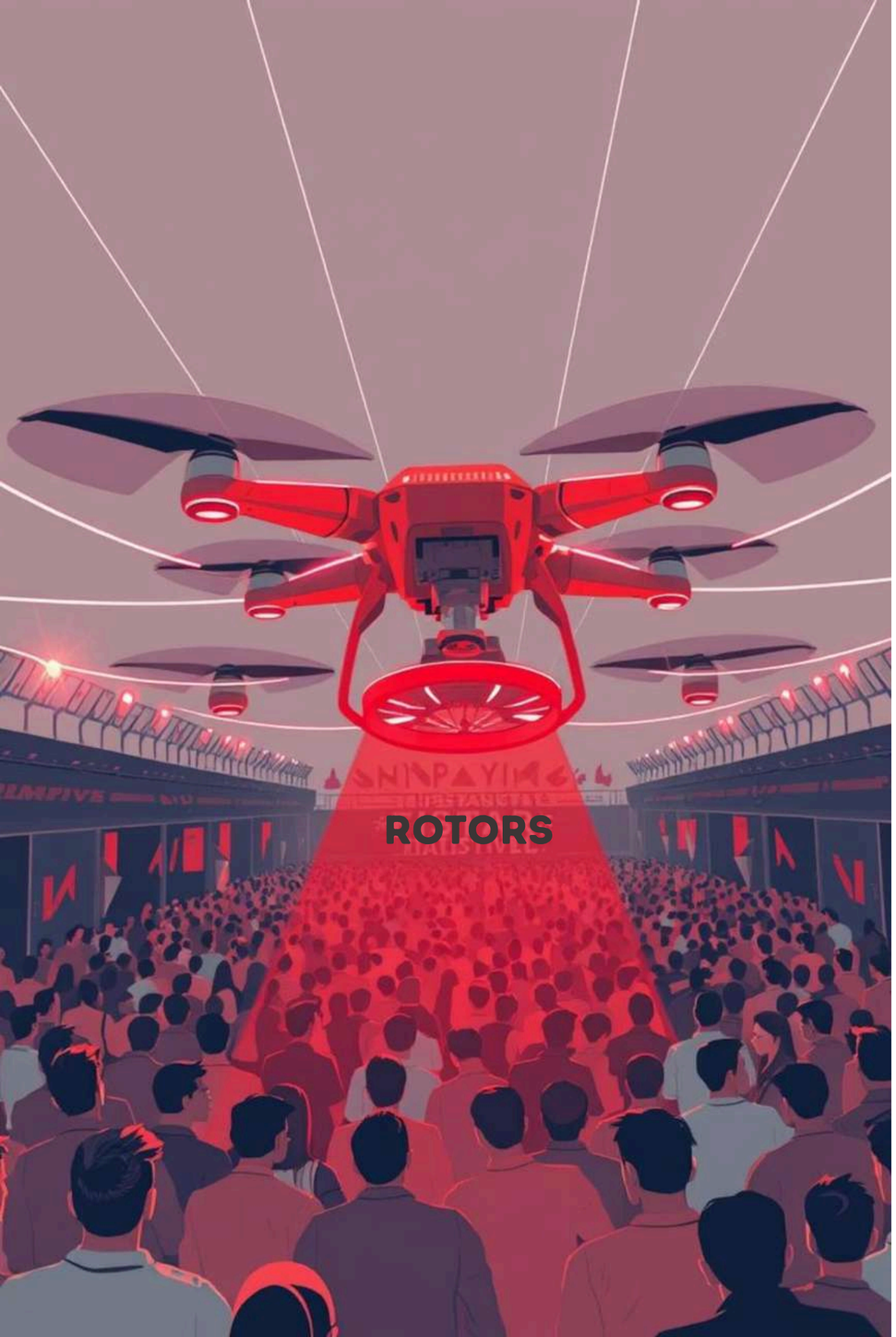


TITLE :

SURAKSHA AI: INTELLIGENT AI-ASSISTED EMERGENCY RESPONSE & CROWD SAFETY SYSTEM

REGISTRATION NUMBER: TH1061

THEME: SAFETY, SECURITY & SURVEILLANCE

TEAM NAME : ROTORS

TEAM MEMBERS WITH ROLES :

KRISH AGARWAL

AI Integration,
AI Models,
Drone Logic

SOMYA SHARMA

Backend Services,
Hardware
Integration

ANUJ

UI/UX Design,
Mobile App
Development

PIHU BHARDWAJ

AI- Data integration ,
Research, Workflow
Planning, Testing

ADDRESSING CRITICAL SAFETY CHALLENGES AT MASS GATHERINGS

Mass events like the **Simhastha Kumbh Mela** pose significant safety challenges due to their sheer scale and dynamic nature. Current safety measures often fall short, leading to preventable crises.

Locating Individuals

Pinpointing distressed individuals amidst dense, dynamic crowds is extremely difficult.

Network Failures

Overloaded networks cripple communication during emergencies.

Delayed Response

Lack of real-time data leads to slow emergency response times.

