HawkEye: AI-Powered Security Surveillance

Project Report

1. Introduction

Security threats in public spaces are increasing, and traditional surveillance systems rely heavily on human monitoring, which can lead to **blind spots, delays, and missed incidents**. **HawkEye** is an AI-powered security system designed to enhance **real-time threat detection and response efficiency**. By leveraging deep learning and automated alerts, HawkEye provides **proactive surveillance**, ensuring **faster intervention and improved security.**

2. Problem Statement

Security personnel often **monitor multiple screens**, making it difficult to **detect critical threats in real-time**. Traditional surveillance systems only **record footage** but do not actively **analyze** or **alert authorities** when a security breach occurs. This delay in response can lead to **escalated conflicts, property damage, or loss of life**.

3. Objectives

HawkEye aims to:

- Develop an AI-powered surveillance system capable of **real-time threat detection**
- Reduce **response time** for security teams by **sending instant alerts**
- Minimize **human error** in security monitoring
- Improve overall **public safety and threat assessment**

4. System Overview

HawkEye integrates AI-driven **computer vision** with a **web-based dashboard** to provide real-time monitoring and analysis. The system consists of:

- **AI-Powered Threat Detection:** Uses **ResNet50 deep learning model** to analyze video frames and detect anomalies.
- **Web-Based Dashboard:** Developed with **HTML, Tailwind CSS, and Three.js** for real-time incident tracking.
- **Automated Alert System:** Instantly notifies security teams when a threat is detected.

- **Incident Reporting System:** Logs past security events with severity levels (High, Medium, Low).

5. Technology Stack

- **Machine Learning Model:** ResNet50 for deep learning-based **threat classification**
- **Backend:** Flask for **handling video processing, AI inference, and alerts**
- **Frontend:** HTML, Tailwind CSS, Three.js for a **sleek and responsive UI**
- **Database:** PostgreSQL for storing **incident logs and analytics**

6. Challenges Faced

- **Model Training Complexity:** Achieving high precision in **real-world threat detection**
- **Reducing False Positives:** Ensuring AI **differentiates between threats and normal activities**
- **Optimizing Speed:** Maintaining **low latency** while analyzing **multiple video streams**

7. Key Learnings

- **AI enhances security monitoring** by improving situational awareness.
- **Response time is crucial**—early detection prevents **escalation of threats**.
- **A user-friendly interface is essential** for quick decision-making in security operations.

8. Future Enhancements

- **Enhancing Model Accuracy** with larger, more diverse datasets.
- **Integrating Live CCTV Feeds** for real-time threat detection.
- **Expanding Alert Systems** to integrate with law enforcement agencies.
- **Broadening Applications** for use in **crowd management, corporate security, and smart cities**.

9. Conclusion

HawkEye transforms **traditional surveillance into proactive security** by combining **AI-powered threat detection, real-time alerts, and an intuitive dashboard**. This system ensures **faster responses, minimized risks, and enhanced safety** for public and private spaces.

By adopting HawkEye, security teams can **eliminate blind spots, reduce human error, and stay ahead of potential threats**—because when it comes to security, **reacting late is not an option.**