

AI-powered Smart Surveillance System for Human and Weapon Detection System

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Abstract- The growth of surveillance systems in private places has created a big need for systems that can automatically watch and analyze video feeds as they happen. Traditional surveillance systems mostly rely on people watching the videos all the time which's not very efficient and can lead to mistakes. Security people often have to watch camera feeds at the same time, which increases the chance of missing important events like suspicious activities or threats from weapons. Also old surveillance systems that just look for motion often give alarms because of changes in the environment like light or shadows. These problems show that we need a system that can automatically watch and analyze video feeds in real time.

This paper is about a surveillance system that uses Artificial Intelligence to detect people and weapons. The system uses a model called YOLOv8 to detect people and weapons in real time from many video sources like webcams CCTV footage and recorded videos. The system always looks at the video frames detects objects and identifies activities. It also sends alerts when it finds something dangerous or unusual. This system is better than surveillance methods because it does not need people to watch the videos all the time and it can detect things faster.

The surveillance system has parts including video acquisition, frame preprocessing, object detection, crowd counting and automated alerts. The preprocessing part makes the video frames better so that the system can detect things accurately. The YOLOv8 model then looks at the frames. Finds objects like people and weapons. The system is trained to detect people and weapons which's very important for public safety.

To make the system more useful it also has a hardware alert mechanism that uses Arduino UNO. When the system detects something it sends an alert

stores the information in the cloud and sends an email to the administrator with a picture of the threat. The system also has a web dashboard where the administrator can see what is happening in time and get reports. The cloud database stores all the information about the surveillance.

The system was tested in different situations and it worked very well. It could detect people and weapons quickly and accurately. The crowd counting and suspicious activity monitoring parts made the system even smarter.

The results show that Artificial Intelligence can really improve safety and make surveillance more efficient. The system can be used in places like airports, schools and shopping malls. In the future we can add features, like thermal imaging and facial recognition to make the system even better.

Index Terms—OBJECTIQ, Computer Vision, Artificial Intelligence, Intelligent Surveillance, IoT, MongoDB Atlas, Object Detection, Real-Time Monitoring, Security System, Threat Detection, Weapon Detection, YOLOv8

I. INTRODUCTION

The digital age is here. It is changing everything. Surveillance and security are really important now to keep people safe stop things from happening and protect the things we need. Lots of people are moving to cities. Surveillance and security are becoming essential to make sure we are all safe, in these cities. There is a lot of building going on. We have cars and trucks on the road and cities are getting smarter. Because of all this we really need surveillance systems. These surveillance systems have to watch over public areas and private areas all the time. We need to watch airports, railway stations and shopping malls. They are places where many people

gather. Airports and railway stations are areas, with foot traffic. Shopping malls are also areas we should monitor. We have to keep an eye on these places to stay safe. Surveillance systems are very important, for these places. Schools and colleges, banks and government buildings also need to be watched. So do hospitals, factories and big crowds of people.

This is important to stop things from happening to find people who are acting strange and to react quickly when something goes wrong. That is why we use security cameras and CCTV systems in all these places. They are a common way to keep people safe all, around the world. Although widely utilized, traditional monitoring mechanisms rely on human operators to continuously watch video streams and analyze events manually. Typically, security personnel at the monitoring center are tasked to monitor 10-1000s of cameras simultaneously, while performing constant visual monitoring of video feeds is tedious, tiring and demands tremendous physical and mental efforts.

The result is loss of alertness, fatigue, reduced reaction time and increased error probability, consequently overlooking crucial events or suspicious activities. In most cases, surveillance footage is checked after an event, making it a preventive surveillance system. One of the most significant limitations in traditional surveillance systems is the absence of intelligent analysis of visual information and automatic decision making. Traditional surveillance systems are merely a passive system for storage, in which video footage is simply recorded and later retrieved for checking. Some modern surveillance systems can initiate a recording and trigger an alarm using motion detection algorithms, however these techniques have proven unreliable for their tendency to create excessive false alarms triggered by elements such as variations in light, shadows, rain, moving trees, flying birds, reflections, human and object movement. Such false alarms decrease system efficiency and require unnecessary memory space and effort from the surveillance team. With growing numbers of criminal offenses, illegal possession of firearms, terrorist attacks, robberies, trespassing and public safety threats, the need for more intelligent and automated surveillance solutions has increased, where the surveillance system not only needs to monitor environment, analyze current activity, identify hazardous objects or suspicious behavior and also trigger real-time alarms whenever the system detects a threat.

Such advanced intelligent systems reduce human effort, response time and overall system efficiency. In recent times, advancement of Artificial Intelligence (AI),

Machine Learning (ML) and computer vision technologies has led to the development of advanced intelligent surveillance and automated threat detection systems. With these modern techniques, automated detection of objects and suspicious activity without continuous human supervision in real-time environments is feasible. Convolutional Neural Networks (CNNs), an advancement of deep learning, have shown excellent potential and achieved great success in object detection, object recognition, facial recognition, activity detection, and video surveillance tasks. They allow the computers to efficiently analyze a massive amount of visual data and provide precise decisions.

Object detection is one of the fundamental areas of computer vision that is being implemented into surveillance systems. Object detection is the process in which objects are identified and localized within an image/frame, generally using bounding box and a class label to denote them. Computer vision is really cool. It has been used to make lots of frameworks for object detection since 2010. We have things like R-CNN, Fast R-CNN, Faster R-CNN, SSD which is also known as Single Shot Detector and YOLO which means You Only Look Once.

Some of these methods like Faster R-CNN are really good at detecting objects. They take a lot of time and computer power to work so they are not very good for looking at video surveillance streams, in real time. SSD model improves speed of detection but has drawbacks in the detection of small or partially obscured objects, particularly within a crowd. YOLO models are, however, one of the key object detection models that have shown immense promise for real-time object detection. Instead of considering separate regions of the frame and performing computations individually, YOLO processes the entire frame at once in a single neural network pass; this feature dramatically increases detection speed, enabling real-time detection at high processing rates.

Recently proposed YOLO models such as YOLOv5, YOLOv7, YOLOv8 have demonstrated state-of-the-art performance in terms of both accuracy and speed for various object detection tasks. Amongst all these, YOLOv8 presents a great balance between speed and accuracy, thereby making it suitable for use within a surveillance system. AI-based weapon detection systems are gaining rapid popularity as security is of immense importance at present public environments. Research studies on AI weapon detection have already proved the efficacy of deep learning models in accurate detection of weapons like firearms from surveillance streams at real-

time and immediate alerts during detections to the security authorities. Real-time studies on AI weapon detection models are highly recommending the use of YOLO-based models due to their exceptional real-time speed, accuracy and processing efficiency.

Apart from this, modern surveillance systems not only involve basic detection of objects but also cover aspects such as, crowd detection, suspicious activity analysis, anomaly detection, human detection, threat identification, intruder detection, facial recognition, video analytics, traffic analysis etc. Crowd counting has a key role in management of large public spaces, smart cities and at any public gathering, security in case of events, and emergency response systems for better management of critical situations and human traffic. With the help of IoT devices the above-mentioned modern intelligent surveillance systems are further enhanced. An IoT-based smart surveillance system includes smart software intelligence, physical hardware devices, sensors, alarms, buzzers, LED's and displays which provide a direct response during any emergency. Hardware-based alert systems not only create awareness, but also allow rapid physical response for the critical situation.

Furthermore, the concept of cloud computing has enabled modern surveillance systems to be managed and operated from any geographical location, store enormous amounts of data on a central server, allow real-time syncing of multiple surveillance streams and possess high scalability. All surveillance streams including logs and detection data are stored in the cloud, providing access from anywhere at any time. In spite of all the progress made in the field of intelligent surveillance, there still exist many challenging aspects

A surveillance system needs to accurately detect objects even in non-ideal conditions, like during dark conditions, poor image quality or video stream due to low resolution, blurring effect and so on, all of which can cause errors in the system and decrease the accuracy. The detection of even a simple human or weapon can be challenging in crowded environments or in situations with poor visibility or with occlusions.

The other most pressing challenge in the current generation of surveillance systems is that most of the studies and implementations focus only on object detection algorithms and do not present a comprehensive solution that integrate all the aforementioned intelligent features along with cloud-based data storage and a IoT-based alert and physical response system in a single application. Privacy issues and ethical considerations have become major concerns with the ongoing development of sophisticated surveillance systems. Issues

such as privacy invasion and secure storage and retrieval of the vast amounts of sensitive visual data are a major hurdle to address, necessitating a clear set of rules and procedures governing their use. Scalability, processing efficiency and cost are also some of the major limitations hindering a real-time implementation of these systems.

