AUTOMATIC THREAT DETECTION AND RESPONSE SYSTEM (ATDARS)

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Abstract-

There exist many types of threat detection and response that includes manual and automated systems, each having some disadvantage and advantages. A new system is proposed to enhance the security and safety of the men, machines and the material and the citizens as a whole. This paper proposes an integration of several components which makes the system more accurate, efficient and fast. It is proposed that the system will prove to be a boon to security agencies for detecting vehicular movement and provide security mechanism in case of suspicion. The necessary automated actions like alert and barricade actions will be automatically taken to immobilize the suspicious vehicle.

Keywords—*Automatic cordon system, Video Processing system, Vehicle detection, Alert system, passcode*

I. INTRODUCTION

In the recent past lot of terrorist attacks leading to loss of men and material have been witnessed, all these attacks were planned to disrupt the normal life of the people. Government has taken number of proactive and reactive measures to mitigate such attacks, however, they occur. Target of such attacks is state and central government offices, defense installations and movement of troops as witnessed, common facilities or infrastructures like bridges, road and railway. These attacks are not only of concern to the state and central police, but, are also a matter of great concern to the country as a hole. The authors of this paper work in this area, whereby, a system is designed to provide proactive secure measures. There exists manually or semi-automatic systems, but, these systems requires a laborious approach in coordinating an activity. The technology here we are talking about would require integration of several different types of systems which work intelligently in a coordinated environment. A metal detector system [11] is a huge part of our lives these days, they can be seen almost at every public places. They consist of basically two systems, "hand-held" or "a walk through" the same mechanism can be extended to detect the metallic object movement over the road. Though, the hand held and walk through for smaller objects are worth and are in use, but, installing them to detect vehicular movement will tend to be huge and quite heavy. So, the modified system for such environment will work fine. This system as a whole would provide the information about the vehicle on the road and the individual travelling on it and take necessary actions. This lead us to define the problem statement.

A. Problem Statement

As there are parallel agencies working to destabilize the democratic set up of the country. The threats that may come is from internal and external sources, their main is to obstruct the normal functioning and to damage the system infrastructure. Also, there is limited reference on the integrated system approach that would work without or minimum human intervention. It thus becomes necessary to be proactive in our approach for mitigating such threats and take steps before something very serious and untoward can take place. So the relevance of the paper for the above problem is justified.

B. Existing System:

The system in place that are found, are all using manual checking and gating system [11]. Also hand-held and walk through security systems are commonly used at public places for general use. Manual in-out entry system is also in force at many installations. Intelligence reports are gathered and security loosened or tightened. Biometric system is in place for the employees, card system and password [9] system also are being used by many organizations. Alert system [1][5-8] of different types in the form of text pop-up, light indicators, siren

are also used. Video capturing and processing tools [3-4] for vehicular identification [10] are also used for critical applications.

For our problem statement, a more complex system involving a combination of technology like video processing, sensory system, vehicular movement detection system and alert system would be required. The organized of this paper is as follows. Section I introduces the idea, the problem statement and the systems in use. Section II gives abstracts of the literature used for preparing this paper. Section III gives the methodology of the proposed design. Section IV concludes the paper and finally the reference are given at the end of the paper.

II. LITERATURE SURVEY

Awodele Oludele et. el [11] in their paper "Design of an Automated Intrusion Detection System incorporating an Alarm" describes a system that involves the use of security realms monitored by both human and / or a machine. Their system is a four layers system involving an environmental design, Mechanical and electronic access control, Intrusion detection and a video monitoring. Their system is limited to only the physical security of a room.

Josue Hernandez et.el [3] in their paper have presented movement vectors estimation algorithm for motion detection. The pictures are subsequently filtered to obtain better information about real motion into a given scenes.

in a paper "Automatic Alert Code And Test Generation System [7]", the author have presented a cost effective and timely method of allowing the customer to design each alert, make flight test changes, and maintain the alert data base.

Automatic novel system for sending emergency alert and alarm for multi events through Radio broadcasting transmission system is presented in Perú [8], in this paper the author has presented a proposal on standards for sending emergency messages in via broadcasting via FM Radio and Digital Terrestrial Television ISDB-T, based on the CAP protocol and PLANAGERD, Sending both the same information, creating two redundant broadcast channels and generating greater reliability for sending alerts and emergency alarms.

