

# AI Based Smart Surveillance System

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## ABSTRACT

The AI Based smart surveillance system is gaining huge attention because of rise in demand for safety and security. The surveillance system is designed to analyse the video, image, and audio or any kind of surveillance data automatically without any human involvement. The developments that happened in recent years in the computer vision, sensor devices and Auto ML is playing a keen role in accrediting such intelligent system.

There are many kinds of surveillance and security systems present in the market, but there is no live decision making and predictive analysis surveillance i.e., automated self-decision making system which helps the different public departments like police, health, fire and many more to track and reach the particular location where the incident is happened. In this proposed project we provide the AI based intelligent surveillance and security system which analyses and takes the decision immediately by itself based on the present parametric conditions as per the modules trained by us, It helps in providing the alerts quicker compared to the traditional alert system. The system which is proposed here will react automatically based on the situations occurs as it is trained in various modes. This paper is intending to provide the generalised outline of the AI based smart surveillance system and its functionalities. This paper also consists of information regarding the core processing steps of AI based surveillance system such as tracking, object detection and classification, and behavioural analysis.

Keywords : Artificial Intelligence, Machine Learning, Computer Vision, Predictive Analysis, Object Detection, Behavioural Analysis.

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## I. INTRODUCTION

Now a days, the safety and security is becoming very challenging in modern time society to stop the issues facing by people in their life and also their assets which are valuable from illegal handling. As a result, the personal social safety and security is attaining greater

importance in order to protect the personal information of each and every individual also their day to day activities and valuable things. Large amount of closed circuit security cameras with different modules of sensors, have been designed developed and deployed to monitor the critical infrastructure facilities such as airports, military bases, banking, power plants,

campuses, etc. The monitoring of security cameras in manual mode by human operators is not an efficient solution or even not practical as the human resource is expensive and has limited ability [1]. AI based smart surveillance system is designed to monitor the environment and infrastructure automatically without human involvement. The various monitoring tasks includes the auto detecting and object tracking (like vehicle or human) and analysis of further process and taking necessary actions. The artificial intelligence, image processing, and signal processing, techniques play a crucial role in developing such intelligent and smart system.

Artificial intelligence for video surveillance uses computer programs that analyses images and audio from video surveillance cameras to identify people, vehicles, objects, attributes, and events. The AI program works with the help of computer vision. Computer vision is a set of mathematical methods or algorithms that work like a series of questions or flow chart to differentiate the viewed object with the thousands of reference pictures of people in angles, poses, movements and positions which are stored.

## II. REVIEW OF LITERATURE

Much research has been done in the development of this AI-based intelligent surveillance system and some of this literature is reviewed in this section. Examples of surveillance systems previously studied or developed to have intelligent or automation capabilities: VSAM (Abbreviated as video surveillance and monitoring), PRISMATICA (Abbreviated as proactive integrated systems for security management through institutional technological support and communication), ADVISOR (video digitally annotated for intelligent monitoring and optimized recovery). Fig. 1 shows the general description of the PRISMATICA technology proposed and implemented to improve the safety of passengers in the transport system of public vehicles. It consists of many main elements like

intelligent camera system, camera network (existing CCTV), audio surveillance, transmission system, operator and the main server (MIFSA) also.

AI based smart and intelligent surveillance system solves all the problems inherent in video surveillance. It uses computer vision and sensors to detect what is happening and what should be done about it. All this happens in real time and saves money. Detect, prevent and report intruders when they are imminent.

The main intention of this document is to give an detailed overview of the smart surveillance devices and to review the current existing systems for each of its processing steps.

The overview of the AI-based intelligent surveillance system

A large number of security cameras, the intelligent surveillance (ISS) is a system that has the intelligent ability to analyse the surveillance data automatically and take required actions which are necessary such as generating alarms or warnings. ISS is an multi-disciplinary subject that includes computer vision, electronics (sensing), machine learning (artificial intelligence), and pattern recognition, communication, networking and other areas. The ISS is compatible to make it implemented in various applications and different environments.

Some typical applications are listed below.

- Home security and intrusion detection.
- Home care and security.
- Public transportation places, like bus/train terminal, seaport, airport etc.
- Public area, such as university, campus, government building.
- Traffic monitoring.
- Crown management and analysis.
- Pedestrian detection and autonomous car.
- Military remote surveillance,
- border surveillance
- Perimeter surveillance for headquarters,
- corporations, etc.

### III. EXISTING SYSTEM

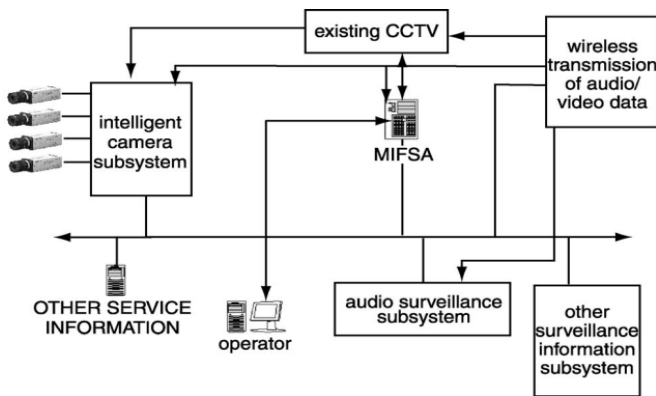


Fig. 1. An overview of PRISMATICA system

- In the evaluation of PRISMATICA machine, here we have the Another staggering surveillance machine named DARPA ARGUS-IS (The Autonomous real time ground ubiquitous surveillance imaging system). With one point eight (1.8) Giga pixels video machine, ARGUS-IS is capable to auto-tune every moving targets with in a range of forty kilometres (equal to the size of small city) the usage of individual platform. The availability of such commercialised ISS products are DETER (detection of events and activities for threat evaluation and recognition) and DETEC AS ([www.detec.no](http://www.detec.no)). Intelligent surveillance machine may also plays a major role in safety and security in private as well as the public domains. However, it is highly complicated due to few sensible issues such as
- Performance: which includes the machine accuracy
- Robustness: the machine ought to be sturdy, again the regular issues includes illumination variation, occlusion, clutter, climate change, camouflage, etc.
- Reliability
- Real time constrain: the machine should quick enough to respond.
- Low price (Cost effective)