Limited Monitoring

Inadequate real-time surveillance for large, dispersed areas.

High-Density Crowds

The sheer volume and unpredictable movement make timely rescue efforts exceptionally challenging.

Misidentification Risks

High potential for misidentification of individuals in fast-evolving, high-stress scenarios.

> "There is **no integrated system** capable of handling SOS alerts, crowd surges, chaos detection, or lost-person scenarios in real-time using intelligent technology."

PROPOSED SOLUTION :

Our innovative **Suraksha AI system** is designed to transform emergency response and crowd safety through intelligent, drone-integrated technology.

1

Multi-Trigger SOS Alerts

Users can initiate alerts via mobile apps, Smart Keychains With GPS , or smart poles, ensuring accessibility in diverse situations.

2

Advanced AI Integration

Leveraging AI models for real-time analysis of various safety parameters, including Facial Recognition to identify lost individuals and Crowd Flow Algorithms to monitor crowd density, flow direction, and detect abnormal or potentially dangerous behavior.

3

Drone-Assisted Relays

Drones act as airborne communication hubs, maintaining signal integrity and surveillance even in network-congested or low-coverage zones. Equipped with live video surveillance, these drones continuously stream data to onboard or edge AI systems, enabling real-time detection of crowd density, movement patterns, and potential safety threats.

4

Automated Response Dispatch

Real-time data feeds into a central dashboard, enabling rapid, automated dispatch of emergency services.

THE MECHANISM: RAPID RESPONSE IN ACTION

SOS Alert Triggered

An individual in distress activates a digital SOS signal at their exact location.

Drone Deployment & Live Feed

A surveillance drone is automatically dispatched, providing a live, high-resolution video stream.

AI Crowd & Face Recognition

AI instantly detects crowd patterns and identifies the distressed person using advanced facial recognition.

Instant Data Display

Critical details (photo, name, contact) of the identified individual are displayed on the central dashboard.

Mesh Communication

Communication establish through different channels in case of network loss.

Optimised Team Guidance

Nearest safety teams receive real-time, shortest-route navigation to the precise location.

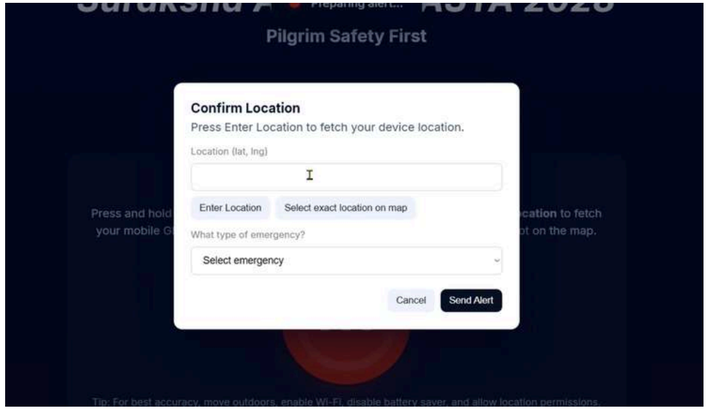
Centralised Monitoring

All operations are monitored and coordinated from a central command centre, enhancing oversight.

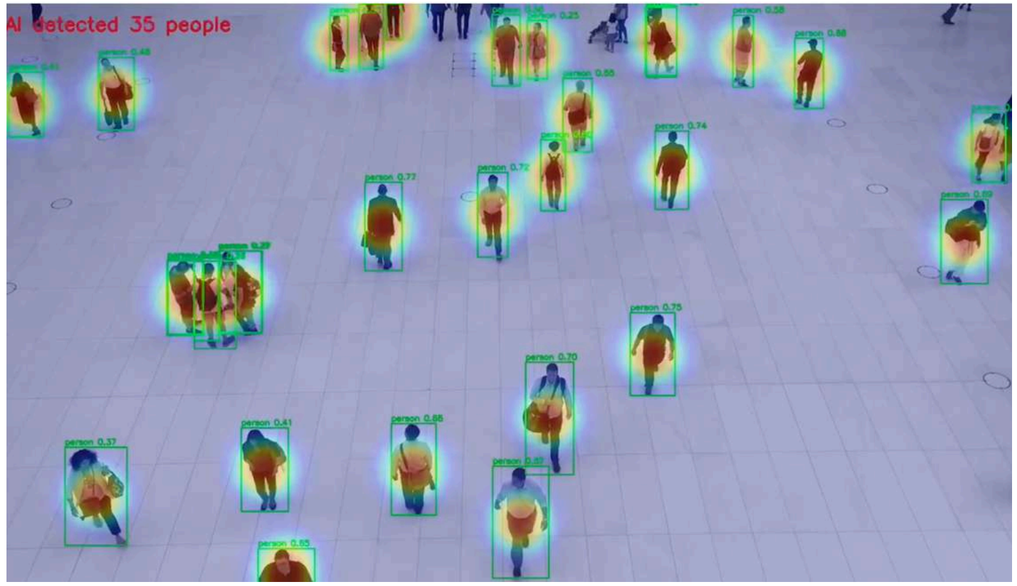
PROTOTYPE DEMONSTRATION

Witness Suraksha AI's seamless operational flow, from alert to precise identification and guidance.