III. PROPOSED DESIGN

The concept behind the system is that when a suspicious moving vehicle is detected, it will be stopped by our barricading system and it will be checked manually. Any suspicious activity will be notified to the control unit and the rescue unit near to the region threat detection. This system will also collect certain database that would help the agencies to control occurrence of terror attack or crime on the road.

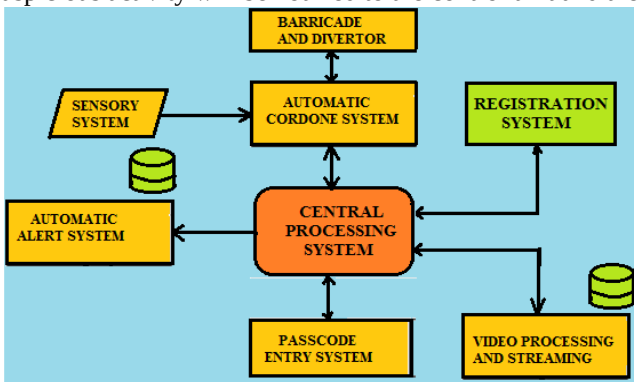

Figure 1: Automatic threat detection and response system

The major elements of the design consist of the registration system, sensory system, automatic cordon system, automatic alert system, passcode entry system, and the video processing and streaming system. The block diagram of the system is shown in figure-1.

A. Automated Cordon System

This is very critical part of the whole system. The use of this system is to cordon off the area either by stopping the unauthorized vehicle entry or forcing it to take a diversion path if available. This unit plays major role in avoiding any untoward incident.

The identification of the vehicle is carried out based on the activation signal received from different sources (i.e. sensors, video capture and streaming system etc.), based on the with these source signals the device made some decision accordingly

The system scans the movement of every known or unknown vehicle passing by the sensory circuits. Idea is to do partial or full scan of every vehicle based on certain parameter or inputs that may already be available with the central system. Thus the system restricts the movement of authorized vehicles and to block or to divert the unauthorized vehicle entry.

B. Alert system

This system uses a microcontroller with communication module for sending the alert message and for activating the siren with the alert light indicators. The alert system will get activated when sensors send the high input via cordon system. We use different levels of threat alert system [7]. The level of threat will define the order of danger. There will be three levels of alert i.e; Level 3 is most critical requiring immediate attention, level 2 be unstoppable suspicious vehicle detected based on its speed and other activity, level 1 is the unknown vehicle detected. Each level is informed by different indicators/signals. System consists of the form of a checklist so as to know the level of alert received [6]. The siren will be activated for the level 3 and 2 threats. Video processing system also provides an alert when suspicion detected in VPU video processing unit. The VPU is initially trained by machine learning mechanism to detect the suspicion objects. Alert system will be robust so that it may work in all weather and other condition. The system is thus able to detect the threat and alert the agencies automatically.

The alert system will get three types of inputs, they are : input from the sensor , input from video processing and manual input. These inputs will be directed and the output will be obtained. There will be three types of output as well, on the basis of the level of threat it poses , they are in the form of messages, indicative lights and the siren etc.

C. Video Processing

Video processing unit is a specialized processor which takes video stream as input and has capability to perform highly complex process on the input stream and it is based

on Machine learning. The use of video processing for the security system increase the probability of detecting and tracking the vehicular like object and human motion with high precision. We use video camera as a Surveillance system for monitoring or recording the images and videos of suspicious object. With the help of machine learning the system adapts to its role and become automatic and reliable after a certain period of training time. The proposed system will serve the purpose of capturing and streaming the video, time.

