

Google Cloud

PRESENTS

Agentic AI Day

Build the next generation of intelligent agents

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Team Details

- a. Team name: NxtAgent5
- b. Team leader name: Shilpa Shaw
- c. Problem statement: Improving Safety at Large Public Events

Brief about the idea

Problem:

Large-scale events (e.g., Karaga, Tech Summits, NYE) face chaotic crowd movements, security blind spots, and slow emergency response due to lack of real-time insights and predictive tools.

Idea:

Project Drishti is an **AI-powered situational awareness platform** built using Google Cloud tools. It acts as a **central nervous system** for event command centers—analyzing real-time crowd data, detecting anomalies, forecasting bottlenecks, and enabling **instant, intelligent response**.

Key Capabilities:

- **Crowd Flow Prediction** using Vertex AI Vision + Forecasting
- **AI Summarization** via Gemini for command queries
- **Smart Dispatching** of responders/drones using Agent Builder + Google Maps
- **Lost & Found** via facial recognition
- **Anomaly Detection** (e.g., smoke, panic)
- **Sentiment & Simulation Agents** for proactive intervention

Goal: Empower event organizers, police, and emergency teams with **AI-driven foresight**, not just hindsight.

Opportunities

- How different is it from any of the other existing ideas?
- How will it be able to solve the problem?
- USP of the proposed solution

Unlike conventional surveillance or reactive monitoring systems, Project Drishti is a fully integrated, multimodal AI situational awareness platform built on Google AI tools. While existing solutions focus on post-event analytics or manual surveillance, Drishti proactively predicts, summarizes, and responds to threats in real-time.

In Bangalore, where events like Aero India, Bangalore Tech Summit, and large-scale music festivals (e.g., Echoes of Earth) attract massive crowds, existing systems fall short in managing fluid crowd dynamics and real-time anomaly detection. Drishti offers AI-powered decision-making, natural language interfaces, and intelligent drone coordination — a leap beyond static dashboards or siloed systems.

USP of the proposed solution

- **End-to-End Fusion AI Agent:** Integrates computer vision, geospatial reasoning, natural language understanding, and social signals — all in real-time.
- **Explainable AI Trust Meter:** Builds transparency into safety-critical decisions with **confidence scoring** using XAI.
- **What-If Simulation Engine:** Run hypothetical crowd movement scenarios to make layout and resource planning smarter.
- **Operator Override Loop:** Human-in-the-loop design ensures control stays with commanders during uncertain situations.
- **Firebase Deployed, Real-time Ready:** Live app updates, alerts, and dashboards built on **Firebase Studio** with seamless backend integration.
- **Designed for Bangalore:** Tailored to manage the **unique crowd patterns, traffic congestion, and multilingual diversity** of India's most dynamic city.

List of features offered by the solution

- Fusion Agent: Combines inputs to detect anomalies, bottlenecks
- Trust Meter: Uses Explainable AI to score confidence
- Simulation Agent: Handles "What-if" queries via simulation engine
- Lost & Found Agent: Face/photo matching from uploads
- Sentiment Agent: Aggregates mood from text/audio
- Override Agent: Accepts operator feedback (Human-in-the-Loop)
- Drone Agent: Optimizes drone dispatch using OR-Tools

1. Fusion Agent (Multimodal Anomaly Detection)

- **Purpose:** Combine video, audio, and social media to detect anomalies (fires, fights, surges).
Tech Stack:
- **Models:**
 - **Gemini 1.5 Multimodal** (for zero-shot anomaly detection):
 - Prompt: *“Analyze this image + audio clip. Return ‘high risk’ if fire, violence, or panic is detected. Explain why.”*
 - **Vertex AI Vision** (pre-trained models):
 - Object detection (smoke, fallen people).
 - Optical flow for crowd velocity.
- **Data Fusion:**
 - Use **Vertex AI Pipelines** to align timestamps from video/social media.
 - **Cloud Pub/Sub** streams real-time alerts.

