Round Two – Prototype Development

Topic & Team Introduction

Project Drishti is envisioned as a **multi-layered, intelligent safety platform** designed to manage, monitor, and protect the dynamic crowd movements expected during **Mahakumbh 2028 in Ujjain**—one of the largest human gatherings on the planet. With the potential of **millions of pilgrims arriving daily** over a span of weeks, the event presents unique logistical, cultural, and safety challenges. Traditional monitoring systems often fall short in such high-density, emotionally charged environments. Drishti addresses this gap by integrating **AI-powered decision-making, real-time data streams, and smart communication mechanisms** into a single, unified platform.

Team Serenity

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Problem Statement: Ensuring Crowd Safety at Mahakumbh 2028, Ujjain

The **Mahakumbh 2028** in Ujjain is expected to draw millions of devotees and visitors from across India and the world, making it one of **the largest spiritual gatherings** in human history. While the event carries immense **cultural and religious significance**, the massive scale of participation poses **serious challenges for crowd safety**, **mobility**, and **overall management**. With activities spread across ghats, temples, processional routes, and public spaces, ensuring a smooth and safe experience for all participants becomes a critical responsibility.

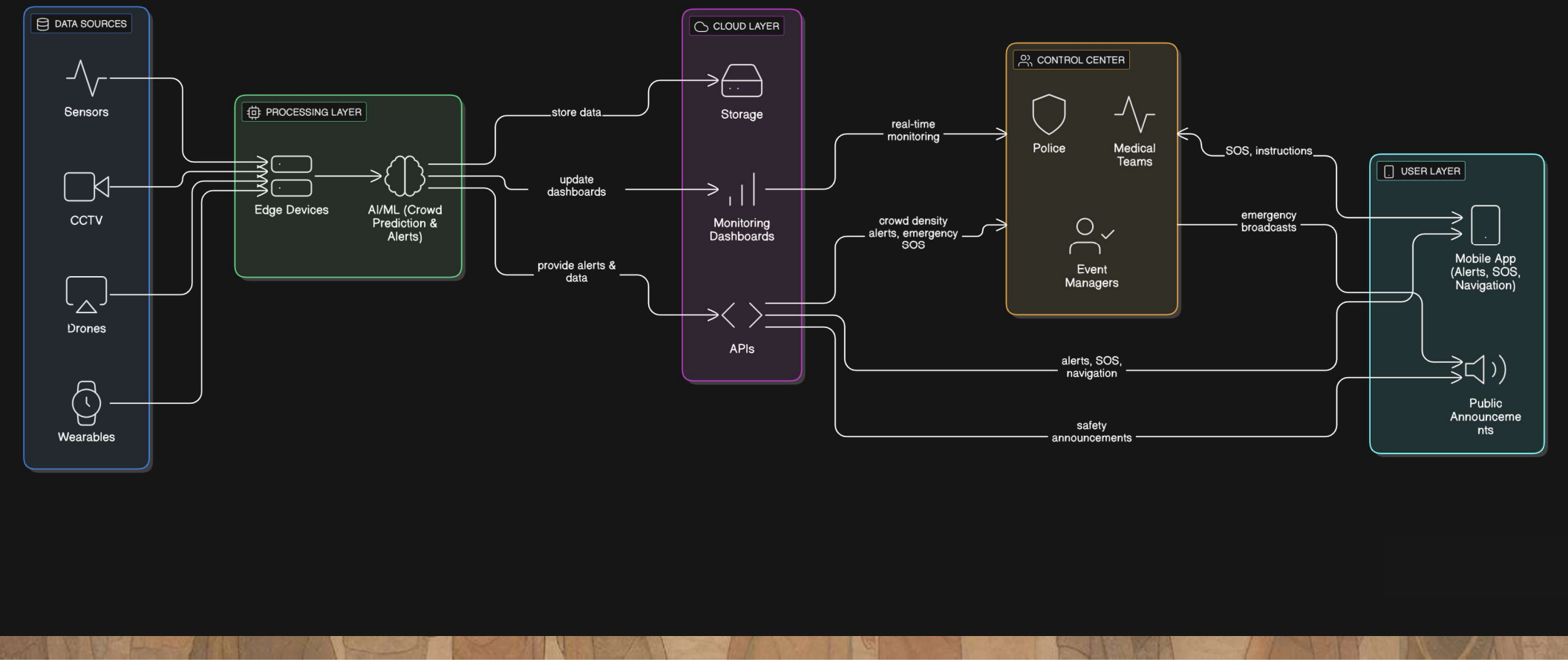
Past gatherings have witnessed **stampedes**, **delayed medical responses**, **infrastructure breakdowns**, and **cases of missing persons**. These issues highlight the limits of traditional crowd control methods like barricading and manual policing. The key problem is the lack of **real-time situational awareness and predictive systems**. Current approaches are reactive, leaving authorities struggling once incidents occur rather than preventing them.

