IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 5, May 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

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|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005110|

Mouse Control Using Facial Gestures

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ABSTRACT: Human-Computer Interface (HCI) is focused on use of computer technology to provide interface between the computer and the human. There is a need for finding the suitable technology that makes the effective communication between human and computer. Human computer interaction plays the important role. Thus, there is a need to find a method that spreads an alternate way for making communication between the human and computer to the individuals. As computer aided learning is growing up, the significance of human-computer interaction is rapidly expanding. Human and computer interconnection has expanded in recent years. Personal and computer computations are a need in the workspace as well as for academic purposes. In the proposed system, we have included the face detection, face tracking, eye detection and interpretation of a sequence of eye blinks in real time for controlling a nonintrusive human computer interface. The image is preprocessed by flipping and converting into gray scale image. These movements are further graphed to a computer screen to position a mouse cursor accordingly. The movement of the mouse is automatically adjusted by the position of the anchor point. Camera is used to capture the image of face movement. The system would take the real-time video input from the user with the help of OpenCV and run in the background. It is able to perform all mouse controls along with some other keyboard controls.

KEYWORDS: PWDs, disabled, facial gestures, opencv, feature extraction, recognition, HOG, HCI, cursor control

I.INTRODUCTION

As computer aided learning is growing up, the significance of human-computer interaction is rapidly expanding. Human and computer interconnection has expanded in recent years. Personal and computer computations are a need in the workspace as well as for academic purposes. Thus, a vision-based approach is taken into account and an effective technique to develop human-computer interface systems is used. A webcam is required to acquire images of facial movements that are recorded by the webcam. These movements are further graphed to a computer screen to position a mouse cursor accordingly. The movement of the mouse is automatically adjusted by the position of the anchor point. Camera is used to capture the image of face movement.

II.MOTIVATION

The motivation behind this project lies in growing an economically feasible and hardware-independent machine using which humans can control the system without having any bodily reference to the PC. The main aim lies in creating a system that is environment friendly to use and at the same time, it is effortless for handicapped or person with disabilities. It needs to supply flexibility to the person as properly as it needs to no longer be time-consuming.
Theory.

2.1 Real-time detection of eyes and faces
In reference [1], the author tried to work on the system's slow response to eye detection. A processor namely, Pentium 11333 Mhz, machine is used for the detection of pupil and the face. This includes taking 30 frames per second. Moreover, it makes use of a PCI frame grabber that is incapable of processing the acquired image and therefore synchronization of the frames is done with the help of a hardware that illuminates the pupil.

2.2 Fast and robust classification using asymmetric aboost and a detector cascade
The face detection is the main element of the proposed system, and it is strongly related to system performance. The search for the user’s face is performed with the help of the OpenCV library and it happens in 2 different search modes.

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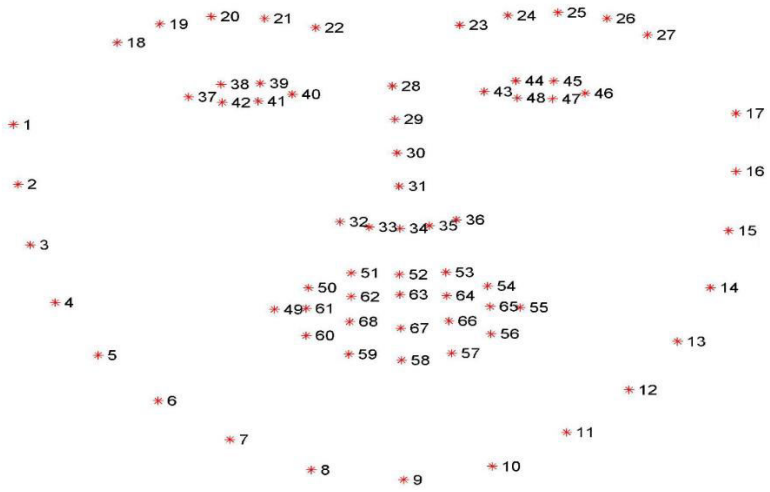
2.3 OpenCV based real-time video processing using android smartphone

Having the face location is not enough for the system to execute the control of the operating system, so it is necessary to look for more elements that allow the system to identify the face's position and other face elements such as eyes, mouth and nose. The proposed system use face landmarks to estimate the face position. These points provide also information about the position of the eyes and mouth.



2.4 Controlling mouse cursor using eye movement

It has explained the three different approaches. The Regression approach is used to minimize the distance between the predicted and actual eye positions, Bayesian approach learns model of eye appearance and non-eye appearance. and Discriminative approach Treats the problem as one of classification.