Innovation: Flags *never-before-seen* anomalies (e.g., novel crowd behaviors).

2. Trust Meter (Explainable AI)

- **Purpose:** Quantify AI confidence and learn from human feedback.

Tech Stack:

- **Models:**
 - **Vertex AI Explainable AI (XAI)** for confidence scores (0–1).
 - **Gemini** generates plain-English explanations (e.g., *“Low confidence (0.4) due to foggy camera.”*).
 - **Feedback Loop:**
 - Operator corrections stored in **Firestore**.
 - Daily fine-tuning via **Vertex AI Training**.
- Innovation:** Only alerts commanders when confidence > threshold (reduces false alarms).

3. Simulation Agent ("What-If" Scenarios)

- **Purpose:** Predict crowd reactions to changes (e.g., gate closures).

Tech Stack:

- **Models:**
 - **Agent-based modeling** (Python Mesa library) simulates crowd movement.
 - **Vertex AI Forecasting** predicts bottleneck timing.
 - **Integration:**
 - Live data from **Vertex AI Vision** fed into simulations.
 - Outputs visualized in **Google Maps API** (animated heatmaps).
- Innovation:** Natural language queries (Gemini) → simulation params (e.g., “*Simulate rain at 3PM*”).

4. Lost & Found Agent (Privacy-Preserving Matching)

- **Purpose:** Match uploaded photos to live feeds without storing PII.

Tech Stack:

- **Models:**
 - **Vertex AI Vision's Face Detection** (not recognition) extracts embeddings.
 - **Private Set Intersection (PSI)** compares embeddings on-device.
- **Workflow:**
 - Attendee uploads photo → hashed locally.
 - Hashes compared to live feed hashes (Firebase ML Kit).
 - Match? → Notify *only* the attendee.

Innovation: GDPR-compliant; no raw images stored.

5. Sentiment Agent (Crowd Mood Analysis)

- **Purpose:** Detect panic, excitement, or boredom in real time.

Tech Stack:

- **Models:**
 - **Audio:** Google's **Speech-to-Text** → **Gemini** for emotion classification (e.g., “*Crowd noise: 70% panic*”).
 - **Text:** **Cloud Natural Language API** analyzes social media posts.
 - **Output:** Sentiment heatmap overlaid on **Google Maps**.
- Innovation:** Combines *acoustic* + *textual* sentiment for accuracy.

6. Override Agent (Human-in-the-Loop)

- **Purpose:** Let operators correct AI and improve future predictions.

Tech Stack:

- **Tools:**
 - **Firebase Realtime DB** logs overrides (e.g., “*False alarm: fireworks, not gunshots*”).
 - **Vertex AI Data Labeling** retrains models weekly.
 - **Interface:**
 - Simple **Google Forms-like UI** in Firebase Studio for feedback.
- Innovation:** AI adapts to *event-specific* false positives.