Proposed Solution

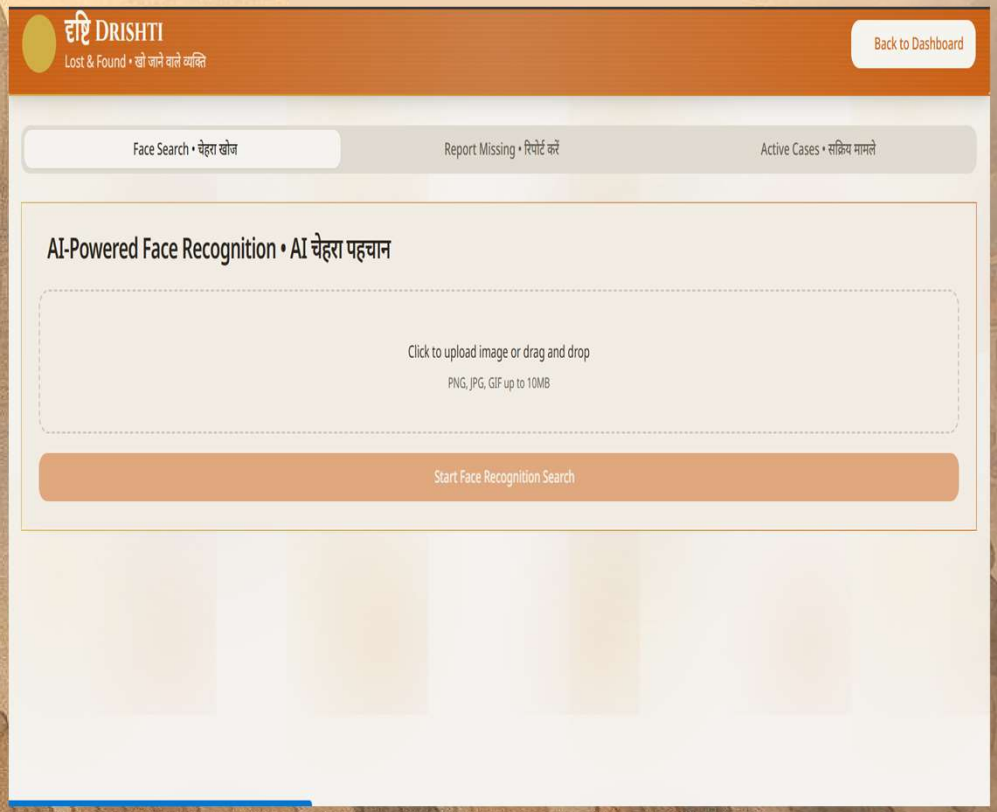
Project Drishti is our solution to this challenge: a **comprehensive, AI-enabled platform** designed to act as the **central command system** for crowd intelligence, safety, and emergency response during Mahakumbh. Built with a focus on **proactive prevention rather than post-crisis reaction**, the platform uses real-time data from cameras, drones, and crowd-sourced inputs to detect early signs of congestion, panic, or disorder. By analyzing behavioral patterns and density surges, it can **predict stampede-prone zones in advance**, ensuring that authorities can intervene before situations become dangerous.

At its core, **Project Drishti** functions as the **intelligent command center** for Mahakumbh 2028—fusing real-time visuals, behavioral analytics, and public feedback into a single responsive system. By combining drone feeds, on-ground data, and dynamic zoning, it delivers early warnings, automates emergency handling, and provides multilingual crowd guidance. The system is fully modular, built to work alongside existing infrastructure, and scalable enough to manage **millions of people across diverse zones of Ujjain**—from ghats to temples to transit points. It's not just a tech solution; it's a **mission to protect lives at the world's largest spiritual gathering**.

