



Self Aiming & Shooting Intrusion Detection System

Dr. Pramod Sharma¹, Gaurav Kumar Pandey², Rishabh Sharma³, Vijendra Pal Singh⁴,
Archit Agarwal⁵

Faculty, PG Dept. of ECE, R.B.S.Engineering & Technical Campus, Bichpuri, Agra, India¹

B.Tech. Final Year Students, PG Dept. of ECE, R.B.S. Engineering & Technical Campus, Bichpuri, Agra, India^{2,3,4,5}

ABSTRACT: The main purpose of this research is to enhance the security system and to save human life from any intrusion. Self-aiming and shooting intrusion detection system can play a significance role in today's security system, as the human being is not able to continuously secure the area from intruder. In this paper the "Self-Aiming and Shooting Intrusion Detection System" is performed in real time using an Arduino MEGA microcontroller and servo motor for targeting intruder. The results in the paper are the outcomes of our B.Tech. Final Year Project work. The "Self-Aiming and Shooting Intrusion Detection System" is a security system which will automatically (self) detect its target, calculate its position using MATLAB and the attached gun will aim and shoot on that target. Basically, it is an intrusion detection system which will not accept any unwelcomed person in its range. The results show successful intrusion detection and shooting system in real time.

KEYWORDS: Arduino mega, web cam, Servo moter, MATLAB

I.INTRODUCTION

Our project titled as "Self-aiming and Shooting Intrusion Detection System" has been undertaken with the aim to increase the security along with to reduce the man power and to save soldeirs precious life. We had use webcam to capture the image of intruder continuously and provide the input to the MATLAB for further processing. By using techniques of GUI we take the background of all those part in the picture or image which is not movable and the target is that part of the image which is movable. With the help of MATLAB image processing we can able to find the coordinate of the target continuously, which serves as the first input part of our project .

The second and the main part of the our project is the targeting. With the help of the coordinate being obtain by the MATLAB we write a code for the Arduino program which is triggered at that coordinate value which is sent by the MATLAB. Thus the MATLAB data will work as an input data for the Arduino and the program of Arduino works on that data.

The third part of the our project is the triggering. When the input data is matched with the pulse generated by the Arduino, a trigger pulse is generated for the movement of upward and downward of the servo motor. We are using two servo motors one for motion in vertical direction while another for motion in horizontal movement.

I.I. NEED OF PROPOSED WORK

The main purpose of this research is to enhance the security along with reducing man power and to save precious life of a soldier.

- Security is meant for continuous 24 hours that is round the clock.
- We know that a person is not able to continuously focus on a particular area for a long time hence there are high possibilities of mistakes by the person and any small mistake may cause in the loss of his life himself, which results in failure of security.



International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 4, April 2019

- To overcome these lapses, we have designed and implemented a “**Self-Aiming and Shooting Intrusion Detection System**” as our B.Tech. project. Which has following advantages: -
 1. As the machine work on the basis of the interfacing of the hardware and the software if these basic are correct and fulfill the objective of the purpose then the machine never make any fault and it continuously works for a long time without failure and rest.
 2. As we know that most of the time machines are very accurate and efficient as compare to human.

I.II. OBJECTIVE OF RSEARCH WORK

The objective of our B.Tech. final year project work entitled “**Self-Aiming and Shooting Intrusion Detection System**” are as follows: -

- Designing an intrusion detection system which will detect the intrusion within the boundaries of the security using a webcam as an intrusion detection system.
- The webcam gives us the information of the intruder in the secured area it will also give the coordinate of the intruder to the airsoft gun which will than target itself in the direction of the intrusion.
- MATLAB will perform the image processing and give the coordinate of intruder to Arduino.
- The gun in the security system is controlled with the aid of two servo motors which will be responsible for the movement or aiming of the gun by changing its x as well as y coordinates towards the intruder.
- For the interfacing of the security system we will be using Arduino MEGA which will be interface with the help of programming to the webcam and airsoft electric gun.

II. REVIEW OF THE RELATED LITERATURE

For finalizing objective of our project work we have reviewed following research papers majorly being related with the technology which we have used in our project work “ **Self-Aiming And Shooting Intrusion Detection System**”, apart from books and websites.

