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Gaze Controlled Gun

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Abstract— **Eye tracking has been an important interesting area of research for quite some time now. In day-to-day applications, eye-tracking can be used as a computer Interface for both industrial and non-industrial applications. Gaze controlled gun is an automated target system for border area which mainly focuses the controlling of firing systems with the help of eye movement and voice, if found an object within a range of 30m. Here the basic purpose is to enhance the border security electronically with automation and with that to reduce the work load and responsibility of the border men that continuously take a look on border 24x7.**

Image of eye is captured using a camera, which is placed in front of the eye. The direction and position of the gun is controlled using the eyeball movement and the gun can be fired with the help of voice detection. This will help in attacking the enemy quickly.

***Index Terms*— Gaze Control, Firing Control, OPEN CV, Voice Detection.**

I. Introduction

Gaze technology is nothing but tracking the movement of eyeball. Eye tracking is a process that allows us to determine where an observer is focusing at a given time. The gaze direction indicates where people focus their attention. The location of face and eye should be known for tracking eye movements. We assume this location information has already been obtained through extant techniques. Exact eye movements can be measured by special techniques.

There are various methods of tracking eyeball ball i.e. by using IR rays, electrooculography and using image processing techniques.

Eyeball tracking using IR rays requires the use of IR emitting diodes; the rays are directed into the eye for tracking its movement. But prolonged exposure of IR rays to eyes is harmful. Therefore, it can't be used for application which requires tracking of eyeball for long period. In case of Electrooculography, it requires complex

circuitry to tap the EEG signal for tracking the eyeball, which hinders normal operation of a person. Using a camera for tracking eyeball is a safe and 'hinder-free' method. In previous research, it is possible to track the eyeball successfully by

using a camera. But one more proposed method is using a better algorithm for detecting and tracking eyeball movement. The system is designed to find the target and accordingly automatic movement of gun in that direction with auto firing.

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block diagram

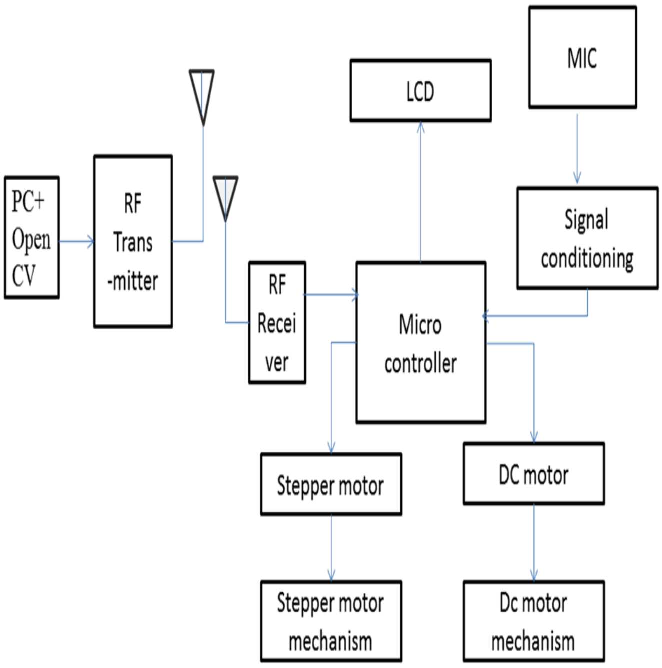

Fig 1

MICROCONTROLLER - Microcontroller LPC2138 is used to perform task such as driving the motor which controls the gun to locate the direction and position. The microcontroller is interfaced with the LCD which display the correct position of the target.

RF TRANSCEIVER - It is a typical system, were this transceiver is used together with microcontroller. 30m range with onboard antenna of transceiver based on CC2500. CC2500 act as a transmitter as well as receiver, where it receives the direction of the eye and transmit to the rf receiver. It receives the direction from the transmitter and gives signal to the microcontroller.

DC MOTOR DRIVER - DC motors are used to physically drive the application as per the requirement. The dc motor works on 12V. To drive a dc motor, we need a dc motor drive called L293D. The dc drive is capable of driving 2 dc motor at a time.

STEPPER MOTOR - We have used L298 stepper motor for locating the target with the help of microcontroller. The L298 is a popular motor drive IC that is usable from 6 to 50V at up to 4A total output current. By itself, the IC is somewhat difficult to wire and use, but the compact L298 motor driver makes it much more convenient to use.

III. EYE DETECTION AND TRACKING

This is a fast eye detection and tracking program that takes the input from webcam. The program using Open CV's face detector for detecting the user's face and eye. For tracking the user's eye, it is using the template matching method. In order to achieve high speed, the program need to perform the face and eye detection only *once* at the program startup. After the eye is successfully detected, an eye template is created at runtime and will be used for tracking the eye using template matching method

IV. HAAR FEATURE-BASED CASCADE CLASSIFIER FOR OBJECT DETECTION

First, a classifier (namely *a* cascade of boosted classifiers working with haar-like features) is trained with a few hundred sample views of a particular object (i.e., a face or a car), called positive examples, that are scaled to the same size (say, 20x20), and negative examples - arbitrary images of the same size.

After a classifier is trained, it can be applied to a region of interest (of the same size as used during the training) in an input image. The classifier outputs a "1" if the region is likely to show the object (i.e., face/car), and "0" otherwise. To search for the object in the whole image one can move the search window across the image and check every location using the classifier. The classifier is designed so that it can be easily "resized" in order to be able to find the objects of interest at different sizes, which is more efficient than resizing the image itself. So, to find an object of an unknown size in the image the scan procedure should be done several times at different scales.

