Google Cloud

PRESENTS

Agentic AI Day

Build the next generation of intelligent agents

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Team Details

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b. Team leader name: SARTHAK SRIVASTAVA
c. Problem statement: Improving safety at large public events

The Problem We Are Solving

Real-Time Event Surveillance Is Overwhelming

- Large-scale events have **100+ live CCTV feeds** monitored by only 2–3 control room staff.
- Human operators **miss critical incidents** — fire, stampedes, panic — due to visual fatigue and overload.
- Traditional monitoring is **reactive**, not proactive.

What's at Risk?

- **Delayed response** to emergencies
- **Loss of lives** in crowd surges or fires
- **Operational inefficiency** and lack of accountability

Real pictures of Mahakumbh Command Center

🔍 The Need:

An **AI-powered “AGENT”** that watches every feed, understands crowd behavior, detects threats, and **alerts proactively.**

Not Reactively

Project Drishti -360
Our Intelligent Safety Agent

What We've Built ?

Project Drishti-360 is an Agentic AI powered situational awareness platform that transforms passive surveillance into **proactive intelligence with 360 degree visibility** — Built using Google Cloud technologies.

Key Capabilities:

- **Object detection on 1000+ video feeds** using **Vertex AI Vision**

- **Intelligent detection of:**
  - Relative crowd density
  - Fire & smoke
  - Crowd count
  - Motion & direction (via centroid tracking)
  - Flow entropy, divergence, average speed

- Feature-engineered data is streamed to a **cloud data lake**

- **Gemini** reads and answers natural language queries like:
  - “Which zone is at risk of stampede?”
  - “Summarize threats in A1 zone”

What Drishti-360 “visualises” in each feed:

- Object Detection: Identifies key entities using **Vertex Vision AI** such as persons, vehicles, fire, and smoke — returning their bounding boxes and coordinates
- Object Count: Calculates the number of detected objects per category in each feed using **Vertex Pre Trained Model**
- Relative Density: Measures crowd pressure using: $$\text{Density} = \frac{\text{People in Feed}}{\text{Total People Across All Feeds}}$$
- Object Velocity: Tracks motion by computing displacement of each centroid over time
- Average Crowd Speed: Calculates mean speed of all individuals within a zone (Low speed ⟶ stagnation or idle crowd, Sudden increase ⟶ panic, evacuation, running, Useful for early stampede detection or flow health in an area)

$$\text{AvgSpeed}_{zone} = \frac{1}{N}\sum_{i=1}^{N} ||V_i||$$

- Velocity Divergence: (acceleration/deceleration) — High divergence or spikes in acceleration ⟶ sudden movement, often correlated with panic or security breach, Useful for triggering anomaly alerts

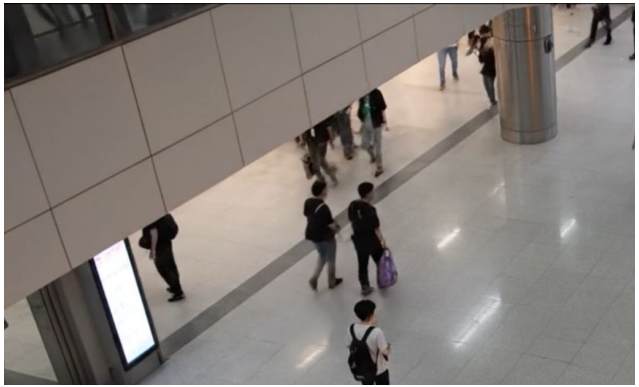
$$\text{Acceleration}_i = ||V_i(t) - V_i(t-1)||$$

Live Demo of DRISHTI-360

Google technologies used and their use cases

Google Technology	Use Case in Drishti–360
Vertex AI Vision	Real-time object detection (people, fire, smoke) on CCTV feeds
Vertex AI Agent Builder	Builds the intelligent agent to reason, infer, and respond to events
Gemini (via Langchain)	Interprets structured data + alerts; responds to natural language queries
Firebase Studio	Rapid UI/dashboard development for control room staff
Cloud Functions	Event-driven execution of AI pipelines & anomaly triggers
BigQuery / Cloud Storage	Time-series storage of engineered features; scalable, queryable data lake

Features of the solution



- Real-Time People Counting
- Fire & Smoke Detection (Instant Alerts)
- Zone-Wise Relative Density Calculation and mapping
- Object Velocity, Average Crowd Speed, Velocity Divergence, Trajectory
- Predictive Bottleneck Analysis (15–20 mins ahead)
- Natural Language Queries via Gemini
- Scalable to 100+ Feeds with Low Latency
- Numerical Feature Engineering (not raw video)

