top right of the alert table area.

DATE & TIME (UTC)	ALERT TYPE	MESSAGE
2025-10-29 14:55:15	PER-PERSON	ALERT: Person 269 in danger zone too long!
2025-10-29 14:55:13	PER-PERSON	ALERT: Person 240 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 146 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 150 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 140 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 203 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 91 in danger zone too long!
2025-10-29 14:55:02	PER-PERSON	ALERT: Person 161 in danger zone too long!

Admin can **export** historical data (alerts, person activity) in CSV / PDF formats.

Added controls to **modify** threshold values and alert rules in real-time

System applies **updated** settings instantly without server restart.

Execution Steps

Setup Environment

- Install dependencies using `pip install -r requirements.txt` and ensure Python 3.9+ with webcam or video input.

Initialize Database

- Run `python app.py` to auto-create `video_zone.db` and configure admin credentials.

Load / Stream Video

- Use webcam or upload video from dashboard to start live feed.

Detection & Tracking

- YOLOv8 detects people; Byte Track tracks unique IDs in real time.

Live Counting & Alerts

- Zones update counts automatically and trigger alerts on threshold breaches.

View Dashboard & Export

- Monitor analytics, logs, and export data (csv/PDF) from the dashboard.

Role-Based Access Control – Secure login with admin and user privileges

Live People Counting –
Real-time detection and tracking using YOLOv8.

Custom Zone Creation –
Draw and manage multiple regions of interest on video feeds.

Real-Time Updates –
Automatic refresh of zone counts on the dashboard within seconds.

Multi-Camera Integration – Add or manage multiple IP or webcam feeds.

Threshold Alerts –
Notifies users when a zone exceeds its defined capacity.

Interactive Dashboard –
Visualizes data using Chart.js (line & bubble charts).

Data Export – Download analytics and logs in CSV or PDF format.

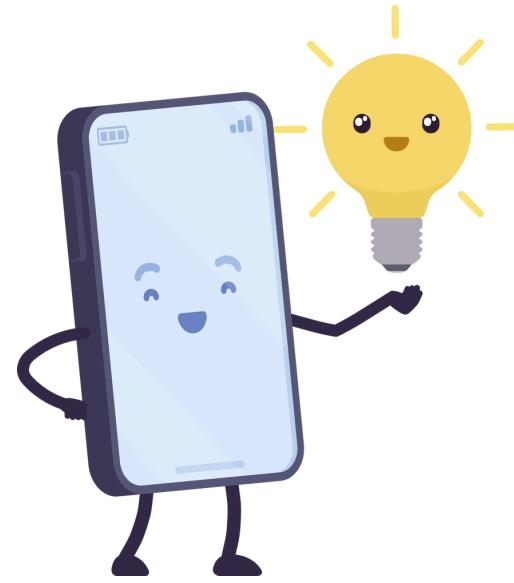
Key Features of CrowdCount

Real-World Implementation Areas

Area of Implementation	Use Case / Purpose
 Educational Institutions	Monitor crowd density in campuses or exam halls.
 Shopping Malls & Public Spaces	Manage foot traffic and ensure safety compliance.
 Corporate Buildings	Track occupancy in lobbies, corridors, and meeting areas.
 Transport Hubs	Monitor passenger flow in stations, airports, and terminals.
 Events & Stadiums	Maintain safe crowd limits during large gatherings.
 Smart City Surveillance	Integrate with CCTV for real-time crowd analytics.



Future Enhancements



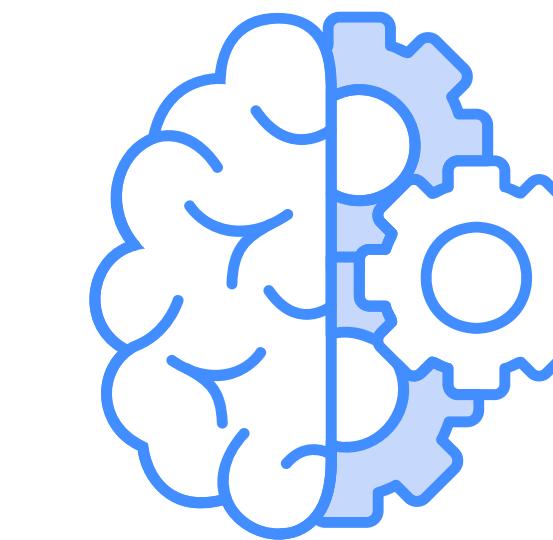
Develop a **mobile friendly** dashboard accessible via smartphones for real-time monitoring and alerts on the go.



Add **multilingual options**, voice assistance, and **accessibility** features to make the system inclusive and usable by diverse users.



Add automated **voice or sound alerts** when crowd thresholds are exceeded, improving real-time responsiveness.



Implement **deep learning models** to automatically identify unusual crowd movements, panic situations, or suspicious activities in real time.



Thank
you

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