III.OBJECTIVES

1. To accurately detect gestures and process it to perform various tasks defined in the system.
2. To provide ease of access while using the system.
3. To create a utility where persons with disabilities can easily communicate with PC and use it with only facial gestures.
4. The user should be able to control all mouse activities just by using facial gestures.
5. User should be able to control some most used actions easily with gestures.

IV.PROPOSED METHODOLOGY

The implementation of the proposed system is as explained below:

1. The system continuously captures video through webcam.
2. This input stream is flipped and converted into frame and this frame is converted to grayscale.
3. The frame is processed for finding face. When a face Is detected features of the face are extracted.
4. These features are compared with the trained model features and then gesture made by the user is recognised.

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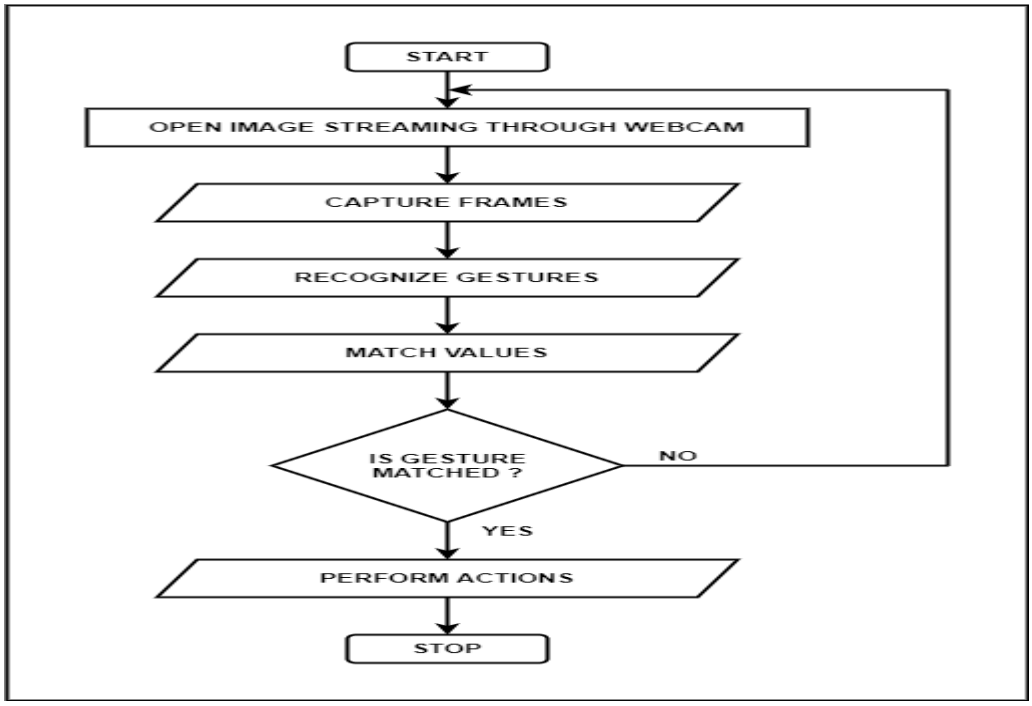
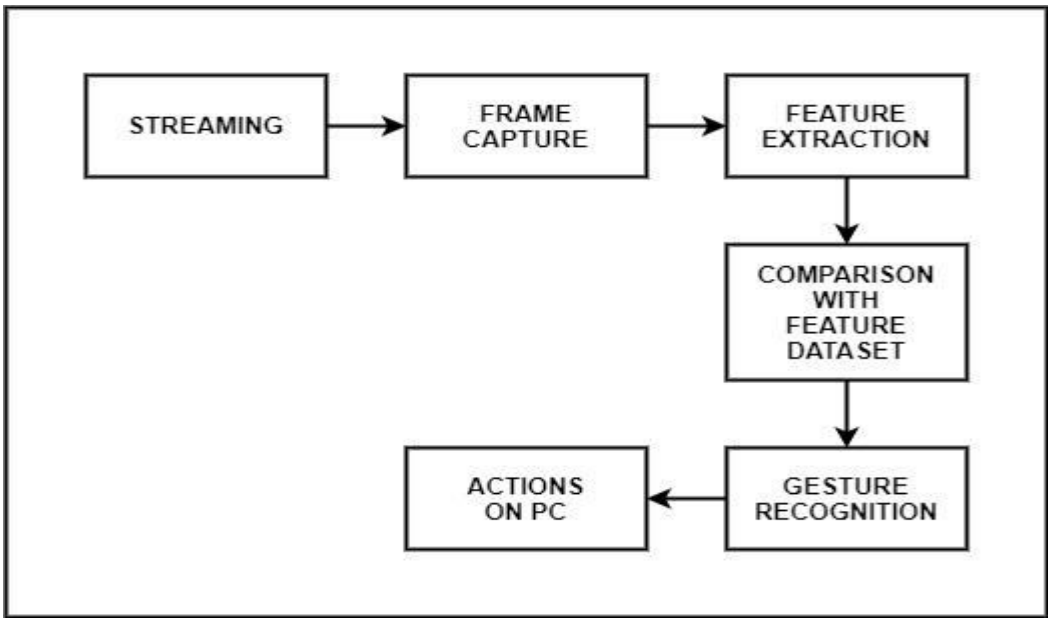
FLOWCHART



