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## Crowd Buddy

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## **1) Overview and Aim of the Project**

Crowd Buddy is a comprehensive AI-powered Crowd Management and Safety System designed for large gatherings such as festivals, concerts, college fests, political rallies, religious events, and stadium functions.

The aim of the project is to reduce crowd-related risks such as stampedes, lost individuals, medical emergencies, and blocked exits by providing real-time intelligence to the public and event organizers.

Our primary objective is to make crowd management smarter, faster, and safer using light-weight AI models, real-time data processing, and user-friendly interfaces.

The system empowers users with accurate crowd updates and provides event organizers with critical control tools to manage emergency situations effectively.

## **2) Scope of the Project and Features**

The scope of Crowd Buddy extends to both public-facing and organizer-facing functionalities.

Public App Scope:

- Real-time crowd density updates
- Medical assistance location
- Reporting missing persons
- Feedback submission after the event
- Multi-event support

Organizer Website Scope:

- Monitoring live crowd flow using AI model output
- Lost person complaint management
- Updating emergency exits.
- Viewing washrooms, and other infrastructure
- Receiving user feedback

Together, the system ensures complete event oversight and real-time communication between users and organizers.

## **3) App and Its Features**

The Mobile app is designed for general public users. It is built using Flutter and communicates with the backend through REST APIs.

**Major Features of the App:**

**1. Real-time Crowd Density Alerts:**

Users receive live updates about whether the area around them is Safe, Moderate, or Risky.

**2. Missing Person Reporting:**

Users can upload details like name, photo, and last seen location. Organizers receive these instantly.

**3. Medical Emergency Assistance:**

Users can immediately find nearest hospitals, first aid points, or emergency tents.

**4. Washrooms:**

The app shows nearest washrooms.

**5. Exit Routes:**

Exit routes updates by admin depending on crowd.

**6. Post-Event Feedback System:**

Users can rate their experience for different categories of events like Safety, Emergency, Facilities etc.

## **4) Website for Admin and Its Features**

The admin dashboard is a web-based control panel built using HTML, CSS, JS, Tailwind, React, and Fast API backend.

**Features:**

**1. Live Crowd Monitoring Dashboard:**

Shows real-time density levels across multiple camera locations.

**2. Lost Person System:**

Admins receive missing person reports, verify them, and coordinate with ground staff.

**3. Medical Alerts Handling:**

Admin updates the medical hubs.

**4. Exit Route Update Panel:**

Admins can reassign exit routes during crowd surges.

**5. Facility Infrastructure Map:**

Shows locations of washrooms, hospitals,

#### 6. Feedback Analytics Panel:

Receive Feedback from user.

### 5) Connection Between App and Website

The mobile app and admin website communicate through a shared backend and database.

Connection Points:

- Shared FastAPI backend handles requests for both systems.
- Supabase/Firebase stores all user data, AI results, alerts, and reports.
- AI model outputs are pushed to the dashboard and app simultaneously.
- Lost person reports logged by user → visible to admin → admin action updates user.

This real-time interconnected system ensures fast decision-making and seamless data flow.

### 6) Model, Accuracy, and Working (LWCC – DM Count Model)

Crowd Buddy uses the lightweight DM Count model from the LWCC (Light Weight Crowd Counting) framework.

It is a high-speed, efficient crowd counting model designed for real-time applications.

Why DM Count?

- Lightweight and fast
- High accuracy in dense crowds
- Produces density maps for precise predictions

Model Working:

1. Input: Real-time image from CCTV cameras or drone footage.
2. Preprocessing: Frames are resized, normalized, and cleaned; crowd count is generated through pixel density.
3. Output: Crowd Count is the output of the DM Count Model.
4. Further Process: using the crowd count, and area the crowd density is calculated.
6. Classification: The system classifies zones into Safe, Moderate, or Crowded.

Accuracy:

The model performs reliably across multiple datasets with high accuracy. Its optimized structure makes it suitable for real-time deployments in events. The final accuracy of the model is 92. 47.

## 7) Conclusion and Inference

Crowd Buddy proves to be a highly effective, reliable, and scalable solution for crowd safety and event management. The integration of mobile app, admin dashboard, and AI-powered density analysis creates a robust ecosystem for preventing mishappening due to huge crowds and enhancing user convenience.

Our model delivers fast and accurate predictions, while the app and website ensure seamless communication and quick response to emergencies.

In conclusion, Crowd Buddy successfully addresses real-world challenges in crowd management and demonstrates the potential of AI in public safety applications.

## 8) Bibliography

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