

# Smart Border Security System Using High Speed Vision Technology

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**Abstract**—The aim of this work is to design the automated security system in order to detect, track and destroy the target for surveillance operations. The system can be operated in two modes, in which the target can be tracked automatically by using MATLAB based system. The image processing algorithms are implemented in MATLAB. The process starts by processing the video signal on computer by using the video camera, then the target is selected which can be tracked further by using different image processing techniques. After the selection of target, the micro-controller unit takes the decision to shoot any activity within its range. The gun is mounted on a tripod stand and its movement is controlled by using the motor. Once the target is selected is can be tracked by moving the camera and gun.

**Keywords**—Border security; High Speed Vision Technology; Image processing; MATLAB; Microcontroller

## I. INTRODUCTION

In these days security is the major issue for all over the world. Security is very important in order to protect vulnerable and valuable assets such as a person, dwelling, community and nation from any harm. International security issues are also very important, especially border and coast security to any country. The people of national security agencies, maritime Security organization, military forces and other forces sacrifice their lives to protect their country people.

The lives of forces are also very precious like other lives. So by using advance technologies, the forces can protect their nation superiorly with minimum life losses. In this modern era, computer base security equipment's are very popular among forces because they are more advance and safe for themselves. For example drone technology the "unmanned aerial vehicle" which is controlled automatically by computer is very popular these days. In this technology, the target is selected and hit by using computer based algorithms including image processing techniques.

Real time image and video processing for object detection and tracking has many important applications in the field of computer vision (B. Coifman et al., 1998), such as video surveillance, military purposes etc. the availability of high quality and inexpensive video cameras and the increasing need

for automated video analysis has generated a great deal of interest in the areas of motion detection, object tracking and object targeted (A. Yilmaz et al., 2006) thus on a very high level, it is possible to identify three key steps in video analysis: detection of interesting moving objects, tracking of the detected objects from frame to frame, and analysis of the object tracks to recognize their behavior and targeted object accordingly.

## II. Block Diagram

This is a block diagram of smart border security using high speed vision technology. Camera helps to detect target from may miles away makes them ideal for border protection. gun is weapon used for defense in army. Here, in this project also we are using gun for protecting border from attackers. ATmega16 controller we are using in this project it's a microcontroller.

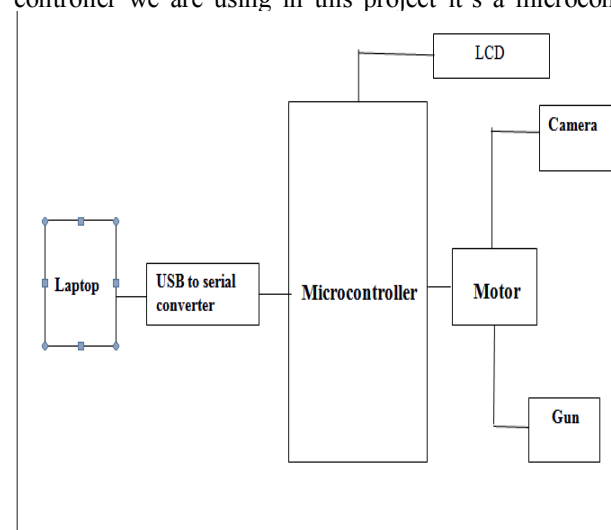


Fig.No.1

## III. Circuit Diagram

This is the circuit diagram of Smart border security using high speed vision technology. This design is implemented on DipTrace software.

