

Team Details

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c. Problem Statement: Smart Surveillance System. A lot of man hours are spent on physical patrolling of border areas. Fencing wires are not reliable and easy to breach. if someone is breaching in absence of guard and monitor the same task.

Brief about the idea

A smart surveillance system is a cutting-edge security solution that makes use of contemporary technology, including machine learning, artificial intelligence (AI), and the Internet of Things (IoT), to improve security monitoring and administration in a variety of settings. With features like automated alarms, real-time monitoring, and sophisticated data processing, the system goes beyond conventional surveillance.

Components

- 1. Cameras:** High-definition (HD), thermal, night vision, or 360-degree cameras.
- 2. Sensors:** Motion detectors, sound sensors, and infrared sensors.
- 3. AI & Machine Learning:** Facial recognition, object detection, and anomaly detection.
- 4. Edge Computing:** Processes data locally for faster reaction times.
- 5. Cloud & Storage:** Stores footage securely and enables remote access.
- 6. Network:** For real-time transmission, Wi-Fi, 5G, or wired connections are used.

Key features

1.Video Analytics Driven by AI: Employs AI algorithms to examine video streams for anomalous activity, including loitering, incursion, and odd conduct.able to automatically generate warnings by detecting faces, license plates, and other items in real-time.

2.Monitoring & Alerts in Real Time: Maintains constant space monitoring, alerting users or security staff to any unusual activities.Users can stay informed wherever they are by integrating it with mobile apps for real-time information.

3.Detection of objects and facial recognition: Enhances access control, enables the identification of things or people, and detects unauthorized people or cars.

4.Integration with the Cloud and Remote Access: Authorized staff can see CCTV footage from any location thanks to the cloud's secure data storage. Additionally, cloud connection allows the system to grow without requiring a large amount of hardware on-site.

5.Analysis of Prediction: Helps proactively manage vulnerabilities before they materialize by forecasting possible security issues using past data.

Benefits

- 1.Improved Security:**Offers quicker, more intelligent reactions to possible dangers
- 2.Cost-effective:**Lowers operating costs by eliminating the need for continuous human monitoring.
- 3.Scalability:**Easily expandable to encompass wide regions.
- 4.Accuracy:**AI-powered analysis makes sure that only pertinent notifications are sent out and minimizes false alarms.

Examples of Use

Public spaces include roadways, shopping centers, and airports to keep an eye on crowds and stop illegal activity.

Houses or workplaces that offer more seclusion and authority.
Integration with the larger municipal infrastructure for traffic control and urban safety is known as "smart cities."

How different is it from any of the other existing ideas

A smart surveillance system differs from previous surveillance concepts in that it makes use of cutting-edge technology (such as artificial intelligence (AI), the Internet of Things (IoT), and cloud computing) to improve the system's accuracy, efficiency, and autonomy. While passive video recording is the main emphasis of standard surveillance systems, a smart surveillance system stands out thanks to a number of intelligent and active features.

1.Traditional Monitoring vs. AI-Powered Analytics

Current systems: usually use static sensors or human operators to watch video, which can be laborious and error-prone, resulting in missed or delayed answers.

Smart system: Without the need for human intervention, this system analyzes the video in real-time using AI to identify odd faces, objects, or behaviors. It can detect suspicious activity, such someone lingering in a location for an extended period of time, or automatically activate warnings depending on certain predetermined parameters, including movement in restricted zones.

2. Automated Alerts in Real Time vs. Manual Intervention

Current systems: Frequently provide photos or video that security staff must manually examine, which causes risks to be addressed later.

