INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 6.078
(Volume 6, Issue 4)
Available online at: https://www.ijariit.com

Eye blink to voice format communication for paralyzed patients

Namratha K. S.
ksnamratha77@gmail.com
Rajarajeswari College of Engineering, Bangalore, Karnataka

Jeevitha B. S.
jeevithajaanu287@gmail.com
Rajarajeswari College of Engineering, Bangalore, Karnataka

Sneha P. H.
vedadgowda@gmail.com
Rajarajeswari College of Engineering, Bangalore, Karnataka

Veda D.
vedadgowda@gmail.com
Rajarajeswari College of Engineering, Bangalore, Karnataka

ABSTRACT

The wide growth of technology in medication field reduces the difficulties of patients to large extent. Motor Neuron Disease is one such major class of physical disabilities resulting in dysfunction. MND patients unable to figure like walk and communicate caused by weakness of muscles. The patient has management solely upon his Eye movement. This technique contains of strategies like face detection, eye detection, eye pursuit, conversion of blink to voice,Video-Oculogragphy methodology is employed to create communication between patient and care taker.The image process module incorporates digital camera and therefore the eye movement image is captured with OpenCv to get the coordinate of eye ball.The system permits the patients to speak with care taker victimisation blink pattern converted into voice format The sensible resolution for image process is obtained be Python programming with Open CV.

Keywords: Video Oculography, Eye Blink Detection, Eye Pursuit, Face Recognition, Open CV

1. INTRODUCTION

Motor Neuron Diseases (MNDs) area unit a bunch of neuro chronic disorders that by selection have an effect on motor neurons, the cells that management voluntary muscles of the body wherever the motor neurons of patients area unit paralytic. It causes progressive weakness, sometimes with muscle wasting. Motor neurone sickness happens once specialist nerve cells within the brain and neural structure referred to as motor neurones shut down properly.There area unit many techniques that area unit introduced for the paralytic patients with low the surface to speak with the skin world, they're Brain wave detection and electro-oculography technique.

In paper planned , new proposition is employed within which eye blinks may be used for communication . Associate OpenCv is employed for image process beside the algorithmic program for face detection and blinking detection. For communication purpose Video-Oculography is employed that is video based mostly technique for measure the vertical and horizontal point elements of each the attention blinks .There square measure many techniques used for detection eye blinks and eye movements.The technique used is straightforward and fewer time intense .Haar-Cascade Classifier algorithmic program is applied for face and eye detection for obtaining eye and facial data. In face detection edge detection and line detection is carried out. Blinks are converted to sentence or words, which is not been used before. The camera, which is focused to the face of the user, records the blinks and is considered as video sequence. It is then considered as the input for detection of eye blinks and code counting. Calculating the number of eye blinks is done and the same corresponds to meaningful sentence according to the count. The method, which is used in this paper, reduces time for detection of blinks and also lessens the cost by large margin. There are few algorithms that are developed for video Oculography system for communication.

Motor Neuron malady is one among the rarest medicine conditions (conditions that have an effect on the nervous system). In Ireland concerning a hundred and ten individuals die every year from Motor Neuron malady. MND chiefly affects adults whose area unit over forty and most cases develops in individuals. However, MND will have an effect on adults underneath the age of f account for hour of all cases of MND, with girls accounting for the remaining four-hundredth. The reason for motor nerve fiber illness are unknown, however it looks doubtless that genes play an element, a minimum of in some individuals with the condition. This can be as a result of 100% of individuals who develop MND even have an in depth family relative with the condition.In concerning five-hitter of cases there is a case history of either motor neurone malady or a connected condition known as Frontotemporal Insanity.This can be referred to as familial motor neurone illness.In most of those cases, faulty genes are known as creating a serious contribution to the event of the condition. The end of life in somebody with motor neurone malady isn't sometimes

distressing and is most frequently in their house. During a few cases, someone with motor neurone malady might die suddenly however painlessly throughout their sleep.