IV.SYSTEM ARCHITECTURE / BLOCK DIAGRAM

The proposed system comprises of building a utility system for controlling all the mouse actions along with some other actions. These actions are carried out by making facial gestures that are captured by the webcam and processed and recognized by the utility. The main aim lies in creating a system that is environment friendly to use and at the same time, it is effortless for handicapped or person with disabilities.



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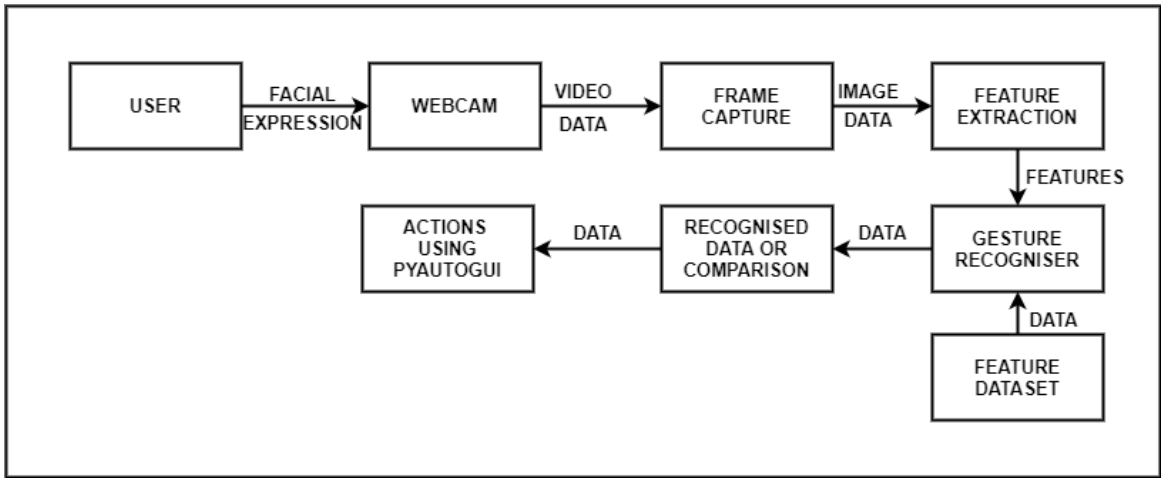
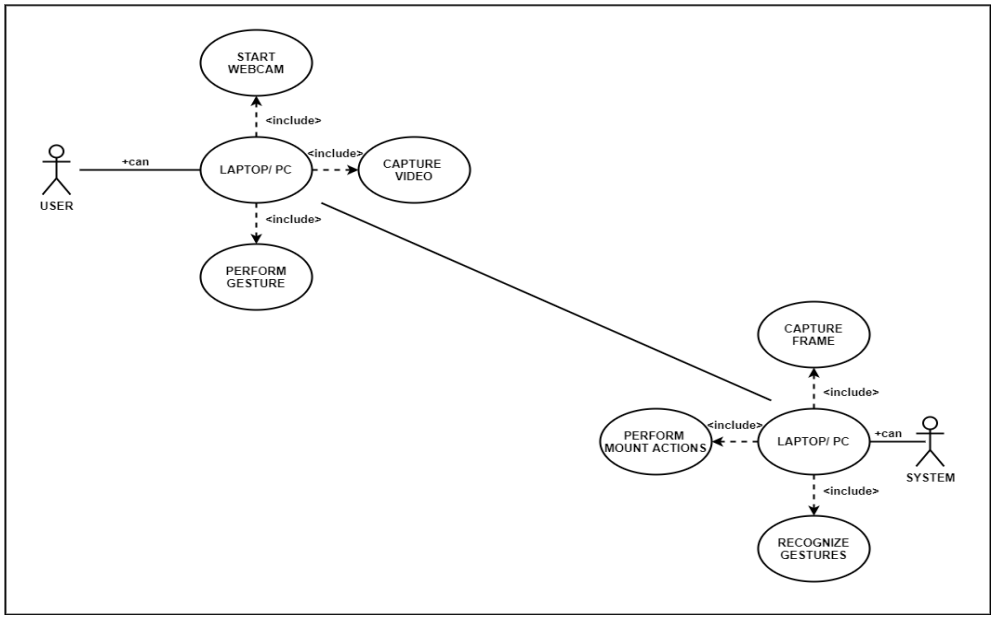
DATA FLOW DIAGRAM