- Panth Shah, Tithi Vyas [1] the author has proposed an algorithm for object detection using image processing and manipulation of the output pin state of Arduino board with AT mega 8 controller by tracking the motion of the detected object.
- Vijayalaxmi, K.Anjali,B.Srujana, P.Rohith Kumar [2] the objective of author is to build a model that can detect the object of specified colour and that works on the basis of visual data captured from a typical webcam which has a fair clarity.
- Ejofodomi et al [3] from this paper we acknowledge that MATLAB algorithm was able to successfully detect the predefined object and track its movement in subsequently acquired frames.
- LipingLu,Jinfang Wang [4] by this research paper we know how to improve target tracking performance in dynamic target track system, this paper propose the processing method of positive and negative difference image to extract target information.
- B.K. Venugopal, Dilson D’ souza [5] the author worked for the experiment considering the proposed eye tracking system, a successful interface between the computer and the hardware was achieved.
- Adafruit industries [6] with the help of this site we get the knowledge how to interface the servo motor to the Arduino. The servo motors can be controlled by the Arduino by interfacing it through a programming codes.
- Helsinki Metropolia [7] in this paper author describes a four wheeled robot built with an Arduino microcontroller controlled by an Android device for tracking and following moving objects.
- MejdI Safran and Steven Haar [8], in this work real implementation of mobile devices based on Arduino platforms and equipped with many sensors and a Webcam has been done. The devices are able to accomplish Detection Tasks of objects and faces. The target objects can be identified by exploiting the combination of shape/color.

III. METHODOLOGY

We have divided our project in two parts, first one is processing and second one is targeting and triggering mechanism.For the processing we have used MATLAB software,the input to the MATLAB will be provided by the

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 4, April 2019

webcam whenever there is any intruder in the range, image processing and tracking software the MATLAB gives continuously the coordinates of x-axis and y-axis of the intruder which is moving object.

Microcontroller is used for triggering mechanism and movements of gun and camera using servo motor. Camera will be mounted above the gun to capture the object. Camera will give live images to MATLAB to recognize the object location. MATLAB will capture one frame, in that we have to select the object points. After that MATLAB will perform color-based thresholding and recognize the object. Using Blob detection, it will find the area of object and it will start tracking that object. As we move object, the blob will also move this is a tracking process using image processing. Wherever MATLAB will find the object, it will send that location in terms of some character to microcontroller. Thus according to the data received from MATLAB, microcontroller will control the dc motor for gun movement. Gun will be pointing to the object using servo motor and the trigger mechanism will take place and gun will shoot to object. The block diagram of “Self-Aiming and Shooting Intrusion Detection System” is shown in Fig.1.

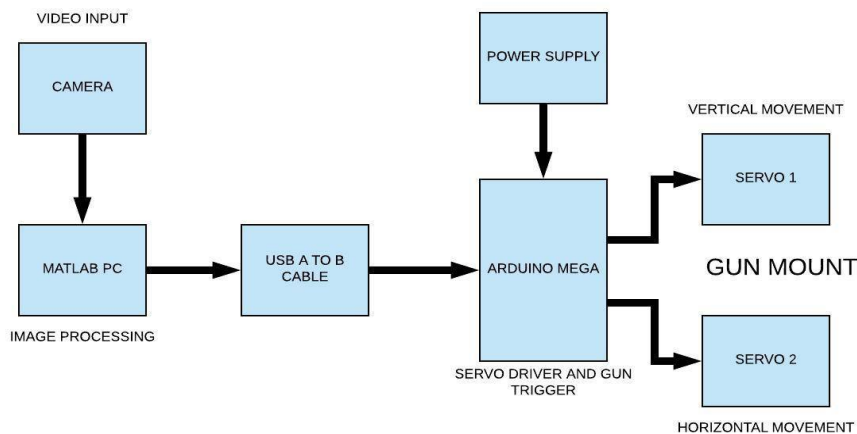


Fig 1. Block Diagram of the designed system.