This paper proposes an AI-powered Smart Surveillance system for human and weapon detection using YOLOv8 and integrated with the cloud platform, IoT devices and deep learning and computer vision technologies. The surveillance system shown is a setup, for smart monitoring. It can understand what is happening and provide alerts and warnings. This system is capable of surveillance. It is a framework.

The proposed system supports multiple input sources including webcam feeds, CCTV footage, RT MP live streams, and recorded video files. Open CV-based video processing techniques are used to capture and preprocessed frames before passing them to the YOLOv8 object detection model. The YOLOv8 model identifies humans and weapons in real time and generates outputs such as bounding boxes, confidence scores, and object labels. The system further performs crowd counting and suspicious activity analysis to improve surveillance intelligence and situational awareness.

To improve practical usability and real-world deployment capability, the proposed system also integrates an Arduino UNO - based IoT hardware alert module consisting of buzzers, LED's, IR sensors, and LCD display units. Whenever a suspicious activity or weapon is detected, the system automatically activates physical alerts, stores detection information in the cloud database, and sends email notifications containing captured threat images to the administrator. A Flask-based web dashboard is developed to provide centralized monitoring, live analytics visualization, user management, alert logs, and report generation functionalities. MongoDB Atlas is used as the cloud database for storing surveillance records, user information, event history, and detection logs.

The main goal of the system is to reduce the need for people to constantly watch things while making surveillance better faster and more efficient when something bad happens.

The new surveillance system is really good because it uses Artificial Intelligence, IoT technologies, cloud computing and real-time analytics together. This makes the system work well and not cost much money. It is a solution for many places like airports, railway stations, schools, shopping malls, industries and cities that want to be safe and smart. The system is also good

for security and smart city applications. It helps these places to be more secure and efficient. The new system is very useful for situations and it makes things better, for everyone.

The remainder of this paper is organized as follows. The next section presents the literature review and discusses existing research works related to AI-based surveillance and weapon detection systems. The proposed methodology and system architecture are then explained in detail, followed by implementation details, experimental results, performance analysis, and system evaluation. Finally, the paper concludes with future scope and potential improvements for intelligent surveillance technologies.

II. LITERATURE REVIEW

Thanks to the rise of urbanization, increasing population density and growing security concerns, there has been a boom in demand for intelligent surveillance systems in recent years. Traditional surveillance systems rely heavily on human supervision to continuously monitor the outputs from CCTV camera feeds. Although traditional surveillance systems are being widely deployed in many areas such as airports, railways, industries, schools, shopping malls and public places, they suffer from various drawbacks which are as follows:

- Dependency on human for constantly monitoring all the CCTV feeds;
- Delay in detection and response due to human fatigue;
- Difficulty in handling large number of camera streams and multiple events;
- Conventional security systems often result in analyzing footage only after a particular event has taken place; and.

To overcome the limitations of traditional surveillance systems, research community started working on designing Artificial Intelligence (AI) and Computer Vision based surveillance systems that could perform automatic monitoring and real-time threat detection. Initial surveillance systems mostly utilized motion detection techniques for detecting suspicious activities in surveillance video. Motion detection technique detects if any activity occurs within the camera frame and generates an alarm or record for the detection.

Motion detection technique is simple, less computationally expensive, and provides higher throughput as compared to traditional method. However, it is unable to accurately differentiate between important and unimportant objects as it creates a huge number of

false alarms due to environmental changes like shadow, lighting variation, weather change, or the motion of any small objects within the frame, and does not identify specific object/person in the scene, thus system becomes unreliable, increases data storage requirement and requires to develop a solution to this issue. Hence, researchers tried to incorporate machine learning and deep learning into the surveillance system for smart object detection and behavior analysis. Deep learning based surveillance systems are currently considered one of the most effective solutions for image processing and object detection applications.

CNN has played a critical role in the improvement of detection accuracy for modern surveillance system. CNN based systems can learn complex features and detect objects even under challenging situations like partial occlusion, background clutter and varying illumination. Studies were carried out by utilizing CNN based models for weapon detection, abnormality detection, face recognition, crowd monitoring and suspicious activity recognition.

The study done by Niranjana J., Mary Dhivya J., and Balamurali A. Published in year 2020 titled "Artificial Intelligence Powered Weapon Detection with Automated Threat Alert System" designed a weapon detection system based on deep learning models to automate the analysis of security video feeds and alert in real-time if any lethal object is detected. They implemented alert systems with email notification and buzzer to alert user and reduce human intervention in critical situations. In this study the transfer learning and data augmentation techniques were proposed to boost model performance under varying environments. It mentioned challenges like false positives, lighting changes, occlusion and necessity of big data.

As stated in this study intelligent surveillance can reduce crime rates at various public places and institutions. They demonstrated that intelligent systems can perform efficient detection than manually based systems and also helped reduce the response time by implementing an alert system with surveillance. However, their work was mostly focused on weapon detection, without presenting a complete end-to-end intelligent surveillance framework including crowd analysis, cloud storage for database management, IoT based hardware alert system and visualization using web module.

Thangavel Murugan et al., performed a comprehensive study and summarized over 100 research articles regarding the AI based weapon detection in security surveillance from the period of 2016-2025. They

included analysis of all types of object detection frameworks, data preparation methods, deep learning models, performance evaluation parameters and practical challenges faced by surveillance systems. From their review it was understood that many of the traditional object detection techniques like Faster R-CNN, Single Shot detector (SSD) and YOLO earlier versions of object detection model was used in weapon detection and surveillance applications. Faster R-CNN technique can perform high detection accuracy compared to traditional method but it has slower detection rate as compared to others and also faces high computation issues which make it less suitable for real-time surveillance. In contrast, SSD performs detection without region proposal and directly outputs detections in one single pass thus speeding up the detection but there might be issues with the detection accuracy when used with low resolution image.

YOLO models were a breakthrough as it performs detection without using region proposal method as they use an end-to-end one-stage framework that predicts bounding boxes and class probabilities directly in a single pass of image, making it very efficient for real-time applications. From the review it was also understood that high values of precision and mean Average Precision (MAP) were recorded for various YOLO based object detection models and these were found to be better for detection as compared to other object detection frameworks. As shown by Thangavel Murugan et al., YOLO based object detection model performed well with MAP score ranging from 78% to 99.5% based on datasets and environments. Modern deep learning models such as YOLOv5, YOLOv7, and YOLOv8 have added significant features that enhance their performance.

The YOLO versions are really good, at object detection now. YOLOv8 model improved its speed significantly making it quite effective for real-time applications along with better small object detection accuracy and multi-scale detection ability. The survey highlighted the efficiency of YOLOv8 for real-time surveillance systems. In their survey, Thangavel Murugan et al., summarized numerous challenges that may affect the performance of AI based surveillance systems such as low light condition, poor camera quality, motion blur, partial occlusion of objects, crowding situation and complex backgrounds which all have detrimental effects on the system's detection accuracy and may lead to an increased false detection rate. Furthermore, the paper discussed several issues that must be considered ethically and from privacy perspective due to presence of

continuous video monitoring in public places. They emphasized the importance of ethical AI implementation and security of data.

The implementation of surveillance system using IoT technology has enabled many real-time features that could help to alert automatically to avoid disaster in situation like fire or theft, such as alarm, buzzer, and sensors along with some output devices like display and speaker and by making a communication system among them to increase awareness about any suspicious activities and reduce dependency on human monitoring for surveillance.

Numerous studies indicated that combining AI with IoT for surveillance applications such as industries, smart city, and safety can improve system efficiency considerably. The use of cloud computing also led to a great extent in the development of surveillance system. The cloud based storing mechanism helped in keeping large quantity of videos or files that are not accessible remotely or at central place. Also, it becomes easier for analyzing data with the help of cloud services such as MongoDB Atlas, Firebase, and Amazon Web Services (AWS) cloud services to process reports, user details and video streams.

However, there are many projects which concentrate mainly on accuracy part and end to end intelligent surveillance system having all components like AI based detection, cloud storage for surveillance data, hardware integration and web visualization for real-time and past surveillance are less. Crowd counting and analysis system are mainly focused on counting humans in surveillance footage and abnormal behavior analysis. There are also several applications which predict suspicious activity in videos.

III. RELATED WORK

Intelligent surveillance has been a very significant area of interest for many researchers from the areas of Artificial Intelligence (AI), Computer Vision, Deep Learning, and the Internet of Things (IoT). Conventionally, surveillance systems have mainly depended upon continuous human surveillance and observation of CCTV camera streams which is computationally tedious and can lead to huge error due to human error. When it comes to situations like airports, railway stations, shopping malls, school and public spaces the security guards usually have to monitor several screens for a very long period which leads to mental strain, concentration issues, increased response time and even failures to spot any suspicious movement instantly. Due to these issues researchers are moving

towards developing intelligent surveillance systems which can perform the threat detection and real time event monitoring in an autonomous way.