USE CASE DIAGRAM



V.RESULTS & DISCUSSIONS

Test 1- Virtual Keyboard Writing

The second test was a simulation of a common task in personal computers: typing a text. With this feature it is possible to conduct searches on the internet and use social sites, it is also possible to access training and distance learning sites as well as professional tools.

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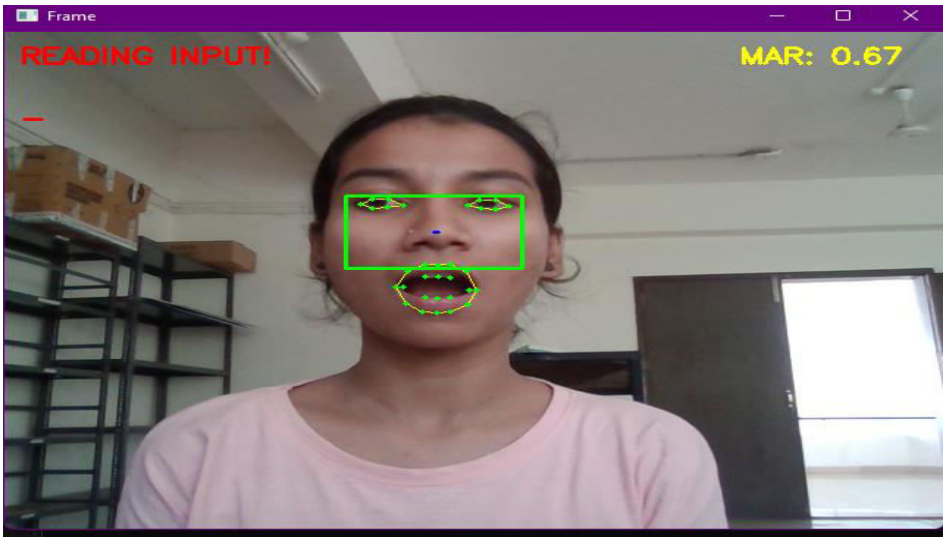
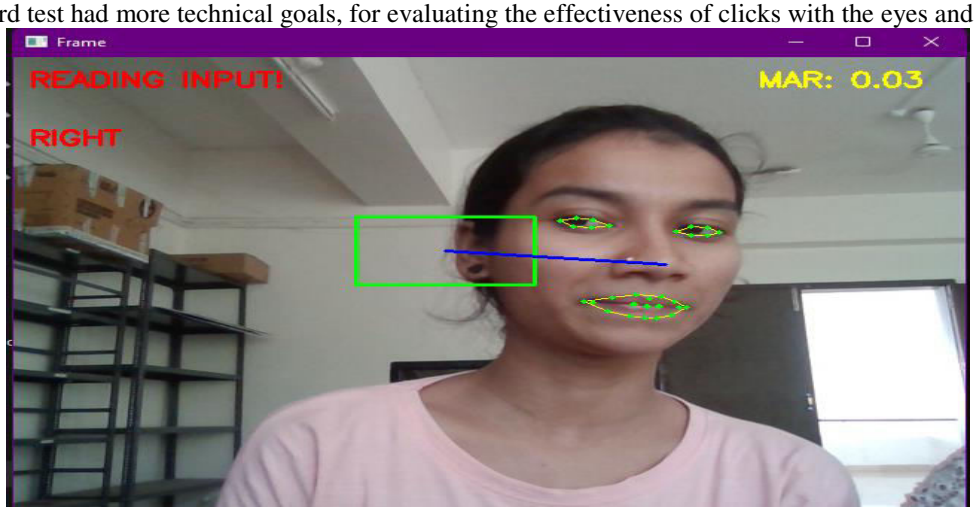
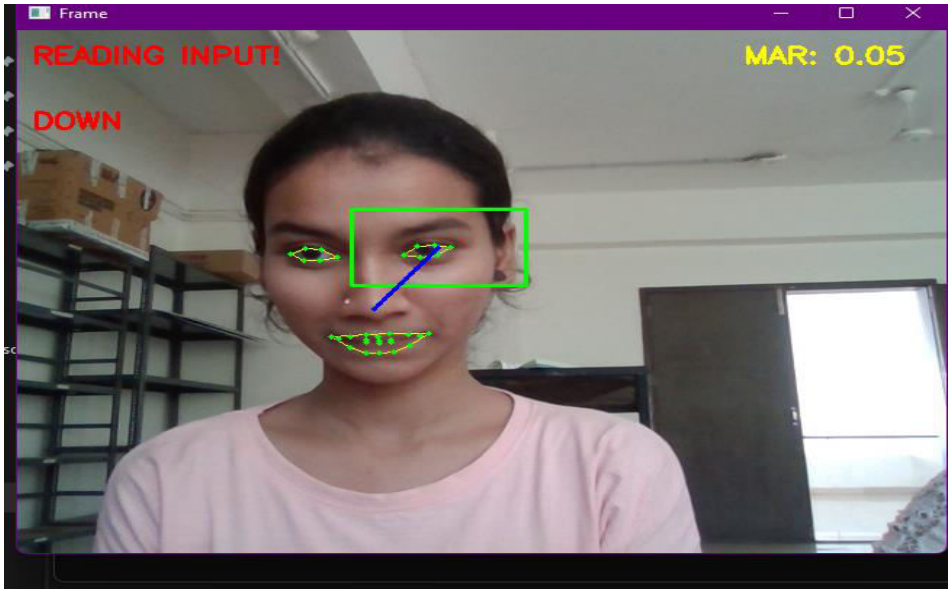