III.I. WORKING

Our project titled as “Self-Aiming and Shooting Intrusion Detection System” has been undertaken with the aim to increase the security system along with to reduce the man power and to save soldiers precious life. We had use webcam to capture the image of intruder continuously and provide the input to the MATLAB for further processing by using technique of GUI, we take the background of all those part in the picture or image which is not movable and the target is that part of the image which is movable with the help of MATLAB image processing we are able to find the coordinate of the target continuously, which serves as the first input part of our project.

The second and the main part of our project is the targeting with the help of the coordinate being obtain by the MATLAB. For this we write a code for the Arduino program for targeting the gun which can be triggered at the coordinate value which is sent by the MATLAB. Thus, the MATLAB data will work as an input data for the Arduino and the program of Arduino works on that data.

After obtaining the coordinate of the intruder and the gun is aligned in the direction of intruder, a triggering pulse is generated by the Arduino to enable the shooting of gun i.e. pulling the trigger of the gun.

IV. RESULT

All the objectives had been fulfilled successfully and thus we are able to design a fully secured system. Thus we have designed a security system which was free from any kind of errors which could be common with human beings. The

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 4, April 2019

designed system will identify the intruder in the range of the web cam, the position of the intruder will be calculated by the MATLAB. The calculated coordinates of position of intruder will be sent to the Arduino which drive the servo motors towards the direction of coordinates. Once the motors align the gun in intruder position, a trigger pulse will be sent to the Arduino to enable the gun shooting or triggering to shoot the target. It will shoot the target until it stops or falls. Fig.2. shows multiple targets bounded by red box in box-img.

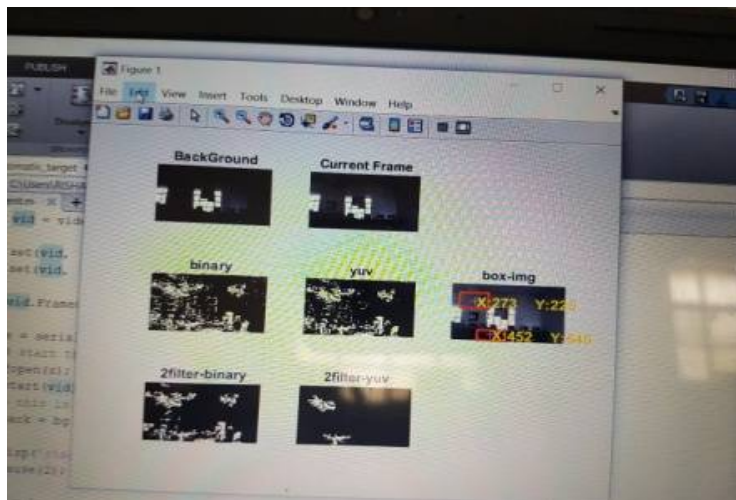


Fig.2 . Screenshot of analyzing the Target

IV.I. SELF-AIMING

The camera will be on & it makes its GUI up to their view range and by the help of MATLAB image processing software, it considered all the non-moving object as the background. When any moving object comes in the view region the MATLAB give its horizontal & vertical coordinates. With the help of coordinates we make the Arduino program to track the moving object for 'X-coordinate' & for 'Y-coordinate'. The gun in the security system is controlled with the aid of two servo motors which will be responsible for the movement or aiming of the gun by changing its x as well as y coordinates towards the intruder. both works according the output of MATLAB. The aiming or tracking mechanism can be seen Fig.3. i.e. webcam in it. laptop and