Most of the early surveillance systems solely rely on motion detection to detect any suspicious movement or trigger alarms whenever a moving object was detected by analyzing the differences between successive frames. Such methods were easy to implement but were very unreliable because shadows, poor illumination conditions, rain and other weather effects, camera vibration or movement of harmless objects triggered false alarm. Besides that it cannot distinguish between the normal and dangerous activity. Hence researchers went towards more effective and automated analysis with the use of machine learning and deep learning approaches for accurate object detection and threat detection.

The entry of deep learning and Convolutional Neural Networks (CNNs) have really revolutionized the intelligent surveillance systems where CNN models were found to be very effective in automatically extracting important features from images and video frames for the task of object detection. These techniques were further adopted in numerous surveillance applications like weapon detection, anomaly detection, face recognition, suspicious activity monitoring and crowd analysis. Systems that employed CNN models for surveillance had higher accuracy compared to image processing systems especially in crowded areas with complex backgrounds.

One of the influential studies in this field was conducted by Niranjana J., Mary Dhivya J., and Balamurali A. In their paper "Artificial Intelligence Powered Weapon Detection with Automated Threat Alert System." They introduced a novel AI based surveillance system to detect weapons automatically with the help of deep learning algorithms. The system aimed at the detection of dangerous items like guns, knives from the surveillance feeds and alarming for emergency whenever a suspicious item was found with the incorporation of integrated alert system and email services which helps in minimizing the response time and human intervention. The authors discussed the impact of AI based systems in enhancing security at sensitive areas like airports, schools, railway stations and how this system could be of great help in these areas. The system made use of the image classification and object detection techniques of deep learning to detect any kind of weapons in real-time.

The article also emphasized on the importance of transfer learning and data augmentation techniques to gain higher detection accuracy and better model generalization capability by training the model on different weapon datasets and under varying conditions

for robustness. Even though their system was efficient, there were few issues identified such as false positive rate, poor lighting conditions, occlusions and missing partial weapon detections. Additionally, their system primarily focused on detecting weapons and generating alarms; it did not include any features of crowd monitoring, management of database on cloud and a dashboard view.

Another crucial contribution to the field of intelligent surveillance was presented by Thangavel Murugan et al. In their review paper titled "AI-Based Weapon Detection for Security Surveillance: Recent Research Advances (2016-2025)." This review covered a detailed survey on over 100 articles published between 2016 and 2025 that reported on the utilization of AI based systems for weapon detection and surveillance purposes.

The review encompassed various aspects like the advancements in different deep learning architectures and object detection frameworks, the importance of proper dataset preparation and selection, various metrics for the evaluation of the developed systems, the best possible ways to deploy them, and challenges associated with the real world applications. In this review, the authors presented several prominent object detection models including Faster R-CNN, Single Shot Detector (SSD), YOLOv3, YOLOv5, YOLOv7, and YOLOv8. According to them Faster R-CNN possessed a unique region proposal network (RPN) which was very useful in precise object localization and had high accuracy compared to other traditional detection systems but requires computationally intensive resources hence is slow for real-time processing.

Single shot detector (SSD) uses an object detection algorithm in which each bounding box is evaluated only once on the image, this reduces the processing time for each bounding box but they tend to under perform in case of small objects in images. Surveillance systems are supposed to have both speed and accuracy and it was when the YOLO (You Only Look Once) models made a breakthrough in developing extremely fast object detection systems by adopting the non-region proposal based, single-stage architecture. Surveillance systems using YOLO-based algorithms were very fast in detection and can achieve very high accuracy.

Thangavel Murugan et al. Mentioned in their paper that the accuracy of YOLO based systems range between 78% and 99.5% depending on the dataset quality, features of the system and other environmental factors. Recent models like YOLOv7 and YOLOv8 have achieved great performance improvements for the accuracy of feature extraction and object detection. It can

be said that YOLOv8 offers a trade off between accuracy and real time performance. It was also identified by the authors that many researchers work on different datasets and evaluation parameters making it difficult to compare the performances of their proposed systems directly. It was highlighted that many real world applications fail to perform due to issues like low illumination, poor quality videos from CCTV's, poor frame rate due to motion blurring and overlapping objects or humans.

Finally, there have been many efforts to combine the IoT based techniques into these surveillance systems for enhancing the alert mechanism, thereby creating an alert which can be given through an audible buzzer, visual light emitted from LED lights, LCD displays, SMS and email. Some examples of the application of IoT are in building management and smart city applications.

IV. PROPOSED METHODOLOGY

The OBJECTIQ system is a way to watch things and keep people safe. It uses computers to look at pictures and videos in time and find things that might be bad. The OBJECTIQ system is made to reduce the need for people to always be watching cameras, which can be boring and tiring. It can look at cameras at the same time and find bad things like guns or people who are acting strange.

Old systems record video, that is all they do. They do not really help to keep people safe. The old systems need people to watch the cameras all the time. This can be very hard to do because people can get tired of watching the cameras. Old systems like these are not very good, at keeping people safe. Miss things, which is not good. The OBJECTIQ system is better because it can look at video in time and find bad things right away.

The OBJECTIQ system uses computer programs to look at pictures and videos. It can look at things at the same time like people, cars and buildings. It can even look at things that are moving like people walking or cars driving. The system is very good at finding things that might be bad like guns or people who are acting strange.

The system works by looking at video from cameras and finding things that might be bad. It can look at video from cameras at the same time, which makes it very good at keeping people safe. The system is also very good at finding things that are moving like people or cars. It can even look at things that are happening in time which makes it very good at keeping people safe.

The OBJECTIQ system is made up of parts including a computer program that looks at pictures and videos. It also has a program that can look at many things at the same time and find things that might be bad. The system is very good at keeping people safe because it can look at things at the same time and find bad things right away.

The system can be used in places, like airports, schools and shopping malls. It can even be used in cities to help keep people safe. The OBJECTIQ system is very good at finding things that might be bad like guns or people who are acting strange. It can even look at things that are happening in time which makes it very good at keeping people safe.

The OBJECTIQ system is very good at looking at video and finding things that might be bad. It can look at things at the same time like people, cars and buildings. It can even look at things that are moving like people walking or cars driving. The system is very good at finding things that are bad like guns or people who are acting strange.

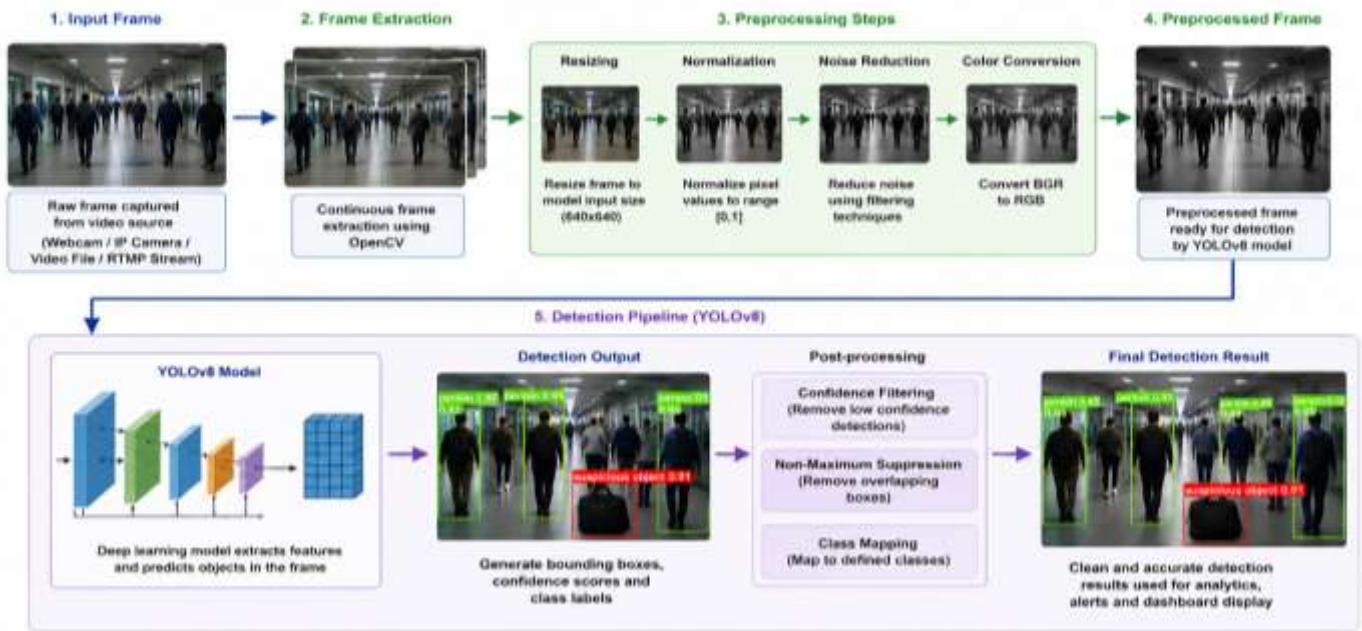


Figure 2: Frame Preprocessing and Detection Pipeline

The system can be used to count people in a crowd, which's very useful for keeping people safe. It can even look at things that are happening in time which makes it very good at keeping people safe. The OBJECTIQ system is very good at finding things that might be bad like guns or people who are acting strange. It can even look at things that are happening in time which makes it very good at keeping people safe.

