SMART INDIA HACKATHON 2025

TITLE PAGE

- **Problem Statement ID – SIH25165**
- **Problem Statement Title- Temple and Pilgrimage Crowd Management (Somanth,Dwarka,Ambaji,Pavagadh)**
- **Theme- Heritage & Culture**
- **PS Category- Software/Hardware**
- **Team ID-**
- **Team Name (Registered on portal) - NeXora**

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IDEA TITLE

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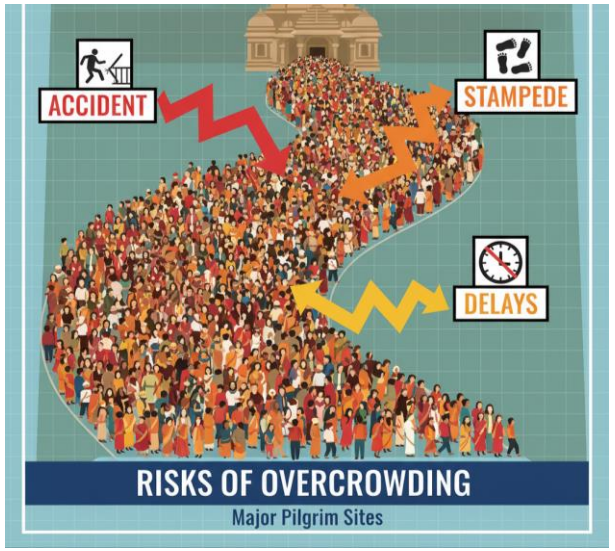
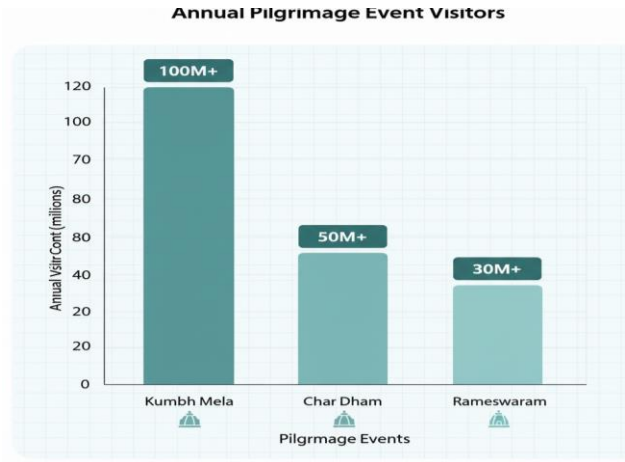
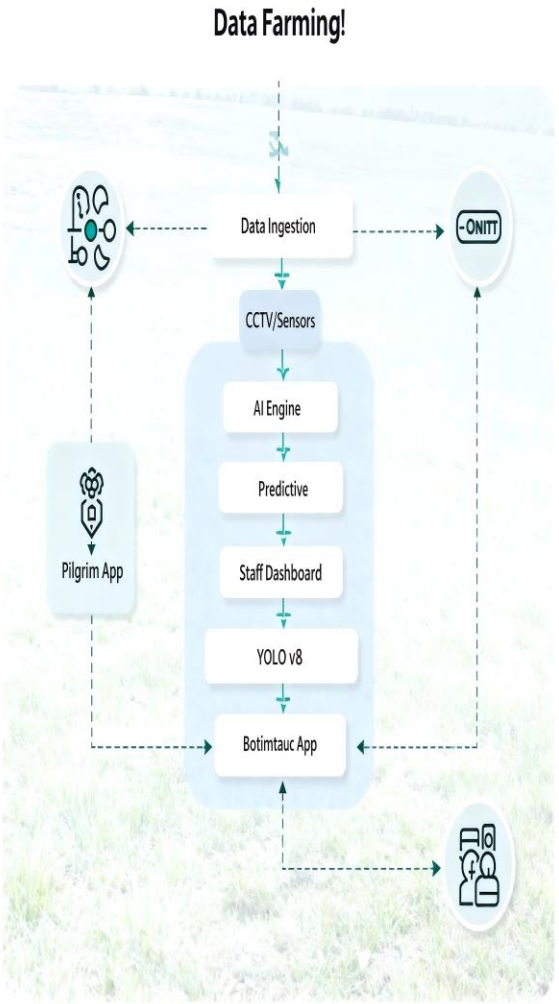
• Proposed Solution

A holistic, AI-powered platform for intelligent crowd and traffic management at pilgrimage and large event sites. Our system leverages real-time data to ensure safety, optimize flow, and enhance user experience.

- **Backend:** FastAPI for high-speed data ingestion and AI model serving.
- **Computer Vision**: YOLOv8 on low-cost edge devices for privacy-preserving crowd and vehicle counting.
- **Frontend:** A dynamic dashboard for staff and a multilingual mobile app for pilgrims.
- **Core Functionalities**: Real-time monitoring, predictive analytics, smart queue management, and rapid emergency response.







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TECHNICAL APPROACH

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Technology Stack

- **Backend:** FastAPI, Python, Prophet/XGBoost , PostgreSQL .
- **Computer Vision:** YOLOv8, OpenCV, Raspberry Pi (or similar edge device).
- **Frontend:** React.js , React Native or PWA (for the pilgrim app).
- **Tools:** Docker for containerization, Git for version control.

