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Encrypted Communication using Face Detection and Eye Tracking using Morse Code

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Abstract

This paper proposes a system that would allow the user to communicate by blinking their eyes. The blinking would be identified as a combination of long and short blinks, these long and short blinks represent zero and one bits of the Morse code. With various combination of these one's and zero's the user would be able to communicate efficiently with the second user. This proposed system can be made applicable to create a unique and discrete communication medium between two users.

Keywords:*morse code, OpenCV, dlib, visual studio, shape predictor.*

1. Introduction

Communication is the vital part of a person's daily life. Different types of communication are through speech, over electronic devices or through actions. When a person communicates through an electronic device, the probability of leakage of data or loss of data by an external entity is the highest. This project provides the user with a platform to communicate with each other through a secure unique method. This system provides security from attackers trying to access concerned data. This data is then received by the user who extracts information using the same system. The procedure is such that a video feed is sent between the users who wish to communicate. The system then detects the face and the eyes on the video feed received by the other user, the system counts the blinks and the pattern of the blink. The language used for communication is Morse Code. Morse code is a combination of ones and zeroes in various pattern.

2. Background and Literature Review

There are a lot of disabled people who can't control some parts of their bodies such as ALS and real time human – computer interaction systems can help them. In this paper, a real time vision system is presented to provide a communication way to people has severe disabilities. Patients will be able to choose words on an alphabet tree which is designed on a binary tree by blinking right and left eye, thus they will make sentences [1]. The system works by detecting the frame for both eyes and then storing their location, if a change is detected then then system performs operation or else it is fixed till change occurs. This application is based on face recognition and facialfeatures techniques to extract region of interest (which in this case are the eyes), by applying filters and cascade classifier with OpenCV implemented in Visual Studio.

A software program was developed to transform blinking into words, along with a graphical user interface; the ALS patient has the possibility to structure sentences, thus, facilitating his/her communication process with relatives and medical staff [2]. ALS causes a loss of physical movement and the patients are unable to perform physical movements. To facilitate their communication, many applications are available in the market. But those applications are expensive hence the low-income patients are unable to afford it. Hence, this application was developed. It is named CodeBlink. CodeBlink was developed using Visual Studio C#.net and other modern technologies such as artificial intelligence that facilitate the interpretation and communication of these patients, because it incorporates default images and words which can be identified and selected quickly. The algorithm

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captures patient's face, eyes and blinking to achieve communication through the system by using Morse Code. Thus, the ALS patients can easily converse with the medical staff using this application.

A vision-based real-time driver fatigue detection system is proposed for driving safely [3]. The driver's face is located, from color images captured in a car, by using the characteristic of skin colors. Then, edge detection is used to locate the regions of eyes [4]. Driver fatigue detection based on eye tracking and dynamic template. Driver fatigue system works by using dlib library, dlib library is a shape predictor module which is used to identify shapes and objects. Shape predictor module which is used to identify thefaces used 68 points identification modules, these points are then used to detect the users face and the eyes, there are 6 points which track the eye movements [5]. Based on the ratio of the eye, the system detects if the user is feeling fatigue, if the condition satisfies the system makes a buzzing sound.

3. Proposed System

The system proposed for communication in a secrete way based on face detection and eye detection is be developed on OpenCV with the help of python 3.6 and dlib module. The system is able to detect face and eye feature based on the shape predictor file on dlib module [6]. These points are utilized to detect the blinks and to produce the output in Morse code language. The system identifies short and long blink and compares them with the stored Morse code date and then displays the required output. The accuracy ofthe system can be increased by increasing the number of points in the shape predictor module.

3.1 Block Diagram

Fig. 3.1 shows the block diagram of the system. It starts by tracking the eyes, it detects if the user does a short or a long blink which represent zero and one of the Morse Code languages, and a certain duration of keeping the eyes open represent a black between each alphabet. Once the user has conveyed the message, the secret message is be displayed.

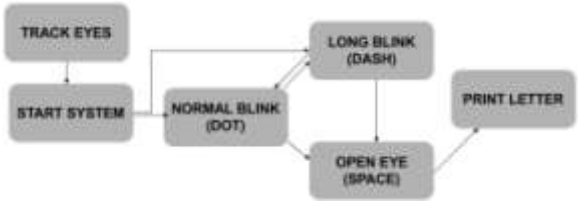

Fig. 3.1 System Block Diagram

3.2 System Architecture

The Fig. 3.2 shows the architecture of the system. The system first gains access to the machines camera and then tracks the face and eyes of the user [7]. The system implements the code on the acquired video feed. The process of detecting the face and the eyes is been performed by the dlib module. Once the blinksare been counted and stored, it compares the acquired code with the Morse code data stored. The output is then displayed to the user.

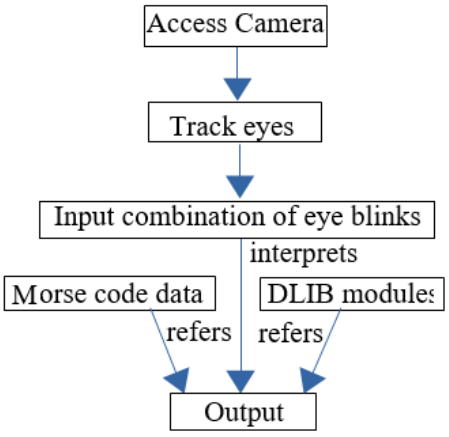

Fig. 3.2 System Architecture Diagram

4. Result

In Fig. 4.1 system used dlib library to detect the face using shape predictor module, this module used 68 points to identify the face and detect the eyes. Euclidian distance is been calculated for the eye and the ratio is been found out. When the ratio falls below
0.25 the system detects it as a blink [5].

Fig. 4.1Working of the system (Displaying the blink count)

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In Fig. 4.2 the system is able to distinguish between short and long blinks. When the eye ratio falls below 0.25, the system counts the number of frames for which the rate is below threshold. If the count is between three and seven the output is short blink and if the count is larger than sever the output is long blink.

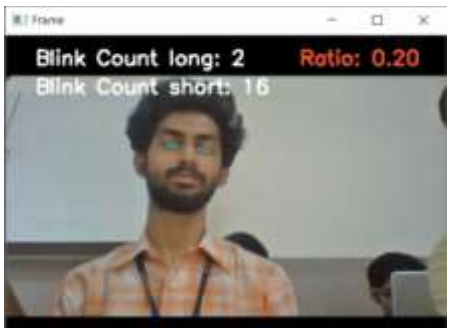

Fig. 4.2Working of the system (Displaying the short and long blink count)

5. Conclusions

Hence, this system implements face detection and eye tracking using dlib module. The system is able to detect face and track the eyes with the system's camera. Once the system has been initiated, it starts to keep a track of the number of eye blinks. The eye blinks are counted based on the eye blink ratio formed by the eyes of the user.

The proposed system can be applied in various scenarios, such as helping handicapped patients communicating with doctors and their family, also the same system can be used to communicate between users, this is the main aim of this system to provide a separate and a unique method of communication between them, so that the data communicated can be kept discrete.

6. Future Scope

The Future scope of the system includes implementing error detection procedure which would help in word prediction. Implementation of face recognition module would enhance the security aspect. A new code language can be developed which would prove to be useful to patients, as the scope of learning would be reduced. Also, a login system can be invoked that would help in enhancing the security of the system.

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