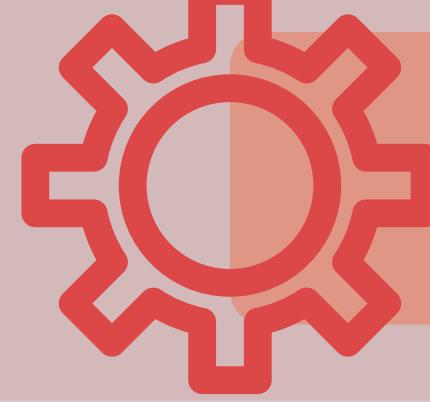




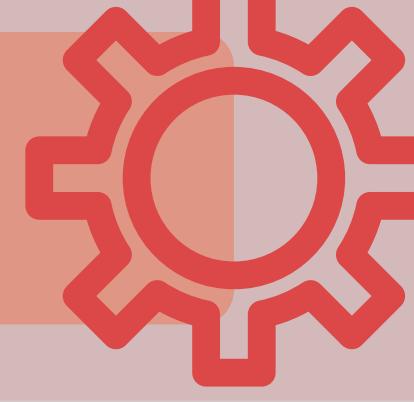
Operation Excalibur

Context-Aware Safety Gear Compliance System

Team
Tanisha.S
Sukirthan Udhayakumar
Sweta.S.K



Problem



- Existing CCTV systems only record footage and lack real-time intelligence to assess safety risks.
- Manual monitoring of video feeds is inefficient, error-prone, and not scalable.
- Unsafe situations often go unnoticed because risk zones are not automatically identified.
- There is a need for an automated, real-time system that detects risk zones and provides instant safety alerts.

Our Solution

- **AI-powered, real-time construction site safety monitoring**
- **Detects workers and PPE using computer vision**
- **Understands context (risk zones + working at height)**
- **Triggers alerts only when actual danger exists**

Workflow

- Capture live video from CCTV / cameras
- Detect person, helmet, and harness using AI
- Identify worker location (safe vs high-risk zones)
- Apply context-aware safety rules
- Generate severity-based alerts (Info / Warning / Critical)
- Log violations for reporting and compliance

Key features:

- Real-time PPE detection
- Context-aware risk assessment
- Multi-person monitoring
- Dynamic zone classification
- Smart alerts with reasons
- Visual overlays for instant understanding

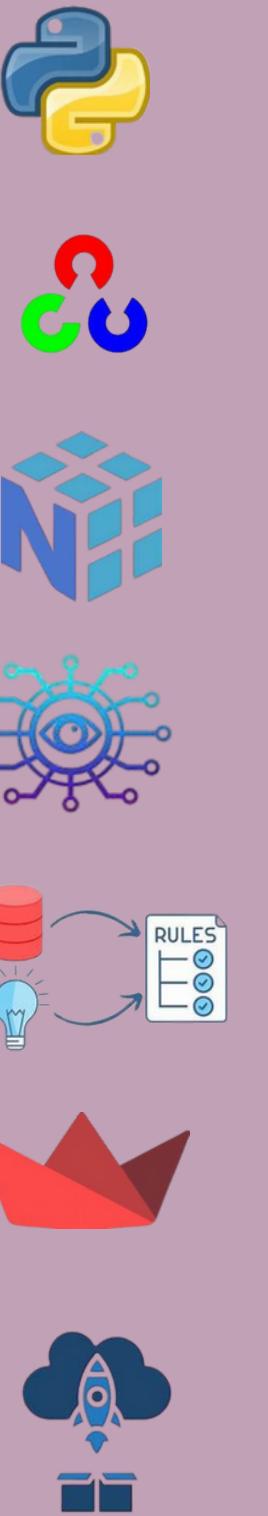
Innovation



- Not just detection → intelligent decision making
- Alerts only in hazardous situations → fewer false alarms
- Edge-based processing → low latency
- Scalable to any site with fixed cameras
- Practical & deployable in real environments

Tech Stack

Python
OpenCV
Numpy
Computer Vision Model
Rule Based Logic Engine
StreamLit
Edge Deployment



- Core development
- Video capture & image processing
- Fast numerical operations
- Person & PPE detection
- Context-aware alerts
- Real-time monitoring dashboard
- Low-latency local processing



