

# Automatic individual Weapon Detection System to Increase Security for Police Officers to Recognizing Terrorists

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**Abstract**---an attack with a firearm becomes a serious threat to a security and a threat to a nation and state, where now a firearm is very easy to find and use so that regulations are needed to use it especially if the weapon falls on the wrong person and attack crimes using firearms continue to increase. These crime targets are not only personal but are carried out in groups and planned, in some developed countries attacks using firearms are able to be identified 40 minutes after the first gun explosion and the police or security officers will provide a quick response, but The problem currently faced is that security officers are late in identifying criminals because of the type of attack carried out in secret and in terms of unpredictable time, attacks with firearms will target important objects such as malls, airports, oil refinery and other facilities, the solution to this problem is to carry out a rapid identification process before the attack occurs, the identification system can be done with the help of a computer camera or CCTV installed in a public place, the camera will identify a threat seen from the main characteristics for example weapon objects appear in misplaced vital objects then the system identifies the weapon carrier including security officers or not because it often happens officers and terrorists will use the same type of weapon, the computer system will automatically give a visual appearance and categorize the object as a threat or not, This identification system has an accuracy value between 80-90% in analyzing and identifying weapon objects

**keywords**---weapon identification, camera, Counter Terrorism, image processing, Police Officer

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## I. INTRODUCTION

The police are at the forefront in guaranteeing security and order in the community, type of crime have developed and are carried out in real ways that make a police officer must always be vigilant, the most dangerous are acts of crime that use sharp weapons or fire, not the crime does not recognize time can be prevented by initial identification steps where and when the crime occurred, crimes using firearms are usually carried out by criminals who are professional and organized, the target is not only the general public but in a larger form eg committing acts of terrorism in the form of confiscation and the killing or destruction of vital facilities such as Bank, Airport, state-owned enterprises and other public areas, some of these public facilities usually have adequate and complete security facilities but this does not fully guarantee a It happens anytime.

The challenges faced today are the data of criminals and the incomplete identity of the perpetrators which can be caused by the relevant new players so that they are not stored in the police database, some overseas police services utilize

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additional cameras or body cameras mounted on the front of the police uniform, where cameras It will read the data of every person who is passing by and identify, more sophisticated technology is to rely on surveillance and monitoring systems using CCTV that are integrated with Interpol or other police services so that the data of a recidivist or criminal person can be recognized directly and monitored directly by the camera on wide distance, for example attacks with firearms in public places can be identified by listening to the first shot or the Gun Shoot Identification.

Technology has been installed in several developed countries that were originally used for the military to identify the direction and origin of the shot, the event will automatically create panic and extraordinary chaos and the possibility of casualties or stranded, the current challenge is how to identify an attack before it happens, To overcome this we can not be separated from the use of computer technology assistance that is integrated with smart systems, for example the installation of CCTV cameras that are installed in many places that are integrated with smart systems so that they can scan the face or record an activity and can identify someone who carrying the weapon officer or not, if there is movement with weapons that are threatening then the system will give the first warning and respond directly to the nearest security officer.

## **II. DETECTION SYSTEM**

Firearm detection systems currently have the biggest challenges in the field of security systems, where a fingerprint technology can be used to activate the weapons used, some systems work by using an automagnetic system that can distinguish weapon sizes and shapes and other physical characteristics, this detection technology becomes a must as a supporter of the security system, the working principle of this technology was developed by a university in newcastle using a metal component a metal detector and trials have been carried out on several weapon objects, while the additional technology used is image visualization and recognition of shapes and patterns while identification based on an image correlation so that the types of objects or objects will be easily identified [1].

## **III. METODE SCREENING**

Further research is how to detect weapons using the screening method, this method is considered the most rapid and suitable method of integration as a security system or called EM electromagnetic technology and has been used as a weapon detection system for decades but this technology has limited capabilities, several approaches from this technology is widely applied in airports, train stations and attorney offices, some facts explain that the weapons used are made of metal so that this technology is still very relevant and can still be used [2] [3].