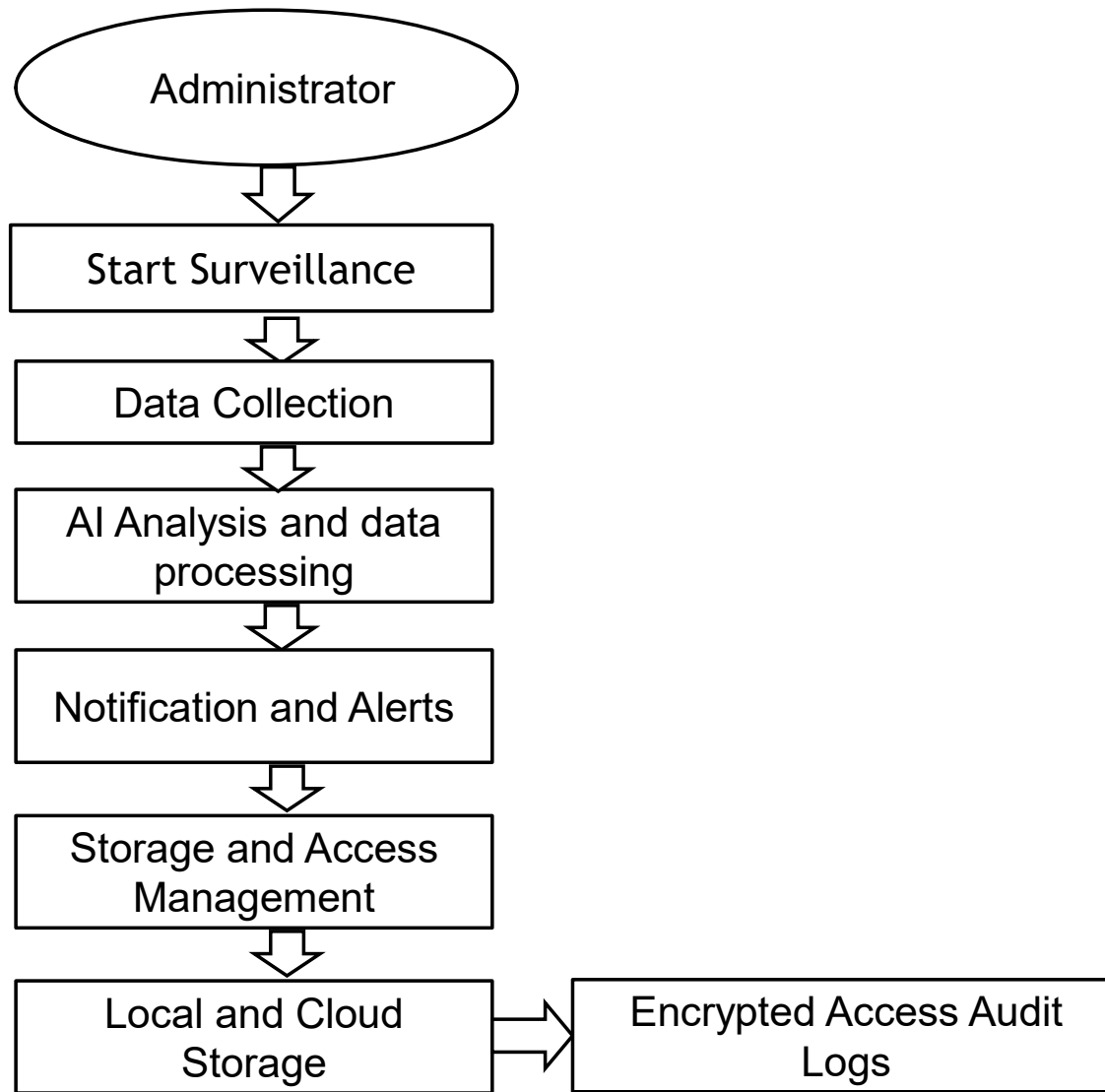
Intelligent system: provides automated answers and real-time notifications. For instance, the system can instantly notify the owner or security team using a mobile app if it detects an intruder. In some situations, it can also automatically sound an alarm or turn on additional security measures (such as locking doors or turning off particular devices).

3. Storage in the Cloud and Remote Access

Current systems: frequently use local storage, like hard drives or DVRs, which can have limited capacity or be vulnerable to theft.

Intelligent system: stores information in the cloud, making it accessible remotely on any device, at any time, and from any location.

Flow diagram of smart surveillance system



How will it be able to solve the problem

1.ISSUE: Excessive False Positive (False Alarm) Rate

SOLUTION:Conventional surveillance systems that use simple motion detection sometimes set off false alarms in response to innocuous occurrences like animals moving, leaves blowing, or changes in lighting.AI-powered video analytics are used in smart surveillance to distinguish between the movement of people, animals, or objects and to modify sensitivity in order to reduce false positives.

2.ISSUE: Slow response times and reliance on human monitoring

SOLUTION:Human operators must constantly watch video feeds in traditional systems, which may be taxing, prone to mistakes, and frequently causes delays in reacting to security concerns.Smart surveillance systems can identify, evaluate, and react to possible security risks in real time on their own. When AI algorithms identify suspect activities, such as a break-in or unusual movement, they promptly alert system owners or security staff.