### IV. PROPOSED SYSTEM

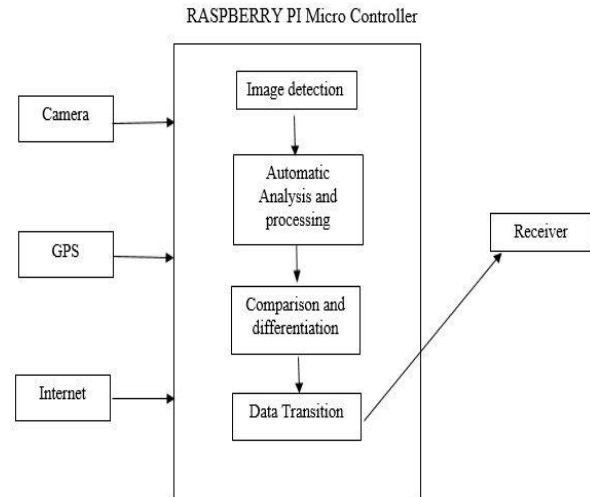


Fig. 1. The schematic diagram of proposed system

In the proposed machine system first the digital camera (digicam) captures the video and constantly transmits the information to the microcontroller. Here the microcontroller is trained with several video modules which includes numerous situations like accidents, thefts, harassments etc... Once the controller gets the information from the digicam it continuously analyses the information initially and process it based on the video type and pixel rate to make the video format supported for the next steps. After processing the information, the data acquired by the system is compared with the trained data modules to differentiate the scenario according to them. After differentiation the information is transmitted to the receiver stating that the particular situation such as theft accident or harassment is happened in the specific place. The place is detected using the GPS Module integrated with the micro controller.

## V. RESULTS

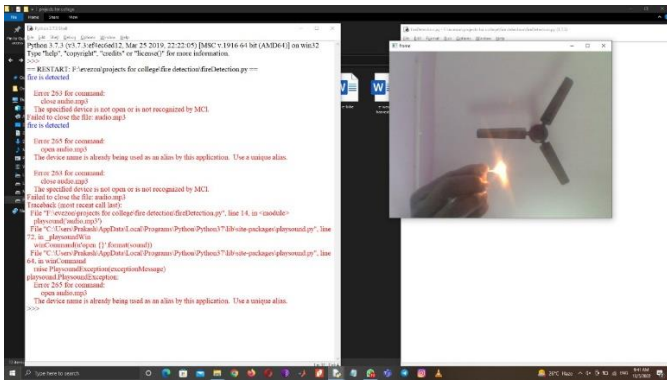


Fig 3. The system detecting the fire and sending alert to the receiver

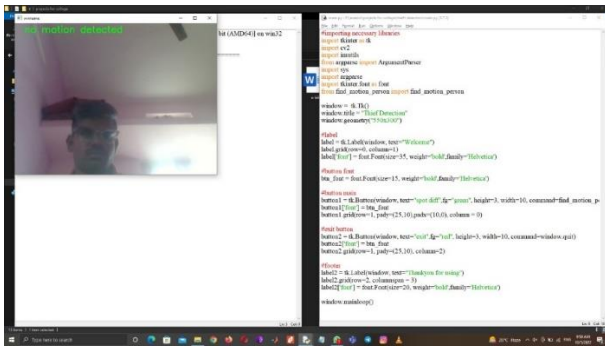


Fig 4. The system detecting the motion of the people

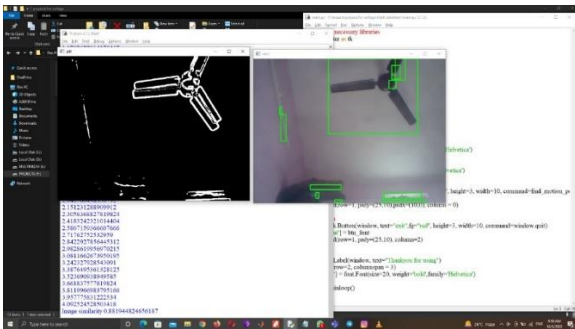


Fig 5. Analysing the positions of the equipment for detecting the robbery

## VI. CONCLUSION

In this paper, the general overview and evaluate of the surveillance systems has been presented. Such intelligent devices are promising to be carried out in numerous environments and applications. This paper additionally has mentioned a few feasible sensor modalities and their fusion situations to enhance the

machine performance. Numerous strategies were proposed to address numerous primary processing steps like background-foreground segmentation, item detection and classification, monitoring and behavioural evaluation. extraordinary aggregate of sensor modality ought to be explored to make the machine sturdy or to simplify the processing system. Current research in behaviour evaluation are nonetheless thinking about simplified scene, and therefore extra practical and complicated scene ought to be investigated. With reducing rate in sensor and processing devices, researchers ought to additionally remember investigating and growing a low value wise surveillance machine.

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