Sustainable Development Goals

● SDG 3 – Good Health & Well-Being

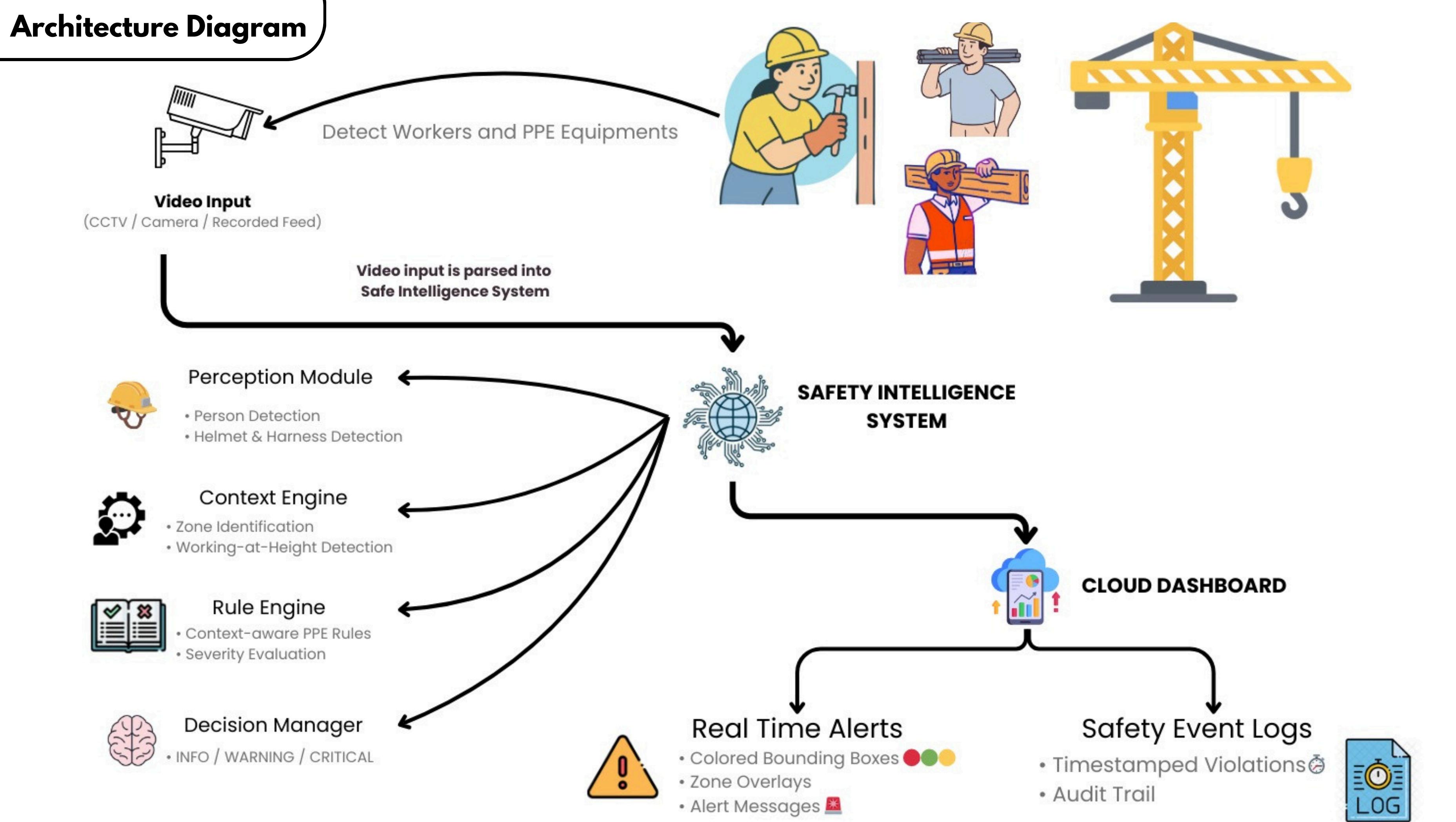
- Prevents workplace injuries and accidents
- Improves worker safety through early risk detection

● SDG 8 – Decent Work & Economic Growth

- Ensures safer working conditions
- Promotes occupational health & safety compliance

● SDG 9 – Industry, Innovation & Infrastructure

- Uses AI & computer vision for smart industrial safety
- Introduces innovative, tech-driven monitoring systems



TEST SCREENSHOT

Stop Deploy :

Construction Safety Monitoring Dashboard



Green = Safe Zone | Red = High Risk Zone

Alerts & Violations

Alerts & Violations

⚠ CRITICAL

Violation	Reason	Count	Severity
NO_HELMET	Helmet missing in HIGH-RISK zone while working at height	2	CRITICAL
NO_HARNESS	Safety harness missing in HIGH-RISK zone while working at height	4	CRITICAL