The OBJECTIQ system is very good at keeping people safe because it can look at things at the same time and find bad things right away. It can even look at things that are happening in time which makes it very good at keeping people safe. The system is very good at finding things that might be bad like guns or people who are acting strange. It can even look at things that are moving like people walking or cars driving. The OBJECTIQ system starts by looking at video from cameras. It can look at video from cameras at the same time, which makes it very good at keeping people safe. The system can even look at things that are happening in time which makes it very good at keeping people safe.

The OBJECTIQ system can look at video. Find things that might be bad. It can look at things at the same time like people, cars and buildings. It can even look at things that are moving like people walking or cars driving. The system is very good at finding things that're bad like guns or people who are acting strange.

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driving. The OBJECTIQ system is very good at keeping people safe because it can look at things at the same time and find bad things right away. It can even look at video that's streaming in real time which makes it very good at keeping people safe. The OBJECTIQ system is very good at finding things that might be bad like guns or people who are acting strange. It can even look at things that are moving like people walking or cars driving. After the system looks at the video it can find things that might be bad. It can look at things at the same time like people, cars and buildings. It can even look at things that are moving like people walking or cars driving. The system is very good at finding things that're bad like guns or people who are acting strange.

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The system uses a computer program to look at pictures and videos. It can look at things at the same time like people, cars and buildings. It can even look at things that are moving like people walking or cars driving. The system is very good at finding things that're bad like guns or people who are acting strange.

The OBJECTIQ system is very good at looking at video and finding things that might be bad. It can look

at things at the same time like people, cars and buildings. It can even look at things that are moving like people walking or cars driving. The system is very good at

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Figure 3: YOLOv8 Detection Output with Bounding Boxes

The OBJECTIQ system can look at video. Find things that might be bad. It can look at things at the same time like people, cars and buildings. It can even look at things that are moving like people walking or cars driving. The system is very good at finding things that're bad like guns or people who are acting strange.

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The system can count people in a crowd, which's very useful for keeping people safe. It can even look at things that are happening in time which makes it very good at keeping people safe. The OBJECTIQ system is very good at finding things that might be bad like guns or people who are acting strange. It can even look at things that are moving like people walking or cars driving.

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The email notification system is made to help people respond to emergencies faster by telling administrators about activities right away. The system sends alert notifications with pictures and details about what happened so security people can look at the situation quickly. Do what they need to do. The system can send alerts on its own, which means people do not have to watch everything all the time and it makes the whole surveillance system work better.

To make the system more useful in life it also uses IoT-based hardware components with Arduino UNO. The hardware part gives alerts when it finds dangerous situations. This helps people know what is happening and respond fast when there is an emergency.

The hardware part has things like buzzers, green lights, IR sensors and a small screen. The Python backend and Arduino hardware talk to each other through communication. When everything is normal the green light is on to show that everything is okay. When the

system finds weapons or suspicious activities the buzzer goes off the red light turns on. It shows warning messages on the screen.

The OBJECTIQ system also uses cloud database technology to manage surveillance data in one place. It uses MongoDB Atlas as the cloud-based database to store detection logs, alert records and other information. This makes the system work better because it can handle data people can access it from anywhere and it stores everything in one place. People can look at detection records and reports later to analyze what happened and for security purposes.

A web dashboard is made with Flask to show what is happening in time and let people monitor everything in one place. The dashboard is the interface where administrators can watch live feeds look at analytics manage alerts and make reports. It shows what is happening in time crowd statistics and system notifications in a way that is easy to understand.

The system can also make reports on its own in PDF and CSV formats. These reports have information about surveillance events, detection summaries and alert history. This helps with documentation. Lets people look at what happened later.

The whole surveillance system keeps working in a loop where it captures video processes it analyzes it and shows it in time. The system is made to be flexible so it can handle features like facial recognition, thermal imaging and edge AI processing in the future. Compared to surveillance systems and other research the OBJECTIQ system is better because it can detect objects fast in real time analyze threats on its own store data in the cloud give physical alerts with IoT and let people monitor everything from a web interface. It combines AI, IoT cloud computing and real-time analytics into one system, which makes it good, for modern surveillance and public safety. The OBJECTIQ system is a way to make surveillance and public safety better. The OBJECTIQ system uses OBJECTIQ framework to make everything work together.

V. SYSTEM DESIGN / IMPLEMENTATION

The OBJECTIQ system is a way to keep an eye on things. It is a surveillance system that can find objects in real time watch crowds look at suspicious behavior and send out warnings automatically. The OBJECTIQ system puts together Artificial Intelligence, Deep Learning, Computer Vision, Internet of Things, cloud computing and web technologies to make a platform for surveillance.

Unlike surveillance systems that need people to watch the cameras all the time the OBJECTIQ system can do it on its own and respond to threats right away. It is better because it uses Artificial Intelligence to find objects store things in the cloud send out alerts and show what is going on in a dashboard.

We have been using surveillance systems in airports, railway stations, schools and shopping malls to watch out for suspicious behavior and keep people safe.. These systems are not perfect because they need people to watch the cameras for a long time. People can get tired not pay attention and not see things away. So we might not catch behavior until it is too late.

New technologies like Artificial Intelligence and Computer Vision have changed surveillance systems a lot. Now we can use computers to find objects and look at videos in a way. The OBJECTIQ system uses these technologies to make a smart surveillance system that does not need people to watch all the time.

The OBJECTIQ system is built using Python because Python is great for machine learning, image processing and web development. It uses YOLOv8 to find objects OpenCV to process images and videos Flask to build the web application MongoDB Atlas to manage the database and Arduino UNO to send out alerts. The system is made up of parts that work well together so it is easy to add new things later. The OBJECTIQ system is designed to reduce the need for people to constantly watch the cameras and to make the response to security threats a lot faster. This is a way to keep people safe. The OBJECTIQ system uses the technologies to do this.

The OBJECTIQ system is an example of how Artificial Intelligence and Computer Vision can be used to make surveillance systems better. It is a way to improve security. The OBJECTIQ system can be used in places, such as airports, railway stations and shopping malls. It can help to keep people safe. It can reduce the need for security personnel to watch the cameras all the time.

The OBJECTIQ system is a way to do surveillance. The OBJECTIQ system has the potential to make a difference in the way we keep people safe. The OBJECTIQ system is really good, at helping us keep people safe. The OBJECTIQ system is a surveillance system that uses the latest technologies to keep people safe. It is a way to do surveillance and it has many benefits, such as reducing the need for people to watch the cameras and making the response, to security threats faster. The OBJECTIQ system is an example of how technology can be used to make the world a safer place.

The OBJECTIQ system is a surveillance system. It uses Artificial Intelligence and Computer Vision to find objects and look at videos. It can respond to security threats faster. It reduces the need for people to watch the cameras all the time. It is an innovative way to do surveillance. The OBJECTIQ system is a great example of how technology can be used to make the world a safer place. It is an innovative way to do surveillance and it has many benefits. The OBJECTIQ system is a surveillance system that uses the latest technologies to keep people safe.

A. System Architecture Design

The OBJECTIQ system is made up of parts that work together to keep an eye on things. This is called the system architecture. It shows how all the different parts talk to each other to make sure the system is always watching and can respond quickly. The system is designed to keep watching all the time process information away work with cloud services and send out alerts automatically. Each part of the system does a job and talks to other parts through a special server.