Detection system used by the police is how as an initial preventive step with the police's rapid response in protecting the local residents, the point is how the weapon can be detected before it could first shot, while the rule of a threat with a firearm can be responded to no later than 30 min before the weapon erupts while in fact a threat with a weapon will be responded 45 minutes after the first shot, the researchers conclude that an initial action and advanced technology development are needed so that the response of an action becomes very fast, shot detection using a technology that is combined with acoustic waves and is able to provide information to police, Based on the location of the sound wave shot, the transmitter will send a message to the central police, but this technology will be difficult to use as well as covering areas close to many buildings [4].

Infrared technology allows a data distribution system that measures the temperature of an image, the working system of the device is often combined with Google's infrared or night vision system so that it makes it easier to see people and vehicles in dark conditions or at night, in theory infrared technology works by reflecting light radiation to the human body that can absorb heat even though it is covered with a cloth, so this technology is widely used to detect weapons that are hidden [5] [6].

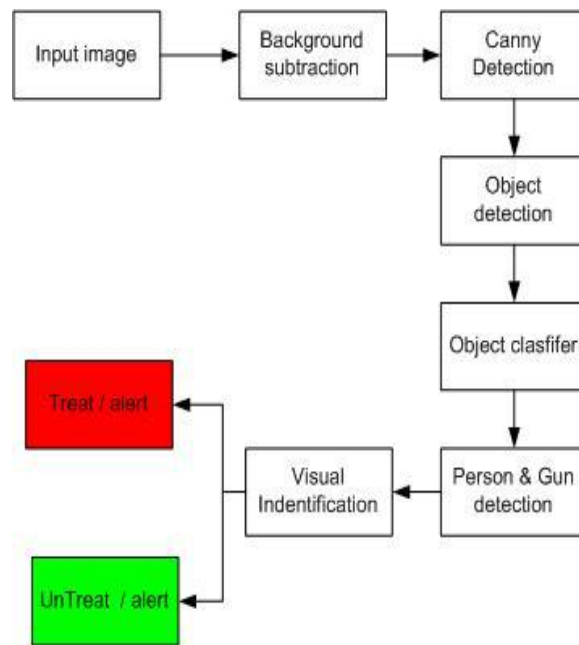
After the process of detecting weapons with a visual display is complete, the process is continued to detect the weapon by reading the movement and appearance of the body into the category of threat or not, so that the object can read the data more fully the system is required to be able to describe the type of weapon viewed from the type and size into the lethal level or not, the next process is the process of segmentation process objects so that the system is able to read data conditions in different weather conditions [7].

Another segmentation system that is successfully used is using an application called the Slamani Mapping Procedure (SMP). This method step is the existence of a computational threshold process (ATC). and relying on a fusion system on a weapon, this system reads color comparative techniques and images that are sized on the top and bottom so that when processed using a computer will display different colors, especially on metal objects will reflect other colors and unusual [8] [9].

Detection of forms is the stage in reading the types and weapons used in general systems will read and the outline of an object in one frame, so that the shape of an object is still readable even though the size of the frame has transformation, this method is usually called the fourir method able to translate a change in the shape of the scale and object rotation [10].

The use of CCTV cameras is currently widely applied in various fields and many are also used by police officers to be used as a monitor in public areas, in several countries in Europe and America technology and this tool is a must but the use of cameras and monitored by an operator is a limitation and a problem which often arises, but the development stage is carried out by making a camera detection system with the help of an automated system so that danger situation conditions can be identified directly, this system is made to improve the security system in a building in the event of a fire or sudden conditions carrying sharp weapons or firearms, this method is still of limited use and can be applied directly realtime and has capability and is more effective in responding system and able to reduce the number of victims of crime. [11]

#### **IV. RESEARCH METHODS**



**Figure 1.1 weapon detection method**

In Figure 1.1 is a true detection method that will recognize patterns and textures, the output of this system is a system of automatic identification and notification system that users will enter into the category of threats or not, the stages of the method are as follows:

- *image input*  
the source of the input image can be taken with an object from anywhere it can be from a body camera mounted on the body or taking pictures via cctv, each object will be identified and converted into several different frame parts for easy identification
- *Background Subtraction*  
obviously the use of weapons and their types vary and in different circumstances and environments, the function of this section is able to identify the types of weapons with modified conditions
- *canny detection*  
in this method is a process to identify types viewed in terms of shape and size.
- *object detection*  
in this section the process of identifying the types of weapons is not only the form but the users based on previous research between terrorists and counter terrorists will use the same type of weapons, then this system will identify the attributes used by the user of the weapon so that it is easily recognized by computers and systems.

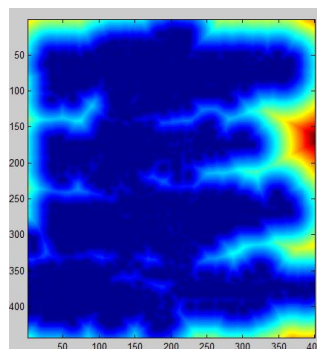
- object classifier  
in this section a weapons classification process is carried out and the user attributes of the weapon are easily identified by the system.
- person detection  
in this section is a process of identifying users of weapons in this section is the most important part because weapons users often use different camouflage equipment and uniform.
- visual detection  
in this section is the final process where the system will identify the weapon user the system is able to take decisions from the object in the category of threats or not

## V. SYSTEM IMPLEMENTATION AND TESTING



**Figure 1.2 testing the identification of the type of weapon**

in Figure 1.2 is a process of identifying the type of weapon that will be used as a sample, the image will later be processed into image processing techniques that will transformation several identification processes, the first stage is the detection thresholds, metal detection methods and the last edge detection to identify the type from the texture and shape of the weapon used.



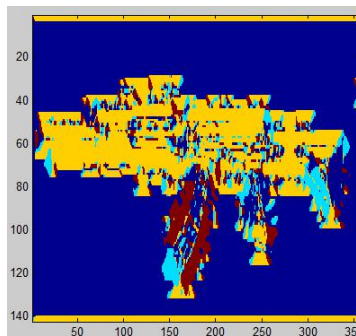
**Figure 1.3 determines the temperature of weapons types in different shapes and types**

in Figure 1.3 above is a process of weapon identification as seen from the heat sensor condition, it can be seen that the metal has a sensor and a very cold temperature. This identification will be difficult to detect if hidden with other cold objects. but in that identification the shape of the weapon is already visible and a further identification system is needed namely image sharpening.



**Figure 1.4 tests on one type of weapon used as sample data**

in figure 1.4 type of testing with one weapon sample, this identification is used to compare with the sample data available in the database which will later enter into weapon identification, for example a soldier or terrorist will use the same type of weapon so that the person is used to identify exactly whether the person entered into threat category or not supported by other characteristics.



**Figure 1.6 system identification shape on the weapon**

in Figure 1.6 above is an identification process seen from the texture of the weapon



**Figure 1.7 identification results using edge detection**

in Figure 1.7 is the edge detection process to see the type of weapon through its shape, the picture shows the type of weapon is still not smooth and needs to be sharpened again, this sharpening is done so that the type of weapon is read by the system and minimizes the identification error



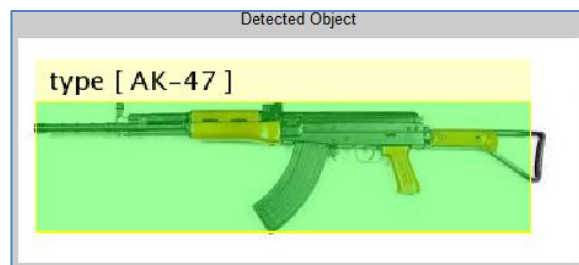
**Figure 1.8 results of the image sharpening process**

in Figure 1.8 is the result of the process of sharpening the image of weapons that have seen its shape and image data is then compared with data in the database.