Methodology:

- **Data Ingestion:** Sensors and CCTV feeds send real-time counts to the backend via a REST API.
- **AI Analysis:** The backend's AI engine uses this live data and historical trends to predict crowd surges.
- **Visualization & Alerts:** The Staff Dashboard displays real-time heatmaps, predictive analytics, and color-coded alerts.
- **Pilgrim Engagement:** The mobile app provides real-time crowd information, virtual queue tokens, and personalized navigation.


```
31
32
33   ource = r"C:\Users\Nomend Sahu\Music\Python\crowd management\cv\CrowdSam.mp4" # (
34   v2.VideoCapture(video_source)
35
36   cap.isOpened():
37   nt("Error: Could not open video file. Please check the video path.")
38   urn
39
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS        Python
er.py"
PS C:\Users\Nomend Sahu\Music\Python\crowd management> & "C:/Users/Nomend Sahu/AppData/Local/Progr
ms/Python/Python313/python.exe" "c:/Users/Nomend Sahu/Music/Python/crowd management/cv/person_cour
er.py"
[zone_A] Detected 300 people.
```

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FEASIBILITY AND VIABILITY

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Feasibility
- Built using cost-effective hardware (Raspberry Pi, CCTV).
- Open-source tech stack: YOLOv8, FastAPI, React.
- Modular design allows phased rollout and easy scaling.

Visibility
- Real-time dashboards for authorities and pilgrims.
- Visual insights from AI-powered crowd analytics.
- Multilingual app enhances reach and user engagement.

Challenges
- Privacy concerns around video surveillance.
- Connectivity issues at remote pilgrimage locations.
- Initial resistance from local authorities and stakeholders.

Strategies
- Edge AI ensures privacy & offline capability.
- Start with pilot implementations to build credibility.
- Partner with temple trusts & local admins for onboarding.

Use Cases
- Crowd management at major pilgrimage sites (e.g. Kashi, Tirupati, Vaishno Devi).
- Smart queue systems for darshan & entry gates.
- Emergency alert system during high footfall events (festivals, yatras).

Business Potential
- Scalable as a GovTech or CivicTech SaaS solution.
- Revenue via subscriptions, licensing, and government contracts.
- Expandable to stadiums, events, and tourist hotspots.

Emergency and Disaster Management
- Disaster Prevention: The system can detect early signs of a stampede, fire, or other disaster by monitoring crowd density and movement.
- Quick emergency response and precaution

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IMPACT AND BENEFITS

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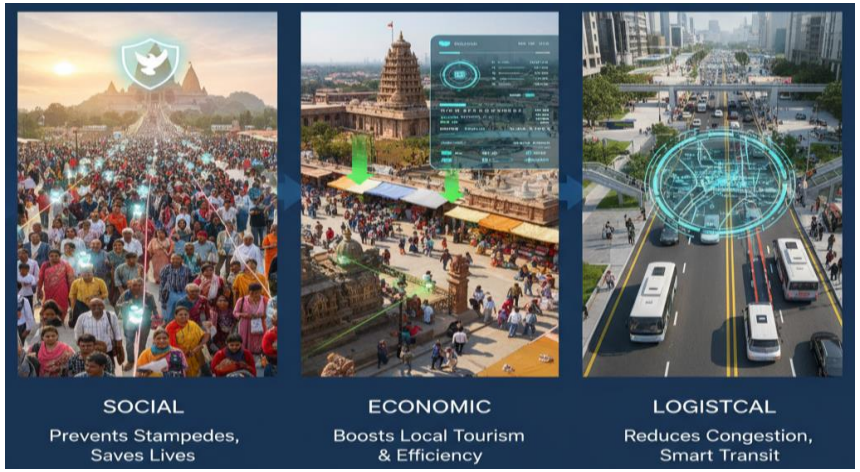

Impact on Target Audience :

- **Pilgrims:** Drastically reduced waiting times, enhanced safety, and a more comfortable, predictable pilgrimage experience.
- **Staff & Authorities:** Proactive crowd control, optimized resource allocation, and a centralized command center for swift emergency response.

Benefits of the Solution:

- Social: The system fosters a sense of security and well-being, reducing chaos and the potential for accidents in crowded environments.
- Economic: Improved efficiency in managing visitor flow can increase tourist satisfaction and potentially local revenue.
- Environmental: Optimized traffic flow and public transport usage can lead to reduced fuel consumption and emissions, contributing to a cleaner environment.

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RESEARCH AND REFERENCES

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- *Specifying the Effective Use of Artificial Intelligence for Crowd Management in Prayag Maha Kumbh Mela*
- *Prophet model for forecasting occupancy presence in indoor spaces using non-intrusive sensors*
- *Time Series Forecasting Using FB-Prophet*
- *YOLO-Based Person Detection and Tracking in Dense Crowds*
- *Crowd Detection Using YOLOv8*
- *Crowded event management in smart cities using a digital twin approach*
- *AI Video Analytics Market Size & Share | Industry Report 2033*

- Goes beyond just counting: also detects suspicious activities (weapons, falls, smoke) in addition to crowd density, to support real-time alerts.