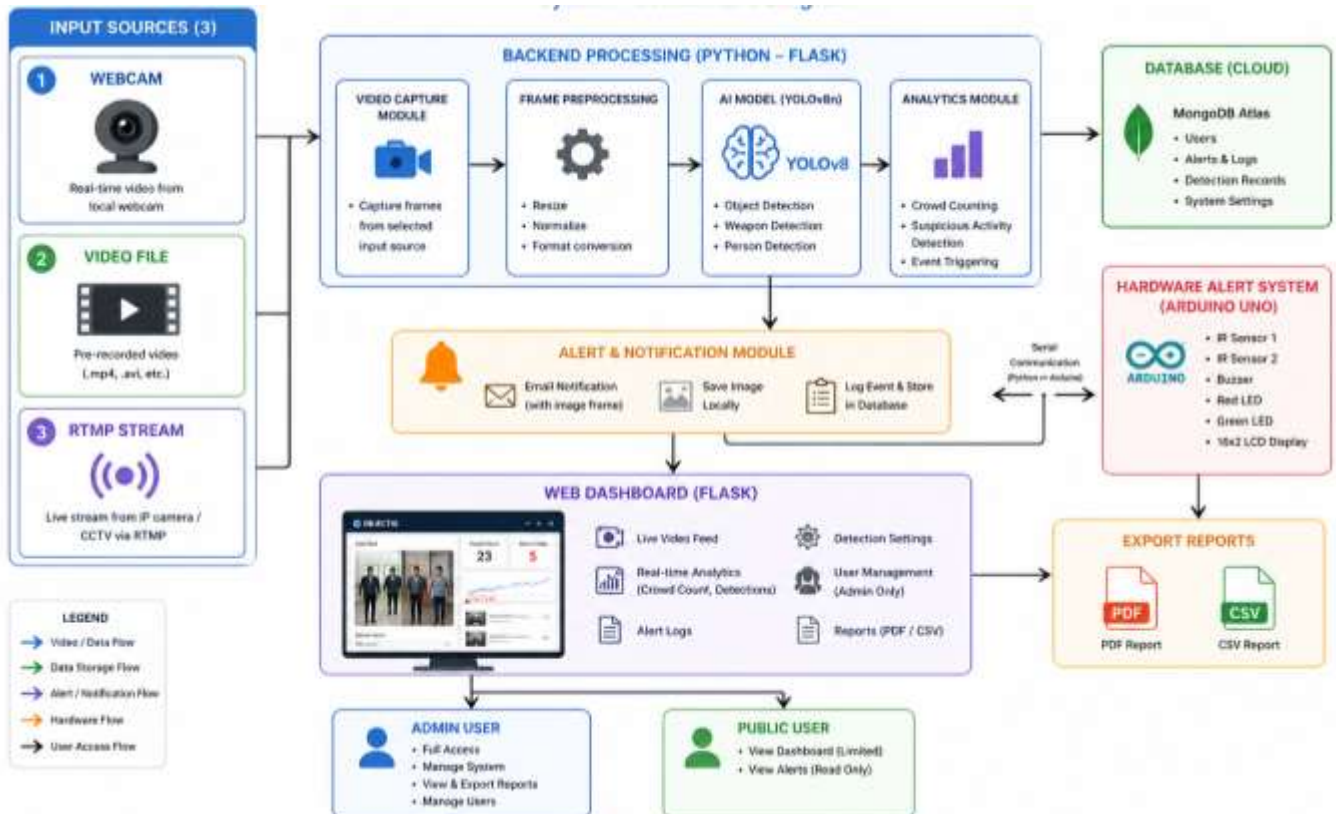


Figure 1.1: System Architecture Diagram

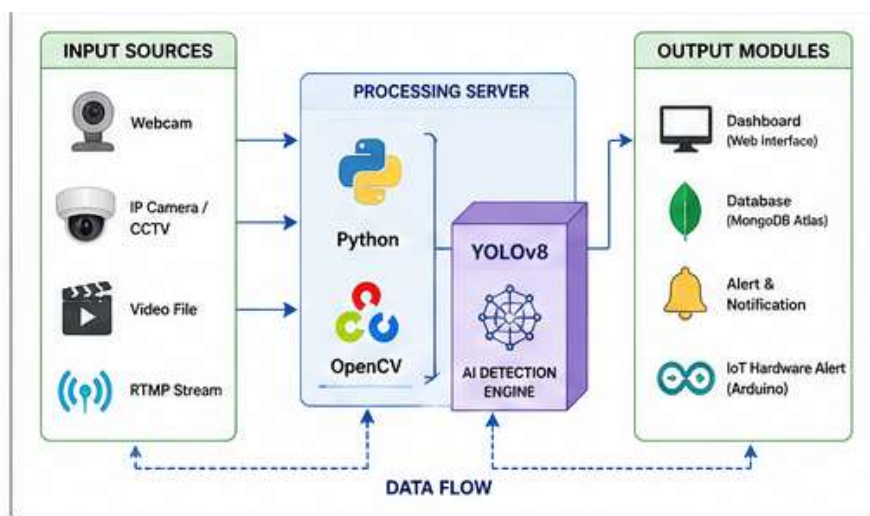


Figure 1.2: System Architecture Diagram

The OBJECTIQ system starts with a part that collects video from many different sources. It can take video from

webcams, video files and live streams from security cameras. This means it can be used in different places from homes to big public areas.

Once the video is chosen another part of the system takes frames from the video all the time. It uses techniques to process the video and get the frames. These frames are then sent to a part of the system that uses artificial intelligence to find objects.

This artificial intelligence part, called YOLOv8 looks at the frames. Finds objects like people, weapons and things that might be suspicious. It then sends this information to another part of the system to be analyzed further.

The analytics part looks at what was found and checks if there are many people if someone is doing something suspicious or if there is a threat. If it finds

something it tells the system to send out an alert. The system then updates the dashboard saves what happened in a database and turns on devices that can alert people.

The system also saves all the information it collects in a cloud database using MongoDB Atlas. It has a dashboard that shows what is happening in real-time using a web interface. This makes it easy to scale up or down and to use in the world.

B. Data Flow Design

The Data Flow Diagram shows how video information moves through the OBJECTIQ system. It starts when the video is chosen and ends when an alert is sent out and saved. The diagram shows how the video is processed and analyzed.

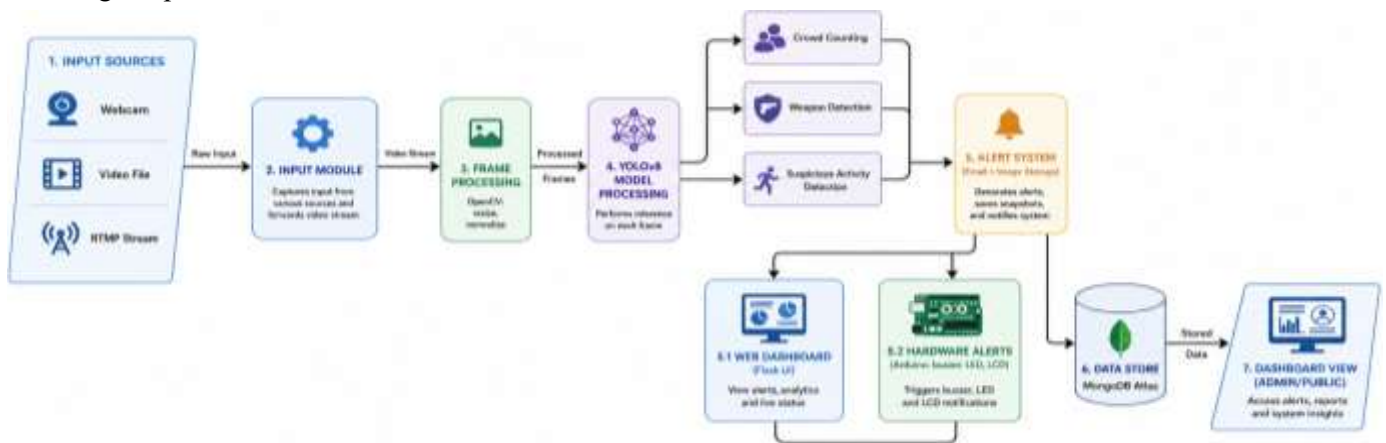


Figure 2: Data Flow Diagram

This system process starts when the user chooses a video source. The video is then sent to a part of the system that takes frames from it all the time. Before the objects in the frames are found the frames are prepared to make sure they can be analyzed correctly.

The prepared frames are then sent to the intelligence part, which is powered by YOLOv8. This part finds objects. Sends the information to many other parts of the system.

The analytics part looks at what was found and checks, for activity. If it finds something it sends out an alert and saves what happened. All the information is

saved in a database using MongoDB Atlas so it can be looked at later.

The Data Flow Diagram shows how all the parts of the system work together to keep watching and respond to threats.

C. UML Design

The OBJECTIQ system uses Unified Modeling Language diagrams to show how different parts work together. These diagrams help us understand how users interact with the system what the system can do and how different parts talk to each other.