The word "cascade" in the classifier name means that the resultant classifier consists of several simpler classifiers (*stages*) that are applied subsequently to a region of interest until at some stage the candidate is rejected or all the stages are passed. The word "boosted" means that the classifiers at every stage of the cascade are complex themselves and they are built out of basic classifiers using one of four different boosting techniques (weighted voting). Currently Discrete Adaboost, Real Adaboost, Gentle Adaboost and Logitboost are supported. The basic classifiers are decision-tree classifiers with at least 2 leaves. Haar-like features are the input to the basic classifiers, and are calculated as described below. The current algorithm uses the following Haar-like features:

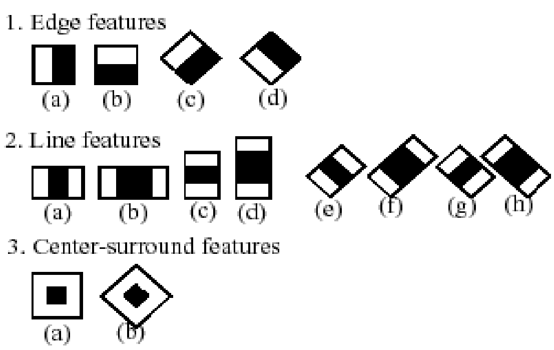

Fig. 2

The feature used in a particular classifier is specified by its shape (1a, 2b etc.), position within the region of interest and the scale (this scale is not the same as the scale used at the detection stage, though these two scales are multiplied). For example, in the case of the third line feature (2c) the response is calculated as the difference between the sum of image pixels under the rectangle covering the whole feature (including the two white stripes and the black stripe in the middle) and the sum of the image pixels under the black stripe multiplied by 3 in order to compensate for the differences in the size of areas. The sums of pixel values over rectangular regions are calculated rapidly using integral images

V. TEMPLATE MATCHING

Template matching is a technique for finding areas of an image that match (are similar) to a template image (patch).

We need two primary components:

1. **Source image (I):** The image in which we expect to find a match to the template image

2. **Template image (T):** The patch image which will be compared to the template image

Template Matching is a method for searching and finding the location of a template image in a larger image. It simply slides the template image over the input image and compares the template and patch of input image under the template image. Several comparison methods are implemented in Open CV.

VI. HOUGH CIRCLE TRANSFORM

The Hough Circle Transform works in a *roughly* analogous way to the Hough Line Transform

In the line detection case, a line was defined by two parameters (r, θ). In the circle case, we need three parameters to define a circle:

$$C : (x_{center}, y_{center}, r)$$

where (x_{center}, y_{center}) define the center position (gree point) and r is the radius, which allows us to completely define a circle as it can be seen bellow

Fig. 3

For sake of efficiency, Open CV implements a detection method slightly trickier than the standard Hough Transform: *The Hough gradient method*.

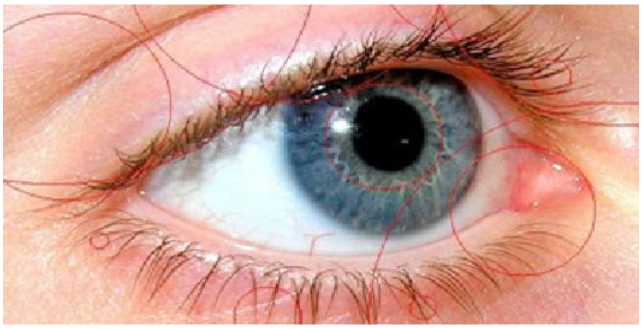

Fig. 4 Pupil detection by implementing Hough transform

VII. FIRING CONTROL

The open CV will read the data sensed & stored in the eye that is any living object in the range and transmit the data through RF transmitter. This data is received by the receiver & provide the s/g to microcontroller, interprets the location of the object corresponding to received code, activates targeting system, mic system and the gives the order to shoot and at last it will fire.

Stepper motor is used to adjust the gun. Trigger motor is used to trigger the gun or shoot.

VIII. FUTURE SCOPE

The scope of the project can be increased by controlling the gun using gestures of soldiers body. Firing can be done with the help of voice recognition also calibre can be made to fire using eye blink.

IX. CONCLUSION

Thus, our proposed system modifies the conventional method of targeting an enemy and firing with the help of gun. Controlling the gun using eyeball movement and voice. In a battle, our eye sees the enemies first, and then we turn our weapon in that direction to fire. Using our proposed system, the calibre is made to follow the eye's gaze and it is made to fire using voice. This will help in attacking the enemy quickly.

REFERENCES

[1] Jensen, A. K., Nielsen, T. S., and Smedeg°ard, J. H. Eye Gaze: Eye Contact and Gaze Awareness in Video.

[2] Vision-Based Eye-Gaze Tracking for Human Computer InterfaceKyung-Nam Kim and R. S. Ramakrishna Department of Information and Communications, Kwangju Institute of Science and Technology, Kwangju, 500-712, Korea(ROK)

[3] Arie e. Kaufman, Amit bandopadhay, Bernard. shaviv, An Eye Tracking Computer User Inter- face , Research Frontier in Virtual Reality Workshop Proceedings, IEEE Computer Society Press, pp. 78-84. October 1993

J.Amali, G.sathiyavani, R.Vishnuvinayagan, Implementation of Turret and Firing Control System by Eye Tracking Method Using Armoured Combat Vehicle Based On LABVIEW Dept of Applied Electronics,Jayam College of Engineering and technology,Dharmapuri DT