Human Eye Gesture - A Method for Computer Interaction

Prof. S.B. Chaudhari  
Assistant Professor  
Trinity College of Engineering

Shubham Chaudhari  
Student  
Trinity College of Engineering

Akshay Lokhande  
Student  
Trinity College of Engineering

Atul Wani  
Student  
Trinity College of Engineering

Balaji Ipper  
Student  
Trinity College of Engineering

Abstract

In this paper we are introducing a system for human computer interface using eye motion is introducing. This system is for handicapped persons which are not able to operate a mouse and mouse function so they can able to operate all mouse function such as cursor moving and click operations on their eye movement. Traditionally for giving the input to the computer system mouse, keyboard devices are used. This paper represents the system which is totally hands free. This system provides a hands free interface between computer and human. The system we introduced is real time, on intrusive and provides affordable technique for eye gaze. Generally webcam is used in eye gaze technique but in this paper we do improvement in eye gaze technique instead of webcam we are using IR Sensor and IR LED'S for accuracy purpose. In this paper we introduced a least square algorithm for gaze direction and effective classification algorithm for different operations.

Keywords: Data Acquisition System, Eye Gesture, Human Computer Interface, Eye blink detection, IR sensors

I. INTRODUCTION

In this paper we are developed a system that take a combination of hardware and software and used them as low power devices. Recently in computer vision we can developed various system based on hand gestures, gait analysis, action analysis [1, 2]. It can be help in mobile robot to take an action on a specific event. In today’s world the gaze tracking has a lot of progress and it makes a lot of an impact on some aspect of human life. Traditionally webcam device i.e. camera based human interaction is use but they are little bit expensive, inaccurate and suffered from many errors and there is a lot of delay in the output. So we are using IR Sensor glasses for the interaction purpose with the computer system. So it is useful to hand disabled person to operate a smart devices. It also may useful to improve the human computer interaction. Computer interaction is most important thing in human computer interaction. The Gaze tracking technique improves the vision in robotics and smart intelligent devices. Many of the gaze trackers are designed with camera, hardwired lenses. We are using the infrared sensors for tracking purpose.

In this paper we represent the procedure that how hardware i.e. IR Sensor glasses work and how It produce a digital and analog value on the basis of eye movement. After getting this value how this value is passed to the computer and then the left, right, up and down movement of cursor is detected.

A. Objective:

The main objective of this project is to help the physically disabled people to handle the computer. They can communicate with the world through social networking websites. This project also encourages e-learning. This project also helps the people to completely replace mouse by the pupil movements. The user can browse the complete user interface.

This paper is organized in as follows: Section II tells about the need of the system. Section III represents the Hardware Specification. In section IV represent the Software Specification, Section V represent the software architecture, and Section VI represent the scope of the system and finally conclude the paper in section VII.

II. NEED OF THE SYSTEM

The need of this system is more for the physically-challenged people. Mostly the physically-challenged people are not able to operate a computer system because of their physical disability. These limitations can be overcome by this system as they can move the cursor and perform operations on the system just by moving their iris. This system will also make the physically-challenged
people independent; they can earn their own livelihood. There is a need to develop a new interaction system for the physically-challenged people. Nowadays all systems work on laptops and computers, people need a good human interaction interface which can be provided by our system.

III. HARDWARE SPECIFICATION

In this section we are describing the hardware that is used in our system. Our system is basically containing the two main parts of hardware. These parts are as follows
1) IR sensor Goggles.
2) Data Acquisition System

A. IR Sensor Goggles:

In IR sensor Goggles the Ten IR Sensors are placed on the both side of goggles. This IR sensor comes in pair of transmitter and receiver where transmitter transmit the light on our eye iris and receiver receive the movement of iris. In IR Sensor the Transmitter and receiver place in parallel position. These transmitter is in blue color LED and Receiver is in White color LED [3].

B. Data Acquisition System:

In our system we are using the Arduino as a platform for collecting the data from the IR Sensor. We are using Arduino as a Data Acquisition System. The Arduino ATMEGA 328-PU version is used. Arduino consist of both physical programmable circuit board it is also called as microcontroller and the piece of software and IDE i.e. integrated development environment that runs on computer and it is used write and upload the code of computer to the physical board. The IDE of Arduino used a simplified version of C++ because it is easier to learn. This Arduino is specially used for creating a bridge between IR sensor goggles and PC Software. The main task of Arduino is as follows:
1) The Arduino provides the regular power supply to the goggles.
2) The Arduino collect the Analog signal from IR sensor on the basis of iris movement and Arduino process the value and convert it into some value. This value is in the form of vector.
3) The Arduino produced the interface between the computer and hardware so it sends the value to the computer.
IV. SOFTWARE SPECIFICATION

In software specification we are developing software that can fetch a data from hardware and perform some major tasks. Following are the important tasks performed by software:
1) The Software collects the data from the Data acquisition system i.e. Arduino and process that data and provide user interface for communicating with the computer system.
2) We are using least square algorithm for the estimation the direction of eye. By gaze estimation it determines the cursor of position.
3) We are also use the effective pattern classification algorithm for performing mouse operation such as Right Click, Left Click and Double Click function.

V. SOFTWARE ARCHITECTURE

In our system we are using the Goggles with planted Infrared sensors. We are using 10 Transmitter sensors and 10 Receiver Sensors. The Transmitter sensors transmit the light of 900 nm on the eyes which is not bad for health and Receiver receive the values through the movement of pupil. We are trying to make use of digital Signal. We take the values using Data Acquisition System (DAQ) and with help of robot class in java we do the functions of cursors.

VI. SCOPE

This system is limited for only those people who have clear eyesight. It is also useful to those people who are physically disabled but they have a proper understanding capacity. The iris movements of user’s eyes are detected through IR (Infra-red) sensors. This project is limited for mouse movements using eyes that are for left click, right click, to move cursor upwards, to move cursor downwards and double click. A single cursor generated by the PC Software can perform many operations like moving the cursor around the complete window, starting a particular program, closing a particular program.

VII. CONCLUSION

In this paper, the system which is basically based on low price and portable components in a wearable form was put forward and implemented using gaze approximation and has successfully done blink identification for click actions. Without using of regular video camera can be considered as an advantage of the proposed system. The result of this system produced an assured user interface in some cases where hand control is difficult. By this technology the human life is become easier and it is very easy to operate a mouse using eye movement.

REFERENCES