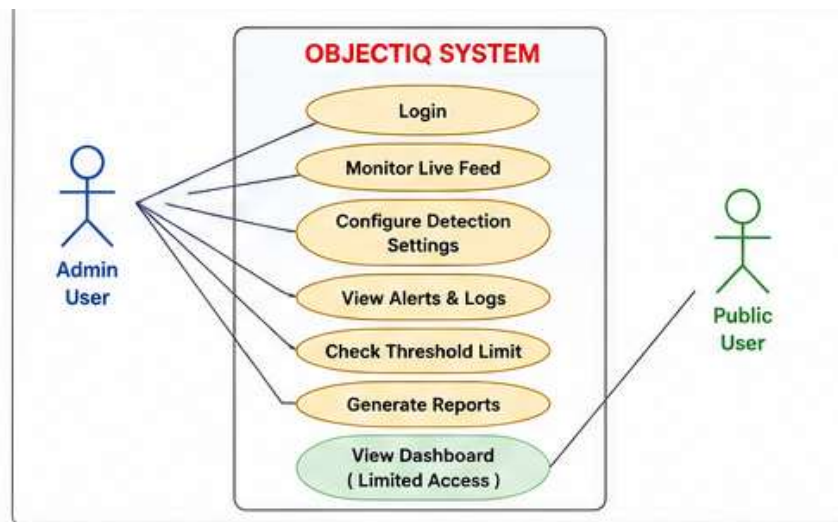


Figure 3: UML Use Case Diagram

The OBJECTIQ system has two kind of users: the Admin User (have full access) and the Public User (have only read access). The Admin User is in charge of the system and can do things like watch live surveillance videos change detection settings manage user accounts look at alerts and logs check how many people are in a certain area and make reports. The Admin User takes care of the system. Makes sure it is secure.

The Public User can only look at some information on the dashboard. See some surveillance alerts. This user cannot change any system settings or surveillance configurations.

The UML design helps us understand how the system works and how users interact with parts of the OBJECTIQ system.

D. Software Implementation

The OBJECTIQ system is built using modern technologies that work together. Python is the programming language used because it works well with machine learning, image processing and web development tools.

The system uses OpenCV to process images and videos like taking out frames getting the video streaming video in real time. YOLOv8 is used to detect objects in the surveillance videos because it's fast and accurate. The YOLOv8 model is trained using pictures of people, weapons and other things related to surveillance.

When the YOLOv8 model looks at the surveillance videos it tells us what it sees, how sure it is and where the objects are. The Flask framework is used to build the backend of the system and to help different parts talk to each other. Flask helps with streaming video

talking to the dashboard working with the database checking who the users are and sending alerts.

The system also sends emails automatically when it detects something dangerous. This helps the people, in charge respond quickly. Does not require them to always be watching the surveillance videos.

E. Dashboard Design

The OBJECTIQ dashboard is a web-based interface that helps monitor the surveillance system. It shows everything in one place. Lets administrators control the system. They can use it to watch surveillance see detection analytics and check system alerts.

The dashboard shows us live video feeds with the things that the YOLOv8 model finds. It does this in time. The YOLOv8 model is what helps the dashboard find these things. We can see what the YOLOv8 model finds on the dashboard. OBJECTIQ shows bounding boxes. Object labels right on the video frames. This helps administrators observe surveillance activities efficiently. The OBJECTIQ dashboard also provides crowd counting statistics, alert notifications, detection history logs and system status updates.

OBJECTIQ is built using Flask, HTML, CSS and JavaScript. This ensures interaction, between the front-end and backend modules. The backend processing server continuously sends real-time updates to the OBJECTIQ dashboard interface. This enables surveillance visualization and analytics monitoring.

F. Database Design

The OBJECTIQ database design focuses on storing and managing surveillance information. OBJECTIQ uses MongoDB Atlas as the cloud-based database. This is because MongoDB Atlas provides

scalability, centralized access, remote monitoring capability and flexible document-based storage.

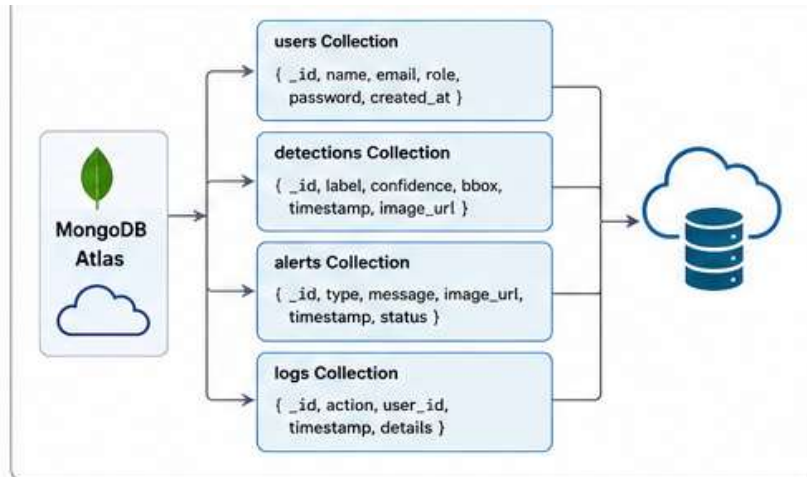


Figure 5: MongoDB Database Structure

The OBJECTIQ database stores types of surveillance-related information. This includes user records, detection logs, alert history, event details crowd statistics and system settings. Detection records generated during surveillance monitoring are stored continuously. They can later be retrieved for analysis and report generation.

The cloud database integration improves accessibility. It enables administrators to access surveillance records through the OBJECTIQ dashboard interface. The centralized storage architecture also improves scalability. It supports deployment across surveillance environments.

G. Hardware Implementation

The OBJECTIQ system uses devices to give us warnings when something suspicious is happening. These devices are connected to a computer called Arduino UNO. They talk to each other in a way. The devices use this language to communicate with the Arduino UNO computer. This helps them exchange information with each other. The Arduino UNO computer is, like a brain that helps them talk to each other. The devices and the Arduino UNO use this language to send and receive messages. They also talk to the Python backend.

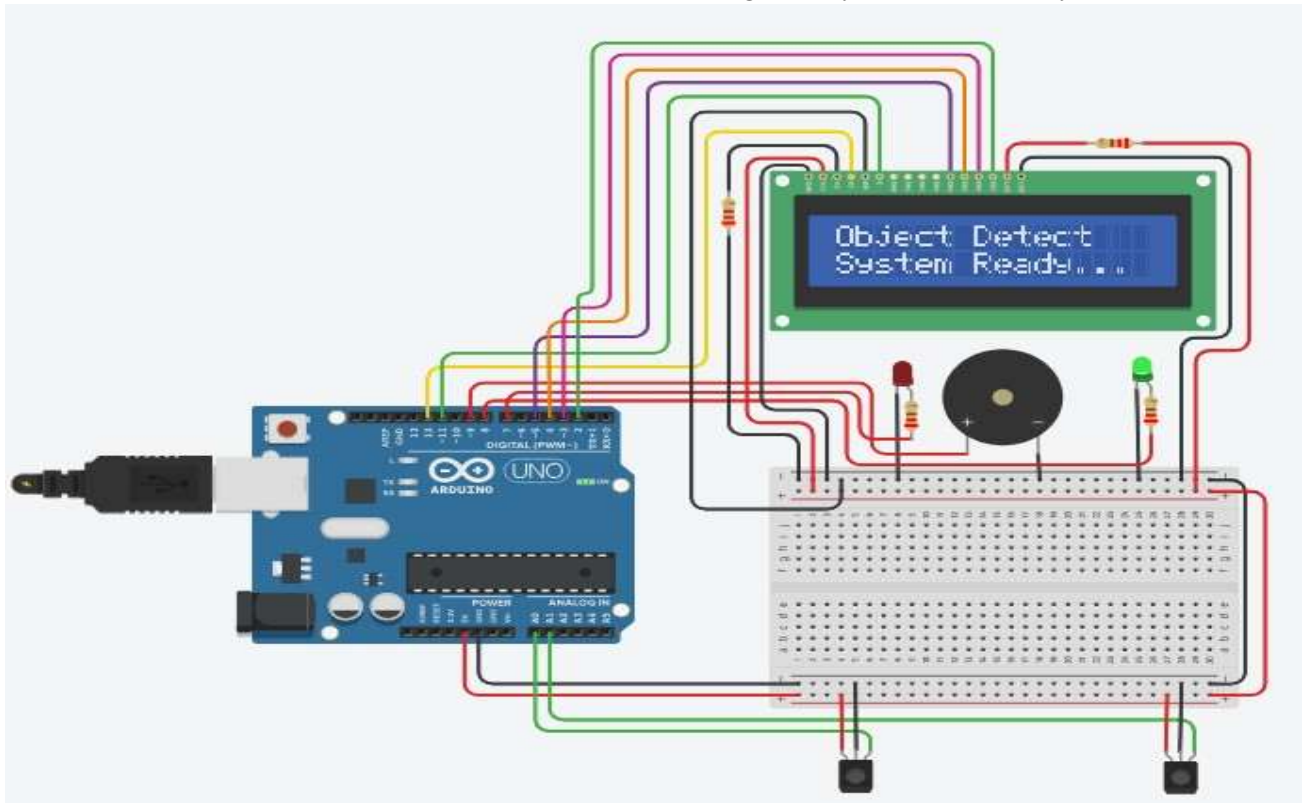


Figure 6: Hardware Alert Module

The devices include sensors that can detect movement speakers that can make noise, red and green lights and a small screen that can display messages. When everything is okay the green light is on. When the OBJECTIQ system detects something like a weapon it sends out a warning.