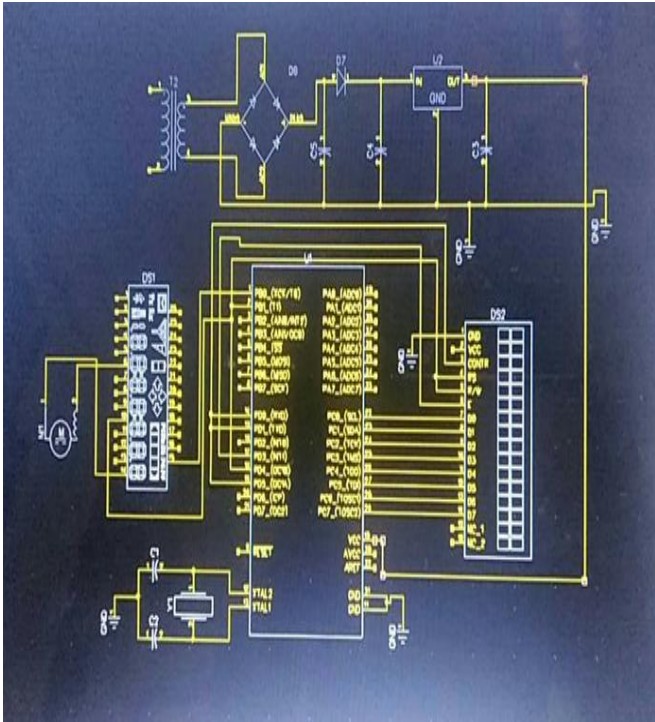


Fig.No.2

IV. Flow Chart

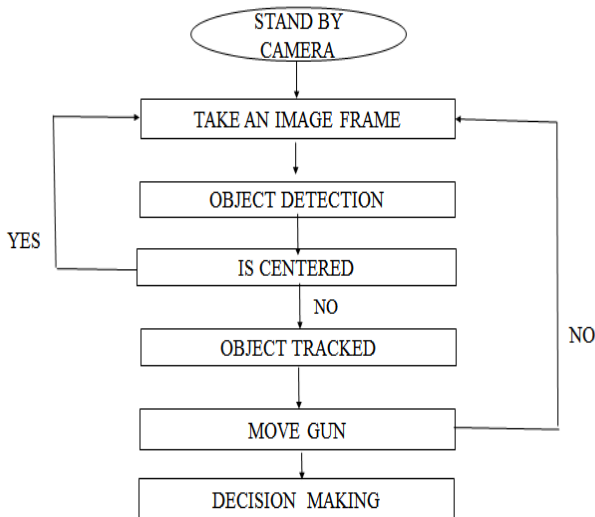


Fig.No.3

This flowchart describes the flow of operations that are necessary for the system to work in the software part. The code is written as per the conditions shown in above flow chart.

V. Photograph of Layout

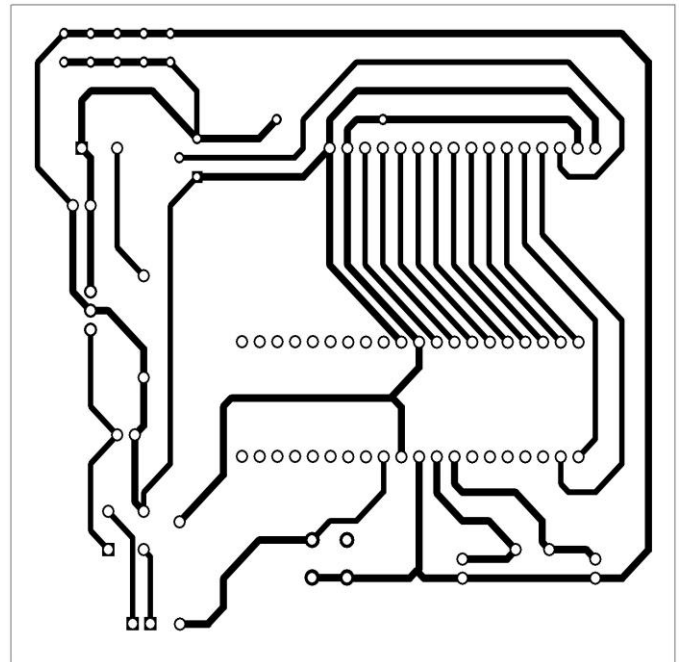


Fig.No.4

VI. Circuit Operation

In this system camera continuously monitor border. This camera is controlled by MATLAB coding. If any motion is detected by camera then signals are sent to the controller using USB to serial converter. The role of microcontroller is to control the rotation of motor and gun action. Motor rotates towards detected motion then gun pointed towards that target and action will be taken out.

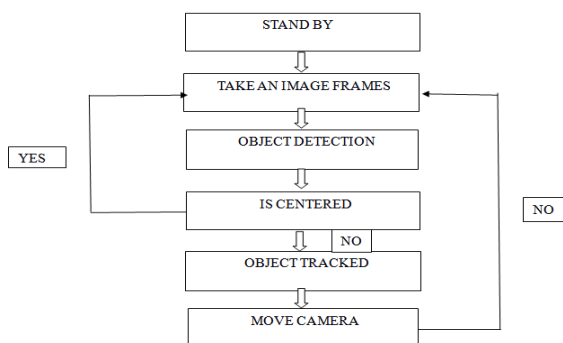
VII. Methodology

Proposed technique reliable as well as it requires less processing time. The algorithm employed in this work is based on the background subtraction object tracking algorithm. The background subtraction method is the common method of motion detection. It is a technology that uses the difference of the current image and the background image to detect the motion region and it is generally able to provide data included object information. Output of subtraction stage is binary image as, the complexity of the background, the difference image obtained contains the motion region along with noise. Therefore, noise needs to be removed using filter.

In this methodology, we are using camera, and gun. Camera is continuously monitoring border area, here we are deciding its vision distance up to that distance camera is monitoring action happening on border area. Camera only detects human as an object except human it won't consider anything as an object. The video visualization of camera is

monitor and record on base band station of military and when any object detected it capture its image and store. This is how camera work. When camera detects object then gun also moves towards the direction of the object where camera has detected it. This controlling of gun as given by microcontroller here gun rotates either on left, right or be at center. Gun get shooting command from microcontroller the shooting process of gun is very speedy as well as quick action. Here, gun as well as camera rotates using motor which is controlled by microcontroller Atmega16.

### VIII Software



### IX. Conclusion

A real-time video of moving object detection and tracking is proposed, based on background subtraction. For object detection, we establish reliable background model, use threshold method to detect moving object and update the

background in real time. At last the moving object is tracked by finding the area and centroid. A benefit of this method is that it is time efficient, and it works well for small numbers of moving objects. Video image data of the human body is processed, and its geometrical centroid is obtained in different time intervals. Then, the velocity is computed. In this way motion and presence of unauthorized entry of person is tracked and necessary actions are taken as per the severeness of the matter.

### X. References

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