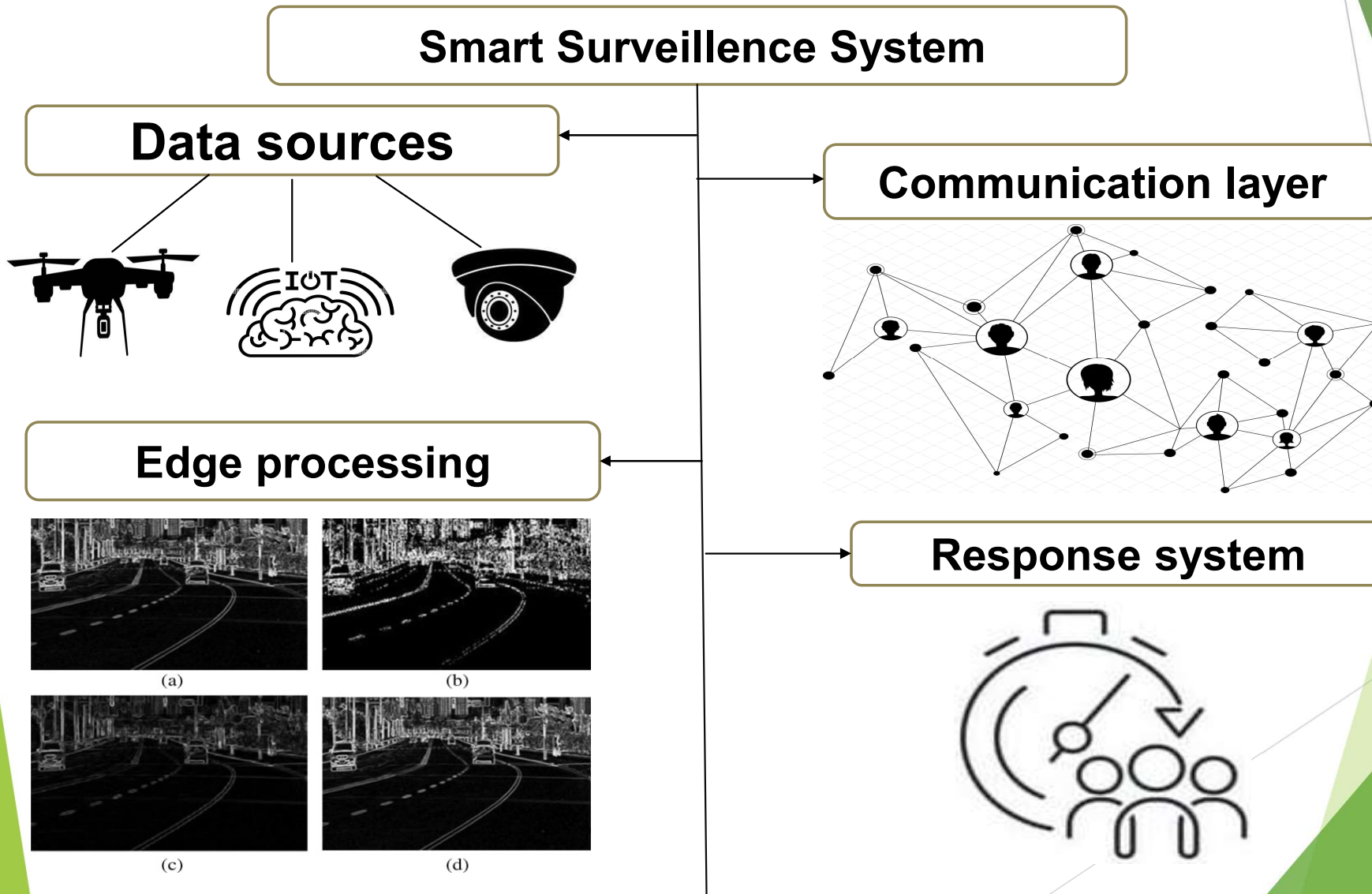
3.ISSUE: Limited Scalability and Coverage

SOLUTION: The infrastructure or camera count of traditional systems may be constrained. Because of this, it might not be possible to cover a lot of ground or several places effectively. Because of their great scalability and flexibility, smart surveillance systems make it simple to integrate new cameras or devices into an existing network.

4.ISSUE: Ineffective Data Management and Data Overload

SOLUTION: Large volumes of video material are frequently stored by traditional surveillance systems, which makes data management difficult. It is ineffective and time-consuming to manually go through hours of video in order to locate a certain incident. AI and cloud computing are combined in smart surveillance systems to process data in real-time, saving pertinent video or sounding an alert only when necessary.

Architecture diagram of the proposed solution



USP of the proposed solution of smart surveillance system

- 1. Automated Warnings & Useful Information** provides immediate alerts for security breaches (via SMS, email, or mobile app). offers comprehensive analytics for predicting threats.
- 2. Astute Cloud & IoT Integration** integrates easily with current access control systems, IoT sensors, and CCTV infrastructure. Secure remote access to surveillance footage is guaranteed by cloud-based storage.
- 3. Behavior Analysis & Facial Recognition** traces movements in limited locations and identifies illegitimate persons. identifies questionable conduct such lingering, hostile acts, or abandoned items.
- 4. Economical & Expandable Solution** Automation driven by AI lowers operating expenses by eliminating the need for manual monitoring. easily expandable to include smart cities, small businesses, and corporations.

Technologies to be used in the solution

1. Technologies for Hardware: High-resolution cameras with motion detection and night vision are known as CCTV and IP cameras.

2. IoT sensors: Infrared, sound, heat and motion sensors for identifying anomalies.

3. Machine Learning & AI Computer vision (OpenCV, TensorFlow, YOLO): For behavior analysis, facial recognition and real-time object detection.

4. Data Storage & Cloud: AI processing and scalable storage are features of cloud services (AWS, Google Cloud, Azure).

5. To safely store: logs, alarms and access control information, use database management software (MongoDB, PostgreSQL, Firebase).

6. Alerts & User Interface: React, Angular, Flutter, and Node.js web and mobile dashboards offer an intuitive user interface for monitoring and management.

7. Security teams: Receive immediate alerts with push notifications from Firebase, Twilio, and WebRTC.