2. RELATED WORK

The patients who have motor neutron disease problem were all speechless. Patients used to communicate to other people using swift key techniques and other software for words. In this technique, there will be a screen which contains all the alphabets from a to z in the order. Whenever the patients want to communication all letters from a to z pops out screen. When patients see the first letter of the work, he will tweak his cheek so that the caretaker will get to know the requirement of the patients.

Patients will be given with the eyeglasses, which have sensors in it, so whenever the patients tweak his check the sensors present in the eye glasses gets activated. Later the better is selected with a help of swift key technique. Then with the help of software for words, the excepted words will be displayed on the screen. There is one most technique called Electro-oculography that defines the interface of an eye gaze that make use of biological called as electro oculogyric. This interface of eye gaze helps then user to move the computer cursor on gui. This is useful for communicating with the other purpose. These methods are very painful because we make use of electrodes. The electrodes will be pieced to the upper layer of a skin around the eyes to measures the potential difference of the eye and measure of eye blinks. In fig 1. represents the person using swift key techniques for communication

Fig. 1: Patients using swift key method for communication

3. PROPOSED SYSTEM

In our project we have a tendency to build use of video oculogragy. In video oculuograpy there'll be a camera hooked up to the wheel chair of the patients that may record the attention blink of the patients and convert that reflex to the important sentences so the one who is taking acre of that patients can come back perceive|to grasp} and understand the sentences and patients will simply communicate with the individuals.Video-oculography may be a non invasive system and a video based mostly technique that is employed to live the vertical and horizontal position of the parts of each the attention blinks by victimisation the camera to record.in this the technique we've used is straightforward and fewer time overwhelming.This American state created for simple communication for the patients.There will be set of pictures keep displaying on the screen the patients blinks the attention at the actual image that the image would describe the patient want.The most helpful organ in organic structure is eye.With the analysis of the attention movement more info regarding the patient would be disclosed. Analysing of the attention movements is employed in identification of the many different application like identification, recognizing and therefore the activity of an individual. This paper embrace a number of the algorithms that's used for detections of eye blinks, some of the algorithms are OpenCV, Haar-Cascade algorithms, that is used for communication. This technique is incredibly much useful for the patients. The objective of developing algorithmic program of a true time video Oculography system is that to produce effective for those those that cannot afford because the previous technique was too expensive. Thus, it's necessary to design the system that is reasonable to which is less effective elements.

Electrode less system,It is to develop a system within which the patient will communicate with none application of electrodes. As a result of this electrodes got to be punctured to the skin of organic structure that is incredibly painful. The utilization ofelectrodes and technique offered asof currently that is price effective however it's painful and the patient will fell uncomfortable too. There are few algorithms that is developed for video Oculography system for communication. the most objective of this project is to develop algorithmic. This project is to develop AN algorithmic program that is a lot of correct compared to the prevailing ones. In Fig 1.2 represents the system of video oculography.