System Design Overview



Live Glimpse of the Prototype



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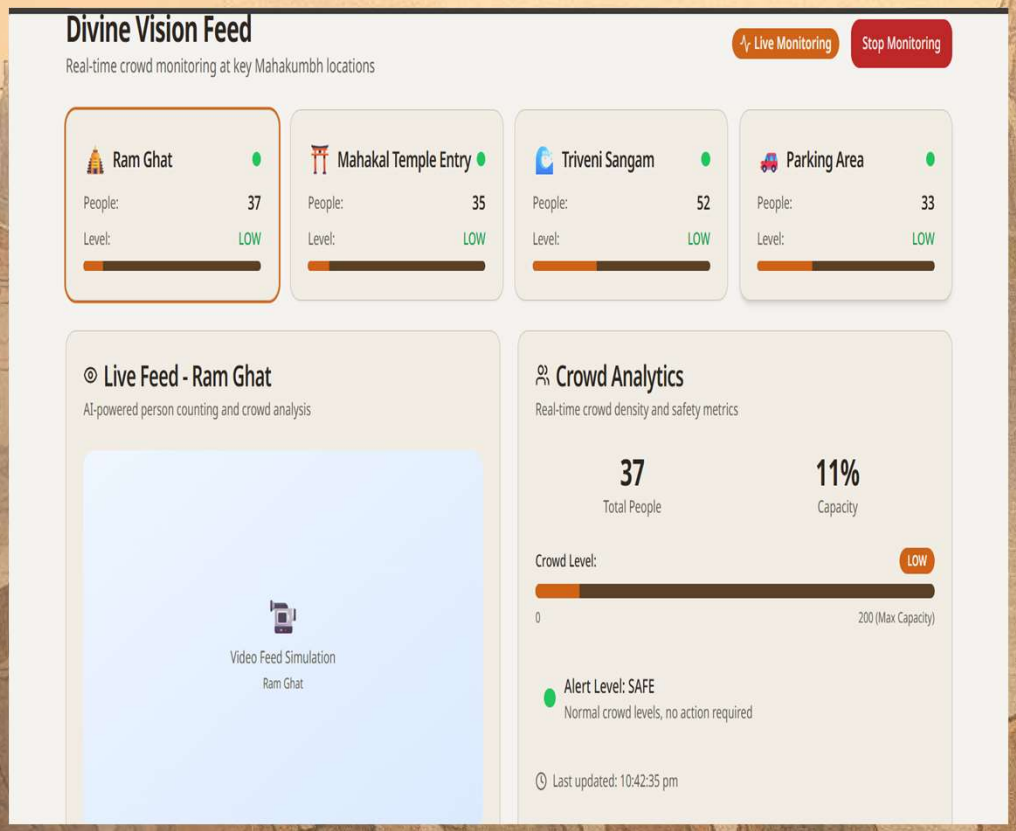