**Figure 1.9 weapon detection by comparing surrounding objects**

in Figure 1.9 is a process of identifying weapons by comparing with surrounding objects, this process is useful for identifying weapons that have been modified or changed in accordance with the conditions of use in the field.



**Figure 1.10 final results identification**

in Figure 1.10 is the final result of weapon identification that has transformation several stages of weapons, the system automatically displays visual data with AK-47 automatic weapon types.

The next identification process is the process of recognizing several types of weapons used, the system will test the introduction of patterns of weapon users whether used by security guards or terrorists, this way to train the system to have a high level of data reading and high accuracy



**Figure 1.10 weapons indication complete with user attributes**

in Figure 1.10 above is the process of identifying weapons complete with the user according to the attributes used, this method is used to train the ability of the system in identifying objects of weapons users including threats or not.



**Figure 1.11 results of identification**

in Figure 1.11 is the identification result that shows the type of user with visual information with the user name of weapon "**type [Iraq Police]**" which can be interpreted as a reading system that the user is an iraq police force and is not included in the threat category





Figure 1.12 the identification process with two different types of weapons

in Figure 1.12 above is a method of identifying weapons with different shapes and has been modified both from the shape and color of the weapon.

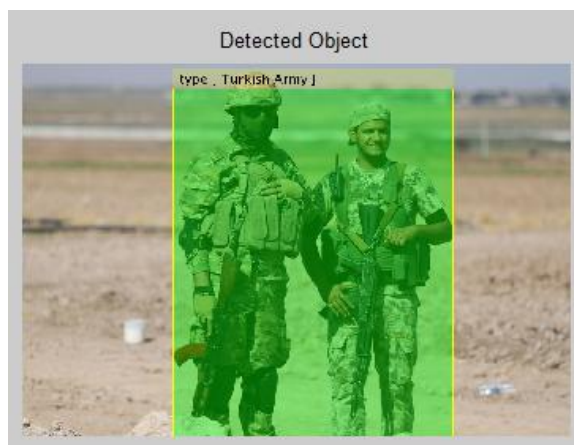


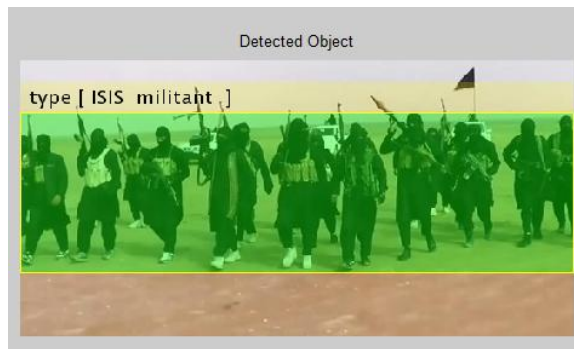
Figure 1.13 modified weapon identification system

in Figure 1.13 above is the process of identifying the type of weapon, the system automatically displays a visual "type [Turkish Army]" which means the user is a Turkish army and is not included in the threat category and entered into counter terrorism forces based on the attributes used.



**Figure 1.14 is the process of identifying weapons in the militant group ISIS**

Figure 1.14 is an identification system with a variety of uniform types of weapons and with a more than one weapon modification system.



**Figure 1.15 Identification of more varied weapons**

in Figure 1.15 is the process of identifying more than weapons and different users on the system the authority of visual display "type [ISIS Militant]" the system explains that the weapon is used by ISIS militants and belongs to the threat category

## **VI. CONCLUSION**

From some of the above experiments it can be concluded that the weapon user identification system is able to be implemented and the system is able to provide information and process an different identification on objects with an accuracy value of 90%. the system is able to recognize objects either in units or in groups with different user and different, weapon, this application usability to classify that the object that is in front of us belongs to the category of threat or not.

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