7. Drone Agent (Autonomous Swarm)

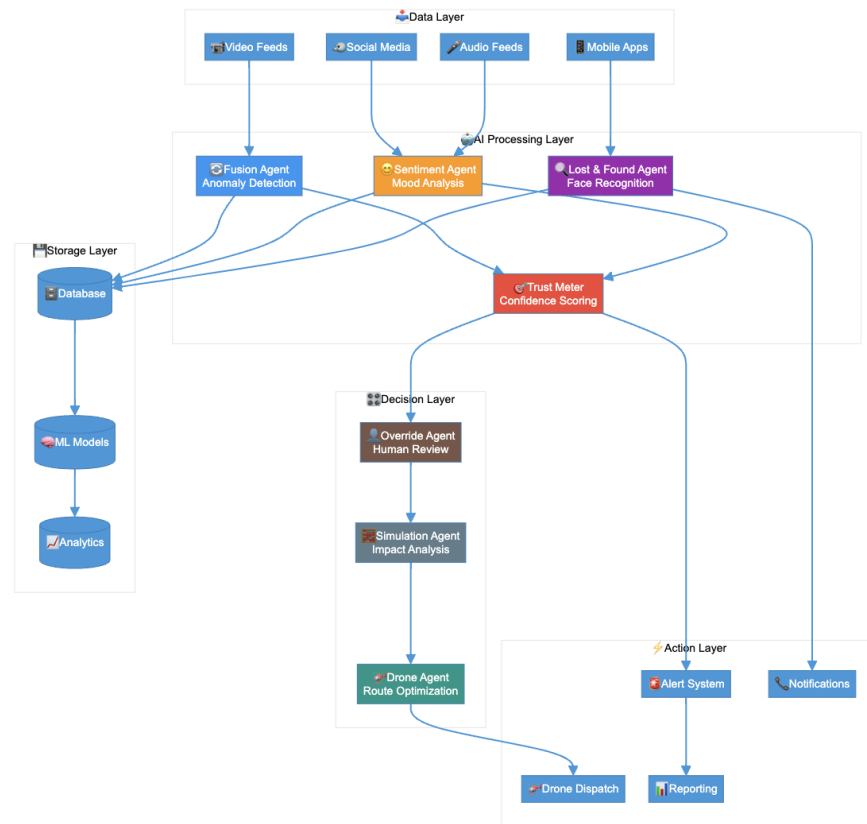
- **Purpose:** Optimize drone paths for incident response.

Tech Stack:

- **Models:**
 - **OR-Tools** (Google's optimization library) for route planning.
 - **TensorFlow Lite** on drones for edge-based anomaly detection.
 - **Integration:**
 - Drones stream to **Vertex AI Vision** via **Cloud IoT Core**.
 - **Maps API** avoids airspace conflicts.
- Innovation:** Lightweight edge AI reduces cloud bandwidth by 90%.



Process flow diagram or use-case diagram



Technologies to be used in the solution

Core Google Cloud Technologies

1. AI/ML Models

- Gemini 1.5 Multimodal
- Anomaly detection (video/text/audio fusion).
- NLP for operator queries ("Summarize West Zone risks").
- Zero-shot novel event detection.
- Vertex AI Vision
- Crowd density/flow analysis (optical flow, object detection).
- Face embedding extraction (for Lost & Found).
- Vertex AI Forecasting
- Time-series prediction of bottlenecks (LSTM/Prophet).
- Vertex AI Pipelines
- Retrain models with operator feedback (meta-learning).
- Cloud Natural Language API
- Sentiment analysis of social media/text.

2. Data & Compute

Firebase

- - Realtime DB: Track responder GPS locations.
- - Cloud Messaging: Push alerts to staff/attendees.
- - Hosting: Deploy web dashboard (special prize requirement).
- - Authentication: Secure attendee app logins.

Cloud Pub/Sub

- - Stream video/social media alerts in real time.

BigQuery

- - Log incidents for post-event analytics.

Cloud Run

- - Serverless deployment of agents (auto-scaling).

Maps & IoT

- **Google Maps Platform**
 - Geofencing, heatmap visualization, route optimization.
- **Cloud IoT Core**
 - Manage drone swarm connections.