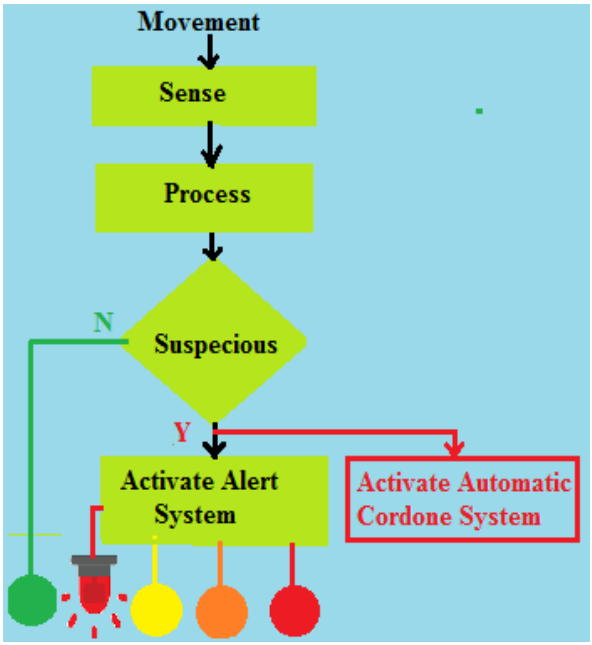

Figure 2: Cordon and alert system

This will help in analyzing the position, time, object and other objects such as humans to be that may be identified for further investigation. Also the processing may identify a moving vehicle by its number plate or other attributes. identified involved On the basis of the inputs provided to the VPU, it is possible to identify a vehicle by its number plate that is scanned by camera, converted to text and matched with the information available with the VPU. This helps in proactive approach for catching the pre-known suspicious object or vehicle.

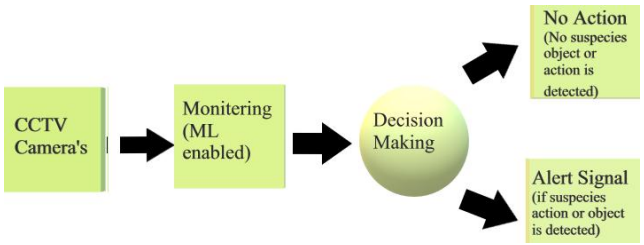

Figure 4: Flow diagram of Video Processing

Thus the steps involved in this process are vehicle detection, extraction of plate region, classification of a vehicle and recognition of plate characters. If the number match with the input number, the automatic cordon and alert system also get activated.

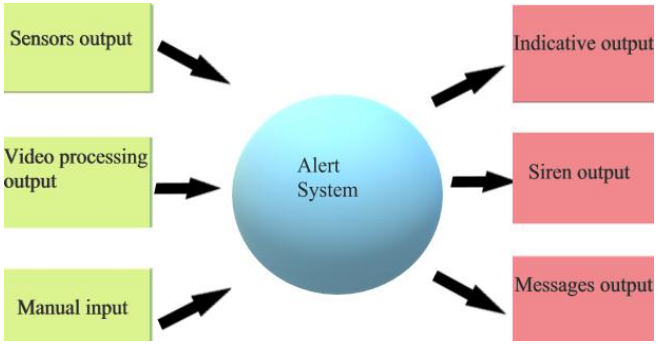

Figure 3 : I/O of the Alert System

D. Passcode System

This is a web based application for any user, who wishes to travel obstruction free in the disturbed or sensitive areas. The role of the whole system is to provide high security to the security agencies and the common people as well. So, the basic actions of security to suspect everyone will also be done for the authentic user as well. However, the norms are relaxed as the where about and identity of the people is already established and hence tracking is easier in such cases. It will be encouraged to register on this page and motivation and facilities for free will also be provided. The registration process is quite easier, user need to only enter their Aadhar and the registered number, an OTP will be sent to the user on authenticating the app with the OTP received, one become registered user of the application. The benefit of taking Aadhar is that the completed database from mapped and stored for future use. This includes the photograph. The actual photograph taken by the camera module is matches with the one in database for analyses. The registered user will be provided with a unique and intricate passcode. The unregistered user will be treated as green-eyed. All the people will be considered tantamount unless the sensors encounter a suspicious object.

IV. CONCLUSION

The proposed system is one of the robust in the sense that it provide accurate alert and control system based on the threat detection by an automated approach. The mitigating of the threat in real time will however be supervised by manual system. It has been observed that such an automated detection and response system proves to be a boon for the security systems. A huge number amount of database system is gathered in this process. It is therefore possible to use that system for data analysis for finding the bad elements and detect based on past behavior and data. Overpowering of the attackers will be with the help of only the security Advantage of the proposed work are:

a. A secured and reliable hallway is modeled, because a new concept of passcode is introduced in this system. Hence the chances of unauthorized infiltration are quit less.
b. Due to continuous video processing and sensor survey a large database will be created so us to provide information about the vehicle movement in a region at any point of time,

c. More accurate judgment about any potential threat of the surrounding,
d. Corruption of men is possible but corruption of system is difficult, thus this system will provide an unbiased decision over a threat.
e. It is less fats efficient than existing policies.

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