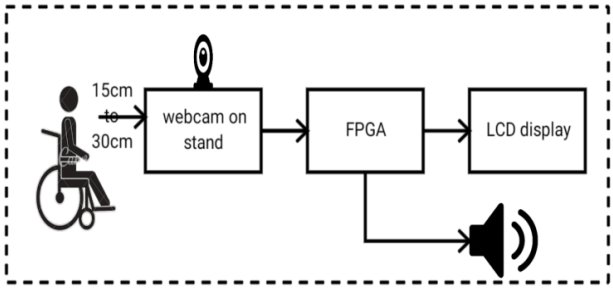

Fig. 2: Represents the system of Video-Oculography

The blinks is used to transmit messages to international Morse code, within which wink is depicted as dash or dot. Thus this technique is painful and therefore the patient is going to be acutely aware and uncomfortable. And there exists the concept to develop associate degree eye-motion detection system for the dysfunction patients. Two forms in motor nerve sickness, lower motor nerve disease and higher motor nerve disease. The lower nucleon may be a lesion that affects the nerve that travels from ventral horn of funiculus to the regarding muscle associate degree higher motor nerve may be a lesion that is dissimilar to higher motor nucleon. It affects the nerve that travels from spinal cords anterior horn to the regarding muscle. The patients laid low with MND have difficulties in speech. Not everybody laid low with MND can have this drawback. Loss of speech will be onerous to regulate. it's troublesome for the patients to create the caretaker perceive what we want particularly once in hospitals. It becomes troublesome for the patients to precise their feelings and even they can't participate in conversations. This method incorporates totally different visual technologies, like wink detection, eye center localization and conversion of the attention blink to speech. In fig1.3 shows that overview of the proposed system

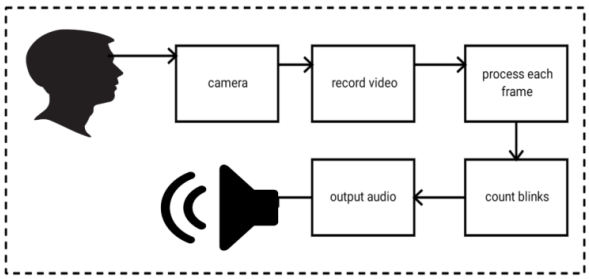

Fig. 3: Overview of the proposed system

4. METHODOLOGY

This system can be used in Hospitals and used at home as well. Here the input is taken from eye blink sensor, which is interfaced with Raspberry Pi. Based on input taken from the sensor the relay circuit will activate and corresponding application is executed. It can also be operated through Android, PC and Laptops.

4.1 Eye Blink sensor

This Eye Blink sensor sense the eye blink using the infrared, The Variation Across the eye will vary as per eye blink. The eye –blink sensor works by illuminating the eye and eyelid area with infrared light. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye. The eye blink sensor is an IR based blink sensor. If the eye is closed, it means the output is high otherwise the output is low. Here the input is sampled one times per blink, these input blinks are classified as a short or long blink. Since ten appliances are being controlled simultaneously, each blinks are used to control the appliance.

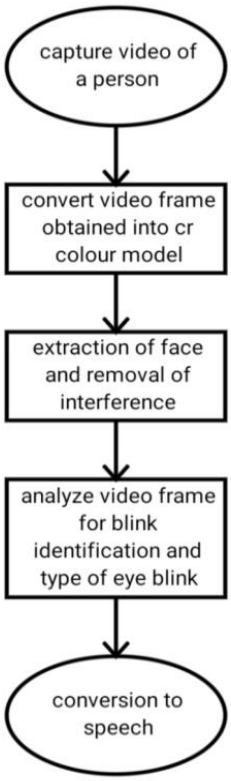

Fig. 4: Flowchart of face and blink recognition

4.2 Face Detection

Face Detection is the first and essential step for face recognition, and it is used to detect faces in the images. It is a part of object detection and can use in many areas such as security, biometrics, law enforcement, entertainment, personal safety, etc. It is used to detect faces in real time for surveillance and tracking of person or objects. It is widely used in cameras to identify multiple appearances in the frame Ex- Mobile cameras and DSLR's. Facebook is also using face detection algorithm to detect faces in the images and recognize them.

4.2.1 Knowledge based: The knowledge-based methodology depends on rules and it's supported human information to discover the faces. Ex- A face should have a nose, eyes, and mouth at intervals bound distances and positions with one another. the large downside with these ways is that the issue in building Associate rules.