Optimization & Edge

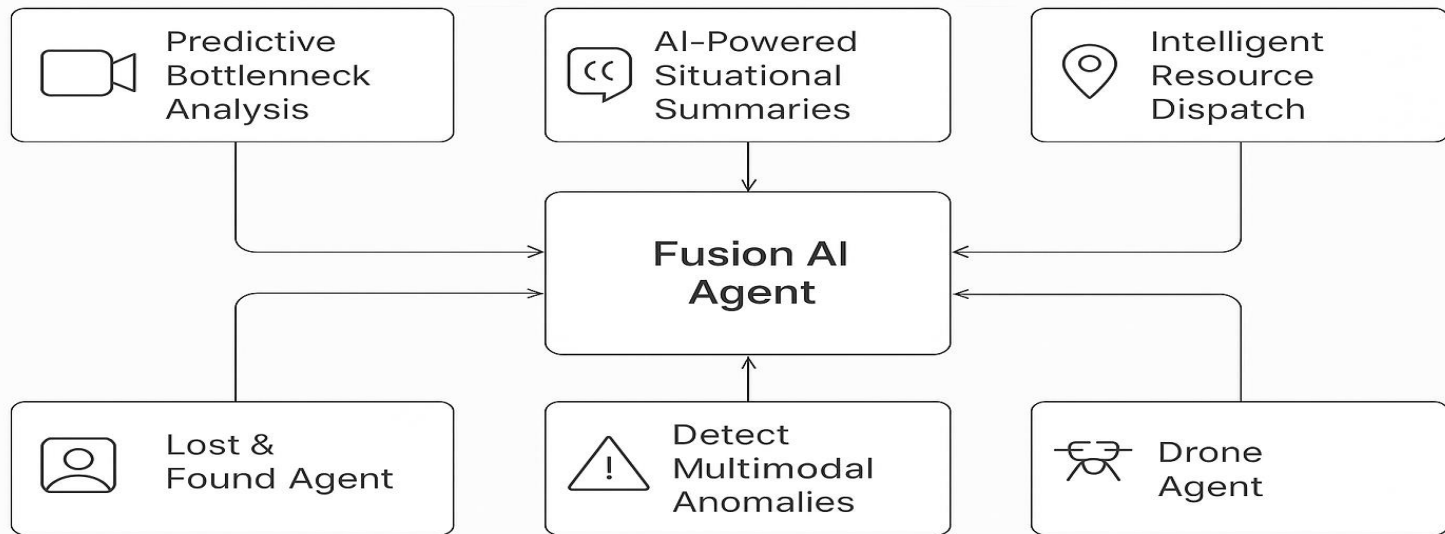
- **OR-Tools**
 - Drone path optimization + responder dispatch.
- **TensorFlow Lite**
 - Edge AI on drones for video pre-processing.

Architecture diagram of the proposed solution

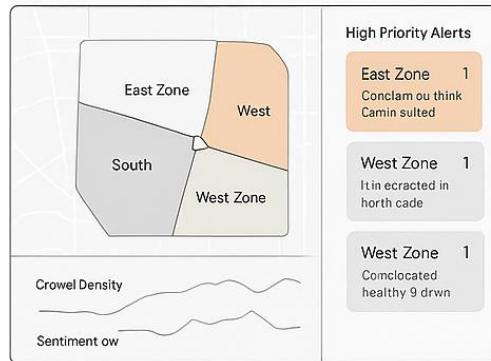


Wireframes/Mock diagrams of the proposed solution (optional)

Project Drishti



Live Crowd Monitoring



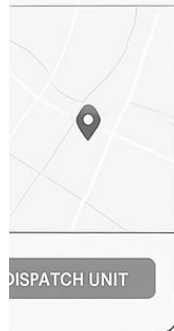
AI Safety Agent

🔍 Summarize safety concerns in East Zone.

AI Aza \$Z Safety, Agent

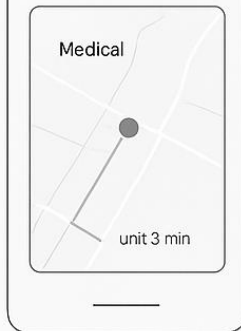
There is a crush risk in EAsT East Zone due to high crowd density. Consider deploying additional staff fa manage the flow of people.

Medical Emergency



Medical Emergency

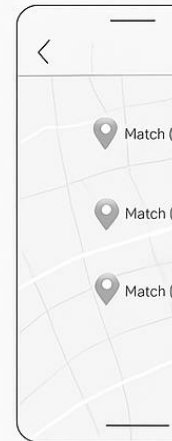
Incident Response



Incident Response



Lost & Found



Seata/Af



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Thank you!