Test 2- Click Evaluation

The third test had more technical goals, for evaluating the effectiveness of clicks with the eyes and mouth.



Test 3–Mouse Moments Upward and Downward



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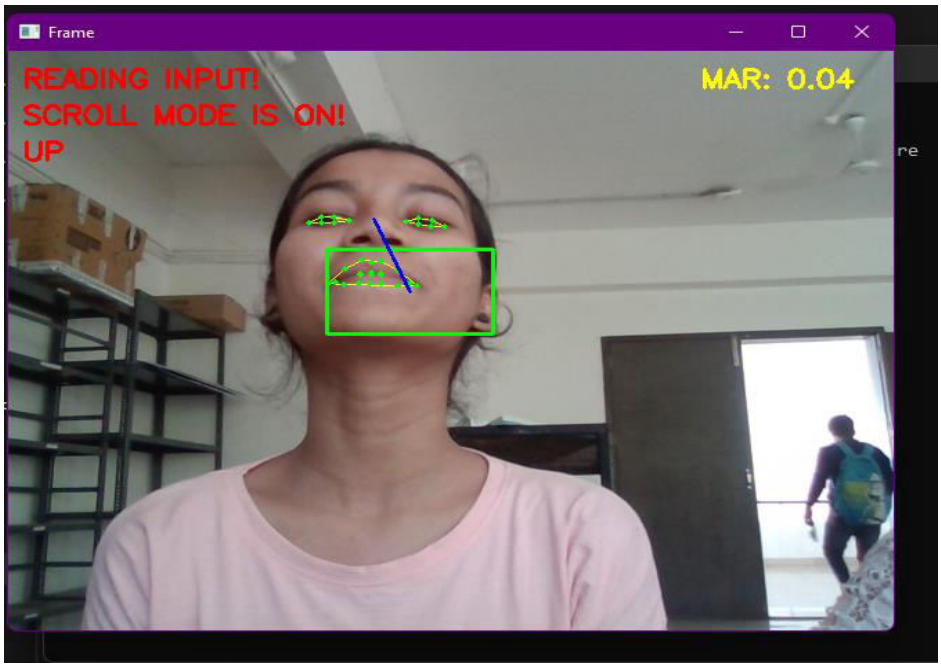

VI.CONCLUSION & FUTURE SCOPE

The proposed system would take real-time input from users with the help of OpenCV and run the application in the background. This application can be implemented on laptops and desktops with inbuilt or external webcams. With the help of this application, the user can perform actions like moving the cursor in all directions, clicking functions, scroll function and drag function. Thus, the system would be functional and useful for physically challenged users. One prominent advantage of the application is available in a ready-to-install executable file without the need of external packages. The application can be set to auto-start on system boot to avoid the inconvenience of manually launching the application. Some system limitations are low lighting conditions because the user's face will not be clearly detected under low light.

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Impact Factor: 8.165

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ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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