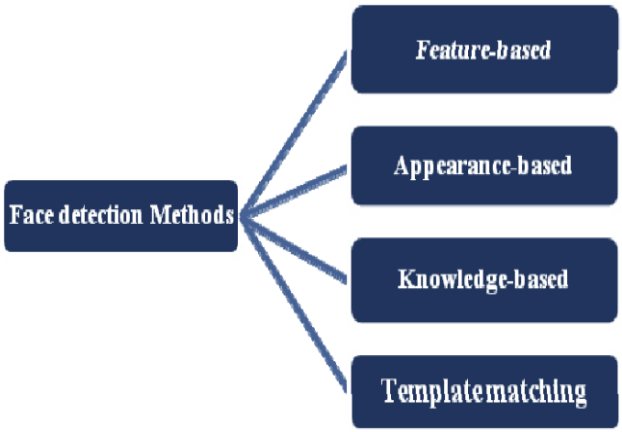

Fig. 5: Face Detection Method

4.2.2 Feature Based: The feature-based methodology is to find faces by extracting structural options of the face. It's 1st trained as a classifier then accustomed differentiate between facial and non-facial regions. The thought is to beat the boundaries of our natural information of faces. This approach divided into many steps and even photos with several faces they report successful rate of ninety-four.

4.2.3 Template Matching: Template Matching methodology uses pre-defined or parameterized face templates to find or discover the faces by the correlation between the templates and input pictures. Ex- an individual's face is often divided into eyes, face contour, nose, and mouth. Models are often engineered by edges simply by victimization edge detection methodology. However, deformable templates are projected to handle these cases.

4.2.4 Appearance Based: The appearance based methodology depends on a collection of delegate coaching face pictures to seek out out face models.

4.3 Arduino

Arduino is an open-source electronics platform and a mini-computer that can be used as a development tool for different software and hardware based projects. The Arduino belongs to a family of microcontroller. Arduino Uno is having 14 digital I/O pins and 6 analog input pins, it provide more option and stronger foundation for those who are starting in this platform. It support like microcontroller by connecting to pc through USB cable and power supply is provided. LED (Light Emitting Diode) is a semiconductor, which provides high-brightness other than ordinary incandescent bulb; hence it is used to display the traffic light operation and signal. The LED light is used when the paralyzed patient tells to on the light

Fig. 6: Arduino

5. ALGORITHM

5.1 Adaboost Algorithm

Adaptive Boosting, is a machine learning meta-algorithm. It can be used in conjunction with many other types of learning algorithms to improve performance. The output of the other learning algorithms is combined into a weighted sum that represents the final output of the boosted classifier. AdaBoost is adaptive in the sense that subsequent weak learners are tweaked in favor of those instances misclassified by previous classifiers. The individual learners can be weak, but as long as the performance of each one is slightly better than random guessing, the final model can be proven to converge to a strong learner. AdaBoost refers to a particular method of training a boosted classifier. A boost classifier is a classifier in the form.

$$F_T(x) = \sum_{t=1}^{T} f_t(x)$$

It focuses on classification problems and aims to convert a set of weak classifiers into a strong one. The final equation for classification can be represented as

$$F(x) = sign(\sum_{m=1}^{M} \theta_m f_m(x))$$

5.2 Haar Cascade Algorithm

Haar Cascade Algorithm is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. Cascade classifier training requires a set of positive samples and a set of negative images. We must provide a set of positive images with regions of interest specified to be used as positive samples. We can use the Image Labeler to label objects of interest with bounding boxes. The Image Labeler outputs a table to use for positive samples. We will provide a set of negative images from which the function generates negative samples automatically. To achieve acceptable detector accuracy, set the number of stages, feature type, and other function parameters.

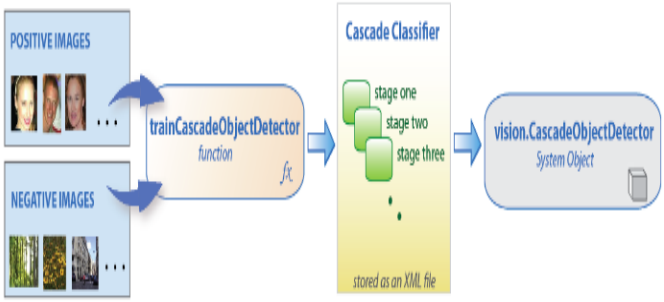

Fig. 5: Cascade Classifier

6. RESULT

The users tested the developed eye-blink controlled user interface. The testing sessions consisted of using the interface with a virtual keyboard, using the interface with a virtual keyboard and using web browsing. The input times were measured and expressed in seconds. The average input speed for the user interface with the virtual keyboard was equal to 2-3 seconds. It works on Automated system using camera. Recognise the Eye Blink detection using camera and Blink to voice conversion using Raspberry pi. Hands-free operation Blink into Device automation.