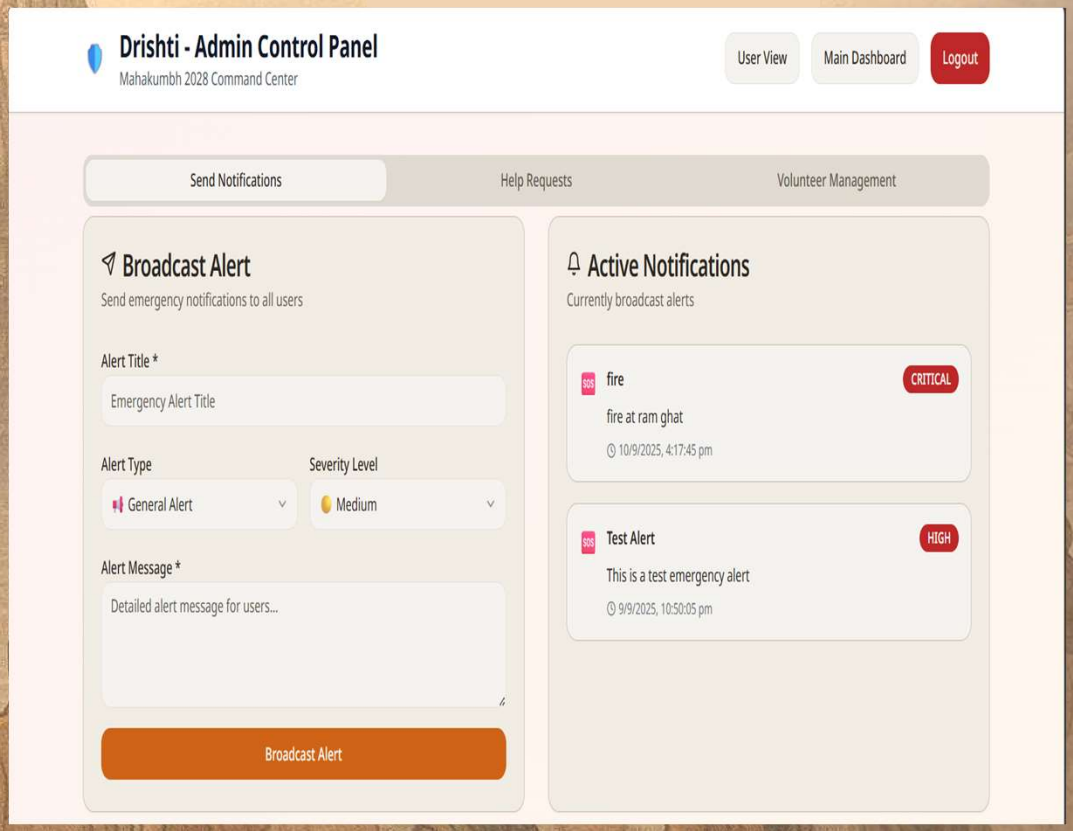

Tech Stack

Artificial Intelligence & M L

- **TensorFlow / PyTorch** –For facial recognition, crowd density estimation, anomaly detection.
- **OpenCV** – For real-time video stream analysis.
- **YOLOv8** –For identifying crowd density, unauthorized zones, lost individuals, etc.
- **Media Pipe** – Pose and gesture

Real-time Video & Sensor I/P

- **WebRTC** – CCTV or drone footage.
- **NVIDIA Jetson** – Edge AI processing to reduce latency
- **GPS** – Location tracking, environmental sensing.

Backend & APIs

- **Flask** –REST APIs for real-time communication between AI engine and dashboard.
- **Node.js** – Handling large concurrent user requests.
- **Redis / RabbitMQ** – Real-time messaging.

Frontend (Dashboard)

- **React.js with Tailwind CSS** –UI for monitoring and control dashboard.
- **Flutter** – For Mobile Application
- **Socket.IO** – Real- data updates on UI.
- **Leaflet.js** – Geospatial visualizations

Multilingual Voice & Alerts

- **Google Cloud Text-to-Speech** – Real-time multilingual announcements.
- **NLTK / spaCy** – For text summarization and intelligent alert generation.

Security & Privacy

- **Firebase** – Secure authentication
- **TLS/SSL Encryption** – Secure data transmission
- **Role-based Access Control (RBAC)** – Custom access for police, health workers, admins.

Impact & Real World Outcomes

✅ **Stampede Prevention:** Early detection of congestion and panic behavior will enable timely interventions, drastically reducing the risk of stampedes in high-density zones like Ramghat and Mahakaleshwar temple.

⚠️ **Faster Emergency Response:** Automated dispatch and responder routing will reduce average emergency response time by up to **60%**, especially in remote or crowded zones.

🧭 **Improved Pilgrim Safety & Experience:** With multilingual alerts, visual crowd guidance, and mobile notifications, pilgrims will feel safer, better informed, and more confident navigating the event

📊 **Post-Event Insights & Learnings:** The system will log all incidents, movement patterns, and responses to generate actionable data for future planning and national replication.

🔁 **Scalable Safety Model:** Once proven at Mahakumbh, Project Drishti can be adapted for other large religious events, political rallies, melas, and disaster-prone public gatherings.

Future Scope

In the future, the Smart Crowd Safety and Management Solution can be scaled to handle even larger gatherings, not only at Mahakumbh but also across other mass events such as festivals, political rallies, and sports events. Integration with existing **smart city infrastructure and government disaster management systems** can ensure a more coordinated response during emergencies. The system can further evolve by incorporating **advanced AI and predictive analytics** to forecast risks, optimize crowd flow, and proactively prevent incidents.

On the technology side, expanding the network of **IoT devices, drones, and wearable health monitors** will provide deeper insights into real-time conditions. The mobile application can be enhanced with **multi-lingual support, voice alerts, and accessibility features** to reach a wider audience, including those without smartphones. Beyond India, this solution holds potential for **global adoption**, where similar mass gatherings face comparable safety challenges.


Thank You
May your journey through Mahakumbh be safe, peaceful, and protected.