

## Requirements for Cloud-Based Smart CCTV Surveillance System

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### 1. Scope of Work (High-Level):

The project encompasses the development and deployment of a software solution that includes:

- **Cloud Platform Integration:** Seamless integration with a chosen cloud provider
- **Video Ingestion & Storage:** Efficiently ingest video streams from multiple cameras and store them securely in the cloud.
- **Real-time Video Analytics:** Implement AI/ML models for real-time detection and alerting based on specific use cases.
- **User Interface (UI) / Dashboard:** An intuitive web-based interface for monitoring, managing cameras, viewing alerts, and generating reports.
- **Alerting & Notifications:** Configurable real-time alerts via email, SMS, push notifications, or integration with existing incident management systems.
- **Scalability & Performance:** The system must be designed to scale with an increasing number of cameras and data volume without performance degradation.
- **Security & Compliance:** Adherence to data privacy and security best practices.

### 2. Detailed Use Cases & Functional Requirements:

Here are the specific use cases we require the system to address. For each use case, please consider both real-time alerting and historical analysis capabilities.

#### 2.1. Safety & Emergency Response:

- **Fire Detection:**
  - **Requirement:** Detect the presence of fire (flames/smoke) in designated areas (e.g., warehouses, production lines).
  - **Output:** Immediate alerts to designated personnel, location of fire, timestamp.
  - **Desired Accuracy:** High accuracy with minimal false positives.
- **Intrusion Detection (Perimeter & Restricted Areas):**
  - **Requirement:** Detect unauthorized entry into specified zones (e.g., after-hours, restricted access areas).
  - **Output:** Alert with image/video clip of the intrusion event, time, and location.
- **Personal Protective Equipment (PPE) Compliance (Optional/Future):**
  - **Requirement:** Detect if personnel are wearing required PPE (e.g., hard hats, safety vests) in designated zones.
  - **Output:** Alerts for non-compliance, with optional logging for audits.

## 2.2. Operational Efficiency & Workplace Management:

- **Employee Gathering Detection:**
  - **Requirement:** Detect instances where more than 'N' (e.g., 2, configurable) employees are gathered in specific non-designated areas for an extended period (e.g., > 5 minutes). This is for optimizing workflow or identifying potential bottlenecks/unauthorized gatherings.
  - **Output:** Alert with location, number of people, and duration of gathering.
  - **Consideration:** Ability to define "gathering zones" and "N" threshold.
- **Queue Management (e.g., Canteens, Dispatch Areas):**
  - **Requirement:** Detect if queue length exceeds a predefined threshold.
  - **Output:** Alert to management, providing real-time insights into congestion.
- **Process Monitoring (e.g., Assembly Lines):**
  - **Requirement:** Monitor specific steps in a manufacturing process (e.g., detect if a certain object is present/absent at a workstation).
  - **Output:** Alerts for anomalies or deviations from standard operating procedures. (Requires more specific definition based on your processes).

## 2.3. Asset & Vehicle Management (Specific to Manufacturing Industries):

- **Gate Vehicle Movement Monitoring:**
  - **Requirement:** Monitor vehicle entry and exit at gates.
  - **Output:** Log of vehicle movements (time in/out), potentially with license plate recognition (LPR).
  - **Desired Feature:** Integration with gate automation systems (if applicable).
- **Vehicle Tracking within Premises:**
  - **Requirement:** Track the movement of specific vehicles (e.g., forklifts, company trucks) within the manufacturing facility.
  - **Output:** Real-time location on a map, historical movement paths.
  - **Consideration:** How to identify specific vehicles (e.g., asset tags, color, type).
- **Parking Lot Management:**
  - **Requirement:** Monitor parking lot occupancy, detect unauthorized parking, or vehicles parked for extended periods.
  - **Output:** Alerts for violations, occupancy statistics.

## 2.4. General Surveillance & Incident Management:

- **Motion Detection & Activity Logging:**
  - **Requirement:** Standard motion detection with configurable sensitivity for all cameras.
  - **Output:** Event logs, ability to search by motion events.
- **Object Detection & Classification:**
  - **Requirement:** Ability to detect and classify common objects (e.g., person, vehicle, bag) for forensic search.
- **Anomaly Detection:**

- **Requirement:** Identify unusual patterns of activity that deviate from learned normal behaviour (e.g., person loitering in an unusual area).
- **Search & Forensic Review:**
  - **Requirement:** Ability to quickly search historical footage based on time, date, location, and detected events (e.g., "show me all fire alarms on floor 3 yesterday").
- **Incident Tagging & Annotation:**
  - **Requirement:** Ability for users to tag and add notes to specific events for incident management and reporting.

### 3. Non-Functional Requirements:

- **Performance:**
  - **Latency:** Minimal latency for real-time alerts (e.g., < 2 seconds for critical alerts).
  - **Processing Speed:** Efficient processing of video streams to avoid backlogs.
  - **Concurrent Users:** Support for X number of concurrent users.
- **Scalability:**
  - **Camera Support:** Ability to scale from current [X] cameras to [Y] cameras within [Timeframe].
  - **Data Storage:** Scalable storage solution for [Retention Period, e.g., 30 days, 90 days] of footage.
- **Security:**
  - **Data Encryption:** Encryption of data in transit and at rest.
  - **Access Control:** Role-based access control (RBAC) for different user types.
  - **Vulnerability Management:** Regular security audits and patch management.
- **Reliability & Availability:**
  - **Uptime:** Target uptime of [e.g., 99.9%].
  - **Disaster Recovery:** A robust disaster recovery plan.
  - **Redundancy:** Redundancy for critical components.
- **Usability:**
  - **Intuitive UI:** Easy to navigate and use for all user roles.
  - **Customizable Dashboard:** Ability to customize dashboard views.
- **Maintainability:**
  - **Modular Architecture:** Designed for easy updates and additions of new features.
  - **Documentation:** Comprehensive technical and user documentation.
- **Integration:**
  - **Existing Systems:** Potential integration with our existing [e.g., access control system, alarm system, ERP] (please specify if known).
  - **APIs:** Provision of APIs for future custom integrations.

#### 4. Technical Considerations:

- **Cloud Platform:** Please propose your recommended cloud platform along with a justification for its suitability for our requirements.
- **Camera Compatibility:** The system should be compatible with specify your current camera types.
- **Edge Processing (Optional but Recommended):** Discuss the feasibility and benefits of edge devices for pre-processing video streams before sending to the cloud, to optimize bandwidth and latency.
- **Data Formats:** Recommended video and data formats for ingestion and storage.
- **Network Requirements:** Recommendations for network bandwidth and infrastructure.

#### 5. Deliverables:

- Detailed Solution Architecture Document
- Development Plan & Timeline
- User Interface Mock-ups/Prototypes
- Source Code (or agreed-upon licensing model)
- Deployment & Configuration Guides
- User Manuals & Training Materials
- Post-Deployment Support & Maintenance Plan

#### 6. Project Timeline & Budget:

We would like to request a detailed proposal including:

- A proposed project timeline with key milestones.
- A breakdown of costs for development, deployment, licensing, and ongoing support/maintenance.