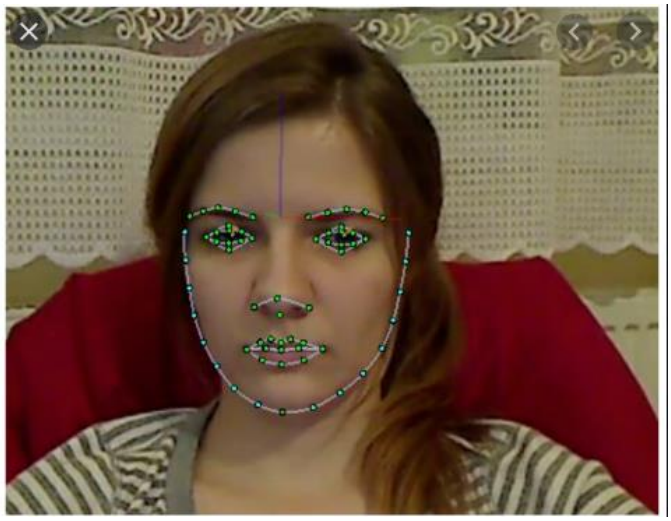

Fig. 6: Result

7. CONCLUSION

This venture is essentially for paralysis patients who endure a great deal. We are attempting a little bit through this venture so that at any rate they can control the home appliances. We have additionally plan to enhance this venture with better showing advantages an eye blink sensor is transducer which detects an eye blink, and gives a yield voltage at whatever point the eye is shut that can help the patient to control the home apparatus and others, for example, switch on off the light or control the fan speed and also call for assistance.

To sum up we want to say this is doing works using Arduino Nano and various sensors was a great experience as we got to know many valuable things. Our project will be useful mainly for the paralysis patients and senior citizen. Though we are thinking about prototype of the project our model has implemented and tested but to introduce it in real life a lot more improvements and also equipment are needed. One of the main motives of our project was to help patient to make their life easier and our system will be fulfilled when we can use the system in real life and people will be benefited.

8. REFERENCES

[1] Reference 1 “Assistance for the Paralyzed using Eye Blink Detection ”Atish udayshankar, Amit R Kaushik IEEE Paper Fourth International Conference on Digital Home 2012,China.

[2] Reference 2 “Augmentative and Alternative Communication device based on eye-blink detection and conversion to Morse-code to aid paralyzed individuals”, Kingushuk Mukherjee , Debdatta Chatterjee IEEE Paper published on 15-17 2015 Jan, Mumbai.

[3] Reference 3 “Assistance for Paralyzed Patient Using Eye Motion Detection”, Milan Pandey ,Kushal Chaudhari , Rajnish Kumar , Anoop Shinde , Divyanshu Totla ,N.D. Mali , IEEE Paper Published ON 16-18 Aug 2018, Pune.

[4] Reference 4 “Smart eye blink solution for mnd patient using python” , Tambe Samreen Mohammed, Rajeshwari P,IEEE Paper Published on 2015,Bangakore.

[5] Reference 5 “Converting Intent of Physically Impaired into Text using Eye Blink Detection”, Veena N, Anitha N, July 2019.

[6] Reference 6 ”Eye blink detection using Local Binary Patterns”, Krystyna Malik , Bogdan Smolka, IEEE Paper Published On 14-16 April 2014 Morocco.

