A similar work done (Khadse and Pardeshi, 2016) was is “An Effective Object Detection Video Surveillance and Alert System”

Their proposed system aim gave me some insights for some of my project problem statement. With the aims being;

1. Reducing Storage Space: the system focuses on capturing only the frames containing motion, significantly reducing storage requirements.
2. Enhancing Efficiency: By selectively recording events, the system saves human reviewers time and effort compared to reviewing hours of continuous footage.
3. Alert System: Upon detecting motion, the system triggers an alarm and sends an email notification if internet connectivity is available.

# Introduction

The contribution of traditional first-generation video surveillance systems over the years has been remarkable. Before their invention, it was unimaginable to accurately replay a crime scene days after an event had occurred. The ability to capture such footage revolutionized the legal system in many countries, providing pivotal evidence that could exonerate the innocent or convict criminals beyond a reasonable doubt [1]. As noted by author [2], surveillance cameras have been widely deployed in banks, supermarkets, and parking lots, primarily serving as forensic tools to aid in post-event investigations.

Despite the strengths of traditional video surveillance systems, these systems have traditionally focused more on deterrence than on real-time prevention, as they continuously record scenes regardless of whether any significant activity is present [1]. For real-time intervention in security breaches, constant human monitoring is necessary [3]. This dependence was a consequence of technological limitations in earlier computer systems, which lacked the ability to process video information in real-time.

However, recent advancements in computer vision and artificial intelligence have transformed this landscape. Modern video surveillance systems are now capable of analyzing and interpreting video streams in real time, detecting and tracking objects, identifying abnormal activities, and generating automatic alerts without the need for constant human supervision. These developments significantly enhance real-time security, making continuous manual monitoring unnecessary.

The rise of the internet has also enabled remote surveillance, allowing users to monitor their properties from anywhere. This empowers individuals to respond swiftly to threats and de-escalate situations, even when far from their homes. However, with this increased functionality comes new cybersecurity challenges. Remote monitoring systems are vulnerable to attacks that could lead to video footage leaks or system slowdowns through Distributed Denial of Service (DDoS) attacks. These concerns pose significant privacy risks, especially in indoor settings where unauthorized access to video footage can have severe consequences.

To address these challenges, modern cryptographic techniques, such as RSA-256, AES, and zero-knowledge proof algorithms, provide robust security measures. These advancements ensure that sensitive video data can be securely transmitted and stored, safeguarding user privacy even in a connected world.

This project aims to leverage cutting-edge technologies in computer vision and cryptography to develop a video camera surveillance system using budget-friendly edge computing hardware. The system will offer advanced features such as intruder detection, alert generation, and secure remote monitoring. Designed specifically for homeowners and small-to-medium business owners, this solution will provide a balance between security, privacy, and accessibility, ensuring users can protect their properties without compromising on privacy.

References

[1] S. Abdurrahman, “Smart video-based surveillance: Opportunities and challenges from image processing perspectives,” pp. 10–10, 2017, doi: 10.1109/icitacee.2016.7892400.

[2] H. Sharma and N. Kanwal, “A Survey of Object Detection Techniques for Improving Smart Surveillance,” *Proc. IEEE Int. Conf. Image Inf. Process.*, pp. 603–609, 2023, doi: 10.1109/ICIIP61524.2023.10537696.

[3] S. Agrawal and P. Natu, *ABGS Segmenter: pixel wise adaptive background subtraction and intensity ratio based shadow removal approach for moving object detection*, vol. 79, no. 7. 2023. doi: 10.1007/s11227-022-04972-9.