The OBJECTIQ system uses the speaker to make a noise and the red light turns on. A message appears on the screen. This helps us know what is going on. We can

respond quickly to the OBJECTIQ system warnings.

H. Report Generation Module

The OBJECTIQ system can also make reports automatically. These reports are, like papers that tell you what went on when someone was watching something. They can be saved on your computer as PDF or CSV files. They include things like summaries and statistics and logs.



Figure 7: Generated Surveillance Reports

Making reports automatically helps us keep track of things. It makes it easier for people in charge to look at the reports and make decisions. We can use these reports

Advantages of the Proposed OBJECTIQ System

The OBJECTIQ system is better than ways of doing surveillance. It uses intelligence to detect objects and special devices that can connect to the internet and storage and web technologies.

All these things together make a system that can watch things automatically and respond to threats quickly using the OBJECTIQ system. The OBJECTIQ system can detect objects in time. It can process information quickly. It does not need people to watch it all the time.

The OBJECTIQ system can take video from sources. It can be used in different places. The special devices that give warnings help us respond quickly when something suspicious is detected by the OBJECTIQ system. The storage system used by the OBJECTIQ system is online. It can store a lot of information. This makes it easy to manage surveillance from one place using the OBJECTIQ system. We can access it from anywhere. The dashboard is, like a control panel that shows us what is going on in time. It is easy to use.

to investigate things that happened to analyze what is going on and to make our security better using the OBJECTIQ system reports.

The OBJECTIQ system is made of parts that work together to make surveillance easier and more effective using the OBJECTIQ system.

VI. RESULTS AND DISCUSSIONS

The proposed OBJECTIQ – Intelligent Object Detection System was successfully developed and tested as an intelligent AI-powered surveillance framework capable of performing real-time object detection, crowd monitoring, suspicious activity analysis, automated threat alert generation, and IoT-based hardware response. The system integrates Deep Learning, Computer Vision, cloud technologies, and embedded hardware components into a unified surveillance platform. Experimental evaluation and practical implementation demonstrate that the proposed system performs effectively in detecting humans, weapons, and suspicious activities from live surveillance video streams.

The OBJECTIQ system was made using Python and other tools like OpenCV, YOLOv8, Flask, MongoDB Atlas and Arduino UNO. We used the YOLOv8 model

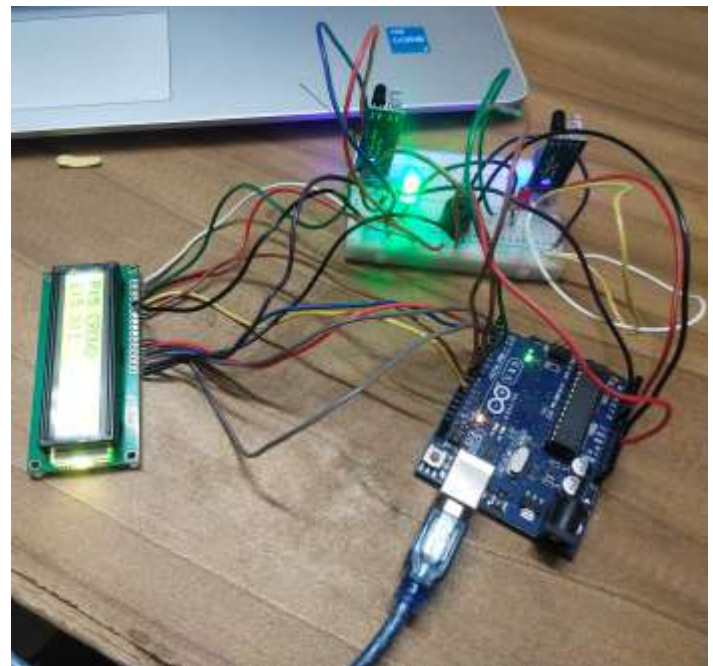
for detecting objects because it's really fast and good at finding things in real time. The OBJECTIQ system was tested with lots of video sources. We tried it with webcam feeds, -recorded surveillance videos and live streams, from IP cameras. The OBJECTIQ system worked well with all these sources, which shows that the OBJECTIQ system is flexible and can be used in situations.

The experimental results show that the proposed OBJECTIQ system can successfully detect multiple objects simultaneously within real-time video frames. The YOLOv8 model accurately identified humans and weapons under different environmental conditions including crowded scenes, indoor environments, varying lighting conditions, and partially occluded objects. The detection results generated by the system included object labels, confidence scores, and bounding boxes surrounding the detected objects. The system can detect things in time which is a big deal. The YOLOv8 model can look at surveillance videos fast and still find objects accurately. It can find people in one video frame and update the crowd count on the dashboard. The system can also find objects and weapons right away which is really important for keeping people safe.

The crowd monitoring part of the system works well when it is used indoors. The crowd monitoring part of the system can count how many people are in the area. Then it shows the numbers, on the dashboard. This is what the crowd monitoring part of the system does. This can be used in lots of places like malls, train stations, schools and cities to keep people safe. It helps figure out how many people are in a place, which's important in case of an emergency.

The system can also detect activity, like weapons. When it finds something it sends out an alert and activates the emergency response system. During testing when a weapon was found the system sent out an alert away and turned on the response system. This means people do not have to watch the videos all the time and it helps respond to threats. One of the things about the OBJECTIQ system is that it combines internet-connected hardware with artificial intelligence. The Arduino UNO hardware talks to the Python backend using communication. When something suspicious is found the system turns on a buzzer, a light and shows a warning message on the screen. It also updates the dashboard at the time. When everything is normal a green light is on which means the system is working safely.

The OBJECTIQ system is really good, at detecting things and keeping people safe. It uses the



YOLOv8 model. Crowd monitoring to do this. The system is also connected to the internet, which helps it work better.

Figure 1: IoT - Based Hardware Alert Activation

The successful integration of hardware alerts improved the practical applicability of the proposed system for real-world deployment. Unlike conventional surveillance systems that only display warnings on computer screens, the OBJECTIQ system provided immediate physical alerts that can help security personnel respond quickly during emergency situations. The hardware alert mechanism also demonstrated the effectiveness of combining Artificial Intelligence with embedded systems and IoT technologies for intelligent surveillance applications.

The Flask-based dashboard interface performed efficiently during real-time monitoring operations. The dashboard displayed live video streams with bounding box annotations generated by the YOLOv8 detection engine. Detection statistics, crowd counts, alert notifications, and surveillance logs were updated dynamically through the web interface. The dashboard also provided user authentication, surveillance monitoring controls, and report generation functionalities.



Figure 2: OBJECTIQ Dashboard Interface

The dashboard interface improved overall usability of the surveillance system by providing centralized monitoring and analytics visualization. Administrators could monitor live surveillance feeds, access stored detection records, review alert history, and generate reports directly through the dashboard interface. Public users were provided limited viewing access, while administrative users had complete control over surveillance operations and system configurations.

MongoDB Atlas cloud database integration was successfully implemented for centralized storage and management of surveillance data. Detection logs, alert records, crowd statistics, user information, and event history were stored within the cloud database. The database architecture improved scalability and enabled remote access to surveillance records. The system demonstrated stable communication between the Flask back end and MongoDB Atlas during continuous surveillance operations.

The report generation module also performed successfully during testing. The system generated surveillance reports in PDF and CSV formats containing detection summaries, crowd statistics, alert logs, and event history. These reports can be used for future surveillance analysis, security investigations, and administrative documentation purposes.

The overall performance of the YOLOv8 model showed significant improvement compared to traditional surveillance approaches discussed in the literature review and related work sections. Earlier surveillance systems

mainly relied on motion detection algorithms that generated multiple false alarms because they could not differentiate between harmless movement and dangerous situations. In contrast, the proposed OBJECTIQ system used deep learning-based object detection capable of accurately classifying objects and reducing false alert generation.

The YOLOv8 model is really good at detecting objects in time. It does a job than older models like Faster R-CNN and SSD. The YOLOv8 model can detect objects quickly. It is very accurate. This is because it uses an architecture that can look at a whole picture at once. This makes it good for using in time.

The YOLOv8 model works well in situations. It likes it when the lighting is good and it can see everything clearly. The YOLOv8 model is great, at detecting people because they are usually easy to see. It can detect people accurately even when there are a lot of them. However the YOLOv8 model sometimes has trouble when the picture is not very clear. It can get confused when it sees objects or things that are hidden. The YOLOv8 model does not like it when the camera is not very good. It likes quality cameras that can take clear pictures.