1.) SOS BUTTON INTERFACE



2.) TYPE OF EMERGENCY SELECTION



4.) CROWD DETECTION TO MAP AND MONITOR PEOPLE IN HIGH-DENSITY AREAS

5.) REAL-TIME FACE RECOGNITION TO IDENTIFY PEOPLE IN CROWDS WHO NEED HELP

These visualisations highlight the real-time capabilities of Suraksha AI's operational prototype.

THE BLUEPRINT: STREAMLINED PROCESS FLOW

A robust, interconnected framework ensuring swift and accurate emergency management from detection to rescue.

Smart Emergency Button
(SOS Trigger)

Drone Activation & Data Streaming

LoRa/GPS Module

Live Video/
Audio Stream

AI Analysis

YOLOv8 CNN DeepFace

Object Detection (YOLOv8)
Anomaly Detection,/CNN)
Facial Recognition (DeepFace)

Control Room Dashboard Alert

Alert Reception & Priotrization

Crowd Detection
Coordinates/Degree

Identity Verification & Context

Logging, Analytics & Handbover

save videe, logs/ & team routes
team tles, post event analytics

Response Team Assignment

Real Time Update

POWERING THE INTELLIGENCE: OUR TECHNOLOGY STACK

Leveraging cutting-edge technologies to deliver unparalleled accuracy and real-time performance.

Python

The backbone for AI/ML algorithms and robust backend logic.

OpenCV & face_recognition

Advanced computer vision libraries for precise detection and identification.

Drone Camera Feed

Integration for live, high-resolution aerial surveillance data.

Pathfinding Algorithms

Optimised routing to guide safety teams via the fastest, least congested paths.

React.js

Intuitive, real-time command centre dashboard for seamless monitoring.

Firebase / MongoDB

Secure and scalable databases for records management and SOS logs.

EMPOWERING SAFETY, ENHANCING EXPERIENCES

Who Benefits & How

Our cutting-edge safety framework is meticulously designed to create a secure environment for all stakeholders involved in large-scale events, from our cherished attendees to the dedicated personnel managing every aspect. This holistic approach ensures peace of mind and operational excellence.

Pilgrims & Attendees

For our beloved pilgrims and event attendees, this system ensures prompt assistance in times of need. With verified identities, we can guarantee a more secure and **hassle-free experience**, providing peace of mind throughout their visit.

Safety & First Responders

Our dedicated safety teams and first responders benefit from precise real-time location data and optimal route guidance. This minimises wasted efforts, allowing them to reach and assist individuals with utmost efficiency during critical incidents.

Event Organisers

Event organisers and administrators gain comprehensive, real-time situational awareness. This proactive approach helps in preventing minor issues from escalating into major incidents, ensuring smooth operations and visitor flow.

Security Personnel

Security personnel are empowered with automated crowd monitoring capabilities. This enables targeted and timely intervention, enhancing overall security and maintaining order across the event premises.

Medical Services

Medical services can provide quicker triage and make informed transfer decisions, significantly reducing mortality rates in critical cases. Every second counts, and our system helps save lives.

Authorities & Policymakers

Authorities and policymakers receive actionable analytics, providing invaluable insights for future planning and optimal resource deployment. This data-driven approach strengthens our collective response capabilities.

Future Forward

Planned Improvements & Scalability

Our commitment to safety and innovation is relentless. We are continuously enhancing our platform with advanced features and scalable architecture to meet the evolving demands of large gatherings and public safety. These upcoming improvements will set new benchmarks in event security.

Mobile App Integration

Our forthcoming mobile application will offer **one-tap SOS functionality** for attendees, integrated with live location sharing and seamless two-way chat. This ensures immediate connectivity and assistance.

Edge AI on Drones

We are implementing **Edge AI capabilities on drones** for robust crowd detection and facial recognition. This ensures continuous operation and data processing even in areas with intermittent network connectivity.

Multi-Drone Coordination

Multi-drone coordination will allow for comprehensive swarm coverage, facilitating faster visual localisation and enhanced surveillance across expansive event venues.

Predictive Analytics

Advanced predictive analytics will enable real-time anomaly detection, providing early warnings for potential crowd surges or panic situations, allowing for proactive crowd management.

Privacy & Compliance

Robust privacy and compliance features are being integrated, including on-device anonymisation, stringent access controls, and detailed audit logging, ensuring data sanctity and regulatory adherence.

Robust Comms

We are building **highly robust communication channels** through hybrid connectivity solutions, combining cellular, mesh, and satellite networks for uninterrupted, high-availability links.

Dashboard & Ops Tools

The enhanced **dashboard and operations tools** will feature role-based views, incident replay functionalities, and comprehensive team performance metrics, empowering efficient command and control.

Scalable Deployment

Scalable deployment is a cornerstone of our architecture, utilising containerised microservices, load-balanced stream processing, and multi-region support for seamless expansion.