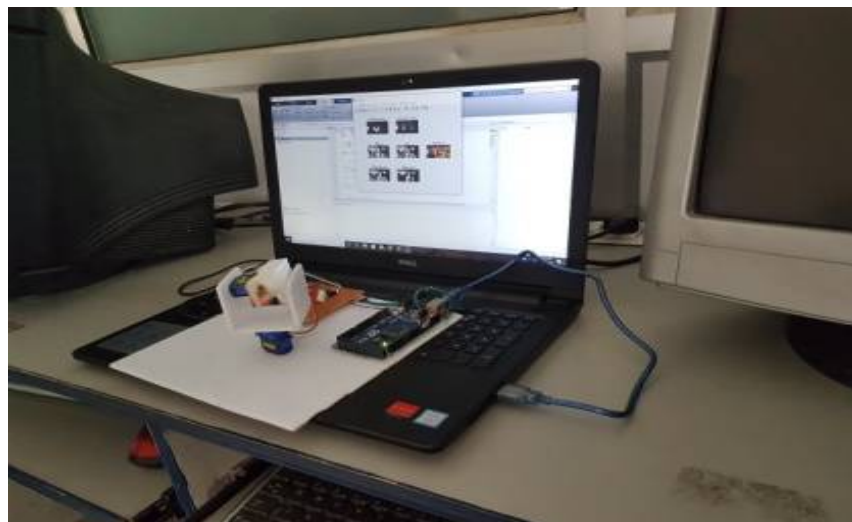


Fig. 3. Overall look of the designed system



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 4, April 2019

V. CONCLUSION

During the demonstration of our project we observe little delay in the processing of image and to live track the intruder, if we can use the camera specifically designed for this purpose, we will be able to get our project working in real time and tracking the intruder and simultaneously shooting towards the target. For our project we had gone through many different iterations i.e. we tried many techniques to achieve the desired results. For the processing of video data we use MATLAB coding. There is lot of video data to be processed and to calculate the coordinate a better processing unit which is specially designed for this purpose will give better results.

REFERENCES

1. Panth Shah, Tithi Vyas, "Interfacing Of MATLAB With Arduino For ObjectDetection Algorithm Implementation Using SerialCommunication", International Journal Of Engineering Research &Technology, Vol. 3, Issue 10, October- 2014, PP 1067-1071, October-2014.
2. Vijayalaxmi, K.Anjali, B.Srujana, P.Rohith Kumar, "OBJECT DETECTION AND TRACKING USINGIMAGE PROCESSING", Global Journal of Advanced Engineering Technologies, Special Issue 2014.
3. EjofodomiEt Al, "Object Detection And Tracking For Wireless Motion Control Using MATLAB" An Open Access Journal , Vol. 4, Issue 2, 2015, PP 1-3, 2015.
4. LipingLu, Jinfang Wang, "Image Processing and Recognition Algorithm For Target Tracking", International Journal On Smart Sensing And Intelligent Systems, Vol. 9, No. 1, PP 353-376, March 2016.
5. B.K. Venugopal, Dilson D' Souza "International Journal of Engineering And Techniques" International Journal Of Innovative Research In Science, Engineering And Technology, Vol. 2, Issue 6, Nov–Dec 2016.
6. Adafruit Industries, "Interfacing of Servo Motor ByArduino", <https://learn.adafruit.com/adafruit-arduino-lesson-14-servo-motors>, Dec 18, 2012.
7. Helsinki Metropolia, " University of Applied Sciences", Bachelor of Engineering, Electronics Thesis, 3 February 2017.
8. Mejdil Safran and Steven Haar, "ARDUINO AND ANDROID POWERED OBJECT TRACKING ROBOT" Department of Computer Science Southern Illinois University Carbondale, Illinois 62901 USA mejdl.safran@siu.edu, info@stevehaar.com .
9. Thennavarajan Subramanian , Rahul Madbhavi , ShreepadPotadar ,Sylvester Jerome D'souza , K V Gangadharan,"OBJECT FOLLOWER AND BARRIER ESCAPING ROBOT USING IMAGE PROCESSING" , International Journal of Innovative Research in science, engineering and technology (An ISO 3297: 2007 Certified Organization) Vol. 4, Issue 7, July 2015.
10. Anurag Singh Rajpoot, Namrata Gadani, Sagar Kalathia, " DEVELOPMENT OF ARDUINO BASED QUADCOPTER", International Advanced Research Journal In Science, Engineering And Technology, Vol. 3, Issue 6, PP 252-259, June 2016.
11. B.K. Venugopal ,Dilson D' Souza " REAL TIME IMPLEMENTATION OF EYE TRACKING SYSTEM USING ARDUINO UNO BASED HARDWARE" Interface International Journal Of Engineering And Techniques International Journal Of Innovative Research In Science, Engineering Technology, Vol. 2, Issue 6, Nov–Dec 2016.
12. Rafael C. Gonzalez,Richard E. Woods, Steven L. Eddins, "Digital image processing using MATLAB", Issue 2, Textbook, 3 May 2009.