The experimental observations also highlighted several practical challenges associated with intelligent surveillance systems. Poor lighting conditions, motion blur, object occlusion, and low-quality CCTV footage affected detection consistency in certain situations. Small weapons partially covered by clothing or environmental

objects were comparatively more difficult to detect than fully visible objects. These limitations are similar to challenges discussed in the reference papers related to AI-based weapon detection and intelligent surveillance systems.

Despite these challenges, the proposed OBJECTIQ framework demonstrated strong overall performance for intelligent surveillance applications. The integration of AI-based object detection, cloud storage, IoT hardware alerts, and web-based monitoring created a complete surveillance ecosystem capable of real-time monitoring and automated threat response.

The proposed system also demonstrated high modularity and scalability. Because the architecture is modular, additional functionalities such as facial recognition, thermal imaging, anomaly detection, edge AI deployment, or advanced behavioral analysis can be integrated in future versions of the system. The framework can also be extended for smart city surveillance, traffic management, industrial monitoring, and public event security applications.

The results obtained from the OBJECTIQ system validate the effectiveness of YOLOv8 for real-time intelligent surveillance applications. The proposed system successfully reduced dependency on manual monitoring while improving surveillance automation, detection efficiency, and emergency response capability. The integration of AI, IoT, cloud computing, and web technologies into a single intelligent framework demonstrates the practical applicability of the proposed surveillance system for modern public safety environments.

The OBJECTIQ system does a job of finding objects in real time and telling if they are a threat. It can also watch crowds. Send out alerts when something is wrong. The OBJECTIQ system is a solution for places like airports and schools because it helps keep people safe. The OBJECTIQ system can be used in places like railway stations and shopping malls. It is also good for cities that want to be smart and safe. The OBJECTIQ system is very good at helping people respond quickly when there is a problem. The OBJECTIQ system is a solution for many industries. The OBJECTIQ system is very important for safety. The OBJECTIQ system is a choice, for places that need to respond quickly to threats.

VII. FUTURE SCOPE

- **Advanced AI Models:** We should upgrade from YOLOv8n to more accurate models like YOLOv8m, YOLOv8l, or even

transformer-based models for better detection performance.

- **Face Recognition Integration:** We need to add face recognition to Advanced AI Models for identity verification, attendance tracking, and blacklist or whitelist monitoring of Face Recognition Integration.
- **Multi-Camera Support:** The system should be able to handle camera feeds at the same time for large-scale surveillance systems using Multi-Camera Support.
- **Cloud-Based Deployment:** We can deploy the system on cloud platforms like AWS or Azure for scalability, remote access, and centralized monitoring of Cloud-Based Deployment.
- **Mobile Application:** A mobile app is necessary for real time alerts, live streaming, and remote system control of the mobile application.
- **Edge Computing Integration:** We should optimize the system to run on edge devices like Raspberry Pi or Jetson Nano for processing and reduce the latency of Edge Computing Integration.
- **Improved Suspicious Activity Detection:** Advanced AI Models can use behavior analysis and deep learning techniques for accurate anomaly detection of Suspicious Activity Detection.
- **Real-Time SMS/Push Notifications:** The alert system should be extended beyond email to include SMS, WhatsApp, or push notifications for Real-Time SMS/Push Notifications.
- **Data Analytics & AI Insights:** Predictive analytics can be used to forecast crowd trends and detect patterns over time. Enhanced Hardware Integration: More sensors, such as motion, temperature, or biometric sensors, should be added for a comprehensive smart surveillance system of Enhanced Hardware Integration.
- **Security Enhancements:** Encryption, secure APIs, and advanced authentication mechanisms are necessary for data protection of Security Enhancements.
- **Integration with Smart City Systems:** The system should be connected to traffic control, emergency services, and law enforcement for time coordinated response of Integration, with Smart City Systems.

VIII. CONCLUSION

The OBJECTIQ system is really good at detecting things. It uses Artificial Intelligence and Computer Vision to watch what is going on and find problems. The OBJECTIQ system is connected to the Internet. Uses cloud technology. This means the OBJECTIQ system can watch things at the time and send alerts if something bad is happening.

The old way of watching security cameras was not very good. People had to sit and watch the cameras all the time. This was boring. People would get tired. They might miss something. The old system was also slow to respond to problems.

The OBJECTIQ system is better. The OBJECTIQ system can watch the cameras all the time without getting tired. The OBJECTIQ system can find problems. Send alerts. This means that people can respond quickly to emergencies. The OBJECTIQ system is a way to keep people safe. The OBJECTIQ system can watch cameras at the time and find problems before they become big issues. The OBJECTIQ system is a way of doing surveillance. The OBJECTIQ system uses Artificial Intelligence to make things better.

The OBJECTIQ system is very good at finding events. The OBJECTIQ system can do this in time. This means that people can respond to problems away. The OBJECTIQ system is an improvement over the way of doing things. The OBJECTIQ system is a way to keep people safe. The OBJECTIQ system is a way of doing surveillance.

The OBJECTIQ system was made using technologies like Python, OpenCV, YOLOv8, Flask, MongoDB Atlas and Arduino UNO. The YOLOv8 model is the core of the OBJECTIQ system. It is used for object detection. The YOLOv8 model is fast. Can find objects quickly. The OBJECTIQ system can watch cameras at the same time. It can find people, weapons and suspicious objects. The OBJECTIQ system can watch webcams, video files and live streams from IP cameras and CCTV systems.

One of the things about the OBJECTIQ system is that it can detect objects in real-time. The OBJECTIQ system can also analyze crowds. Find suspicious activity. The OBJECTIQ system can count the number of people in a crowd. It can update the numbers in time. This is useful for safety. The OBJECTIQ system can be used in airports, railway stations, shopping malls and schools.

The OBJECTIQ system can also detect activity. If it finds something it will send an alert. The OBJECTIQ system is better than surveillance systems. Old systems record video. The OBJECTIQ system takes action away.

It can send emails update the dashboard and activate hardware devices.

The OBJECTIQ system uses devices. These devices can communicate with the OBJECTIQ system. They can send alerts and warnings. The OBJECTIQ system can turn on lights and buzzers. It can display warning messages on screens. This is useful for emergency situations.

The OBJECTIQ system has a web dashboard. This dashboard is user-friendly. It shows video feeds. It shows detection results. The dashboard is useful for administrators. They can manage the OBJECTIQ system. They can configure settings. Generate reports.

The OBJECTIQ system uses a database. This database is called MongoDB Atlas. It is scalable and secure. The OBJECTIQ system can store detection logs and event history. It can store user records and alert information. The OBJECTIQ system can generate reports in PDF and CSV formats.

The OBJECTIQ system is fast and accurate. It can detect objects in time. The OBJECTIQ system is better than surveillance systems. It is suitable for public safety environments. The OBJECTIQ system can be used in places. It can be used in cities and smart homes.

The OBJECTIQ system has some limitations. It can be affected by lighting and low-resolution video feeds. It can be affected by motion blur and crowded scenes.. The OBJECTIQ system is still reliable. It can detect objects. Send alerts.

The OBJECTIQ system can be improved in the future. It can be integrated with AI technologies. It can be used for recognition and anomaly detection. The OBJECTIQ system can be used for traffic monitoring and industrial automation. It can be used for wildlife surveillance and border security.

The OBJECTIQ system is an example of how Artificial Intelligence can improve public safety. The OBJECTIQ system can reduce security risks. It can improve monitoring efficiency. The OBJECTIQ system can reduce workload. It can increase the ability to respond quickly during emergency situations.

In conclusion the OBJECTIQ system is a time intelligent surveillance framework. It can detect objects and analyze crowds. The OBJECTIQ system can send alerts and warnings. It is an intelligent surveillance solution. The OBJECTIQ system is suitable, for public safety environments.

REFERENCES

1. James Connan, Dane Brown, Marc Marais, and Luke Goodal, "2025. Real- Time Gun and Person Detection for Smart Surveillance". In 2025 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD 2025), November 26–27, 2025, Cape Town, South Africa. ACM, New York, NY, USA, 9 pages. <https://doi.org/10.1145/3759023.3759128>.
2. Niranjana J., Mary Dhivya J., Balamurali A., "Artificial Intelligence Powered Weapon Detection with Automated Threat Alert System," Proceedings of ICSICE, 2025.
3. Thangavel Murugan et al., "AI-Based Weapon Detection for Security Surveillance: Recent Research Advances (2016–2025)," Electronics, 2025.
4. Amit Kumar, "OBJECTIQ – Intelligent Object Detection System," Github repository , 2026.
https://github.com/CsWithAk/Object_IQ.git