Impact of the solution

Operational Efficiency

90% reduction in manual camera monitoring workload

Real-time alerts ensure faster response to critical events

Enhanced Safety

Detects threats like **fire, crowd surges, panic**

Predictive intelligence enables proactive crowd management

Cost Optimization

No raw video processing by LLMs

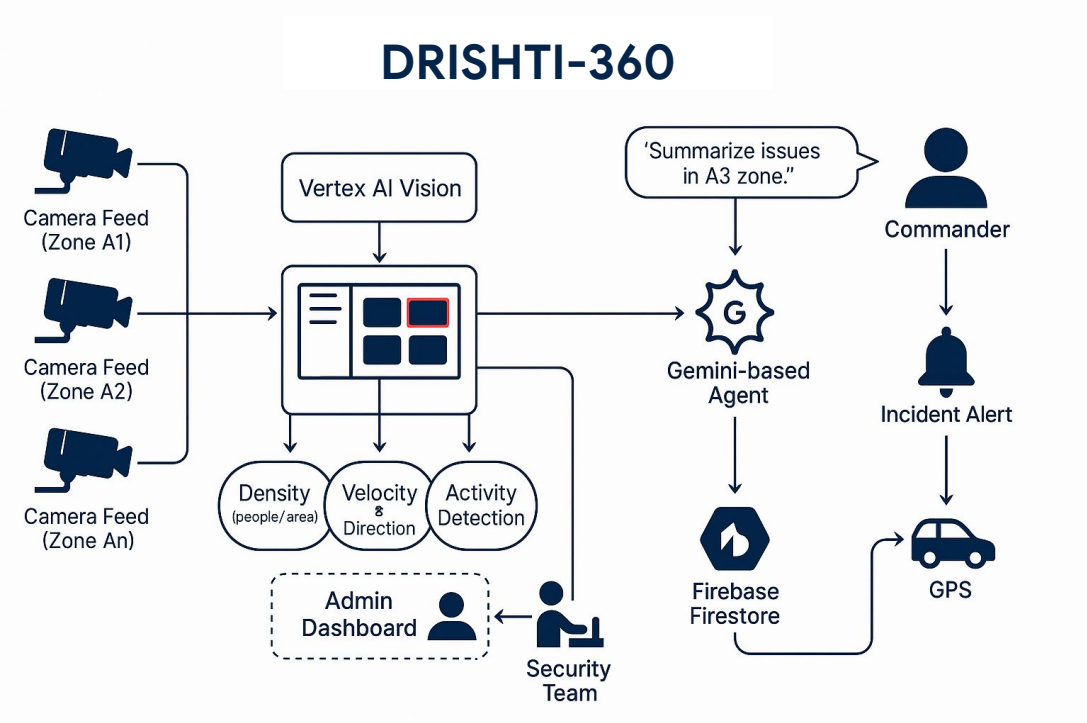
Lightweight numerical data pipeline → scalable + cloud-efficient

Augments Human Intelligence

Helps 2–3 control room staff manage **100+ live feeds** with ease

Enables decision-making through **simple natural language queries**

Architecture diagram of the proposed solution



How is this solution different from others: OUR USP

Drishti-360 doesn't send raw video to the cloud or Gemini.
Instead, we compute **highly meaningful, algorithmically derived features** such as:

- **Relative Density**
- **Crowd Speed & Direction**
- **Movement Randomness (Flow Entropy)**

These **feature-engineered, structured signals** are:

- **Lightweight to transmit**
- **Cost-effective to process**
- **Ideal for real-time forecasting and reasoning**

Object detection runs on **Vertex AI Vision**, ensuring low-latency inference.

Everything beyond detection — tracking, velocity, entropy — is computed via **efficient mathematical logic**, making the system **scalable, fast, and cloud-native by design**.

Future scope

Autonomous Drone Surveillance

Trigger drones to investigate high-priority zones autonomously

AI-Powered Lost & Found

Match missing person photos with crowd feeds in real-time using ReID models

Multilingual Voice Commands

Enable control room staff to speak in native languages to query the system

Edge AI Deployment

Push detection models to on-site edge devices for ultra-low latency response

Public Integration Interface

Allow citizens to report incidents or locate companions via mobile app sync

Adaptive Learning Agent

The more it sees, the smarter it gets — dynamic alert thresholds based on prior events

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Thank you!