Eyegaze Communication System

K. Vignaashri
Dept of CSE,
PITS.

S. Jesima
Dept of CSE,
PITS.

Abstract:- **The objective of the Eye gaze project is to use Eye gaze of the human by the means of interaction with the computer. As such, we have to develop a commercial computer system such that users will be able to operate computer based system by giving commands making use of his eye only. For instance to perform particular function such as to switch ON/OFF lights, the user activate control key on the screen in front of the function only by looking towards that key. The advantage of this system that there is no need of any physical connection between user and the system.**

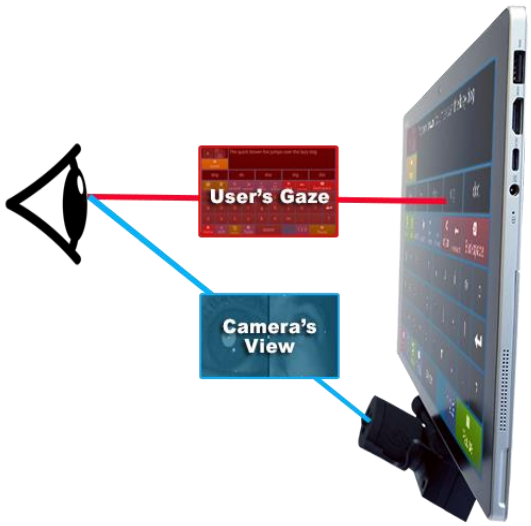
1.INTRODUCTION:

Average computer user spend most of their time looking at the computer screen. A number of researcher found that detection of eye gaze is fruitful for operating the computer system. For human computer interaction natural user handles the computer system or perform their daily work with natural behaviour. But the disabled person cannot perform their daily work naturally. So eye gaze communication system helps them live their life independently. It is also called as hand free communication.The eyegaze communication system is a communication system which is very useful for the blind persons with the help which they can perform their daily activities by using such a communication system. In other words, the Eye tracking is the process of measuring either the point of gaze (where one is looking) or the motion of an eye relative to the head. An eye tracker is a device for measuring eye positions and eye movement. Eye trackers are used in research on the visual system, in psychology, in cognitive linguistics and in product design. There are a number of methods for measuring eye movement. The eyegaze System is a commsunication control system that you can run with your eyes. The Eyegaze System is a direct-select visioncontrolled communication and control system. The motto of this paper clearly deals with the case study of eyegaze communication system.

2.EYEGAZE SYSTEM USERS:

This system is mainly developed for those who lack the use of their hands or voice. Only requirements to operate the eyegaze Systems are control of at least one eye with good vision and ability to keep head fairly still. Eyegaze Systems are in use around the world. Its users are adults and children with cerebral palsy, spinal cord injuries, brain injuries, ALS, multiple sclerosis, brainstemstrokes,muscular dystrophy and Werdnig-Hoffman syndrome. Eyegaze Systems are being used in homes, offices, schools, hospitals, and long-term care facilities. By looking at control keys displayed on a screen, a person can synthesize speech, control his environment (lights, appliances, etc.), type, operate a telephone, run computer software, operate a computer mouse and access the internet and e-mail. Eyegaze Systems are being used to write books, attend school and enhance the quality of life of people with disabilities all over the world.

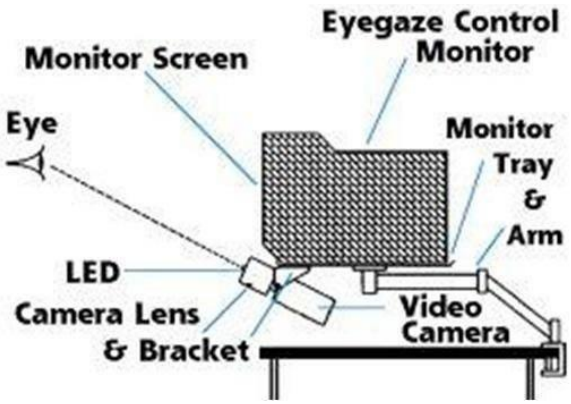
3.EYEGAZEWORKING PROCEDURE:



As a user sits in front of the eyegaze monitor, a specialized video camera mounted below the monitor observes one of the user's eyes. Sophisticated image- processing software in the eyegaze System's computer continually analyzes the video image of the eye and determines where the user is looking on the screen. Nothing is attached to the user's head or body. In detail the procedure can be described as follows: The Eyegaze System uses the pupil-center/corneal reflection method to determine where the user is looking on

the screen. As infrared-sensitive video camera, mounted beneath the System's monitor, takes 60 pictures per second of the user's eye. A low power, infrared light emitting diode (LED), mounted in the center of the camera's lensilluminates the eye. The LED reflects a small bit of light off the surface of the eye's cornea. The light also shines through the pupil and reflects off of the retina, the back surface of the eye, and causes the pupil to appear white. The bright-pupil effect enhances the camera's image of the pupil and makes it easier for the image processing functions to locate the center of the pupil. The computer calculates the person's gazepoint, i.e., the coordinates of where he is looking on the screen, based on the relative positions of the pupil center and corneal reflection within the video image of the eye. Typically the eyegaze System predicts the gazepoint with an average accuracy of a quarter inch or better.The user calibrates the system by fixing his gaze on a small yellow circle displayed on the screen, and following it as it moves around the screen. The calibration procedure usually takes about 15 seconds, and the user does not need to recalibrate if he moves away from the eyegaze System and returns later.

4.HOW DOES IT WORKS?



A user operates the eyegaze System by looking at rectangular keys that are displayed on the control screen. To "press" an eyegaze key, the user looks at the key for a specified period of time. The gaze duration required to visually activate a key, typically a fraction of a second, is adjustable. An array of menu keys and exit keys allow the user tonavigate around the eyegaze programs independently.

5.SPECIFICATIONS:

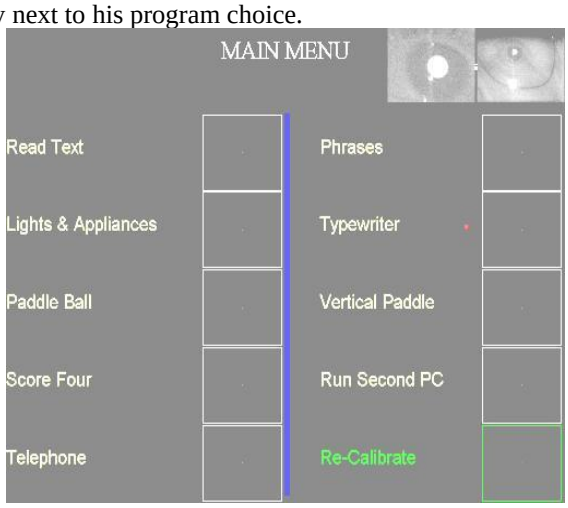
This system is robust and extremely easy to calibrate.
System explicitly accommodate several common sources of gaze-point tracking error.A video camera located below the computer screen remotely and unobtrusively observes the subject's eye.No attachments are required to the head.A small light emitting diode (LED) is located at the center of the camera lens which illuminates the eye. The LED generates the corneal reflection and causes the bright pupil image which enhances the camera's image of the pupil.

6.SKILLS REQUIRED FOR THE USER:

- Good control of one eye
- Adequate vision
- Ability to maintain a position infront of the eye gaze monitor.
- Mental abilities.

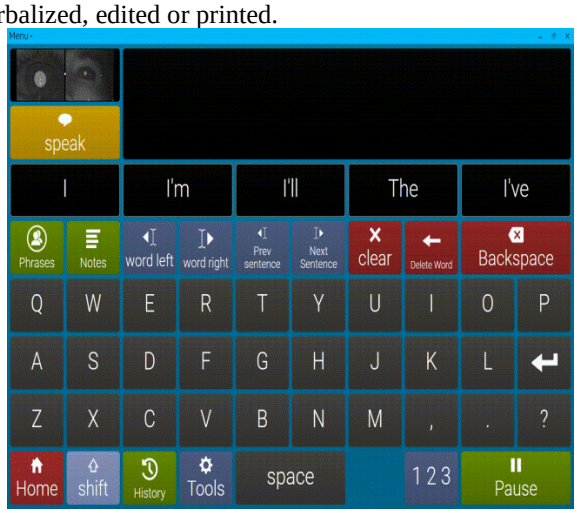
7.MAIN MENU OF THE EYEGAZE SYSTEM:

The Main Menu appears on the screen as soon as the user completes a 15-second calibration procedure. The Main Menu presents a list of available eyegaze programs. The user calls up adesired program by looking at the eyegaze key next to his program choice.



7.1 THE TYPEWRITER PROGRAM:

Simple word processing can be done using the Typewriter program. The user types by looking at keys on visual keyboards. Four keyboard configurations, simple to complex, are available. Typed text appears on the screen above the keyboard display. The user may "speak" or printwhat he has typed. He may also store typed text in a file to be retrieved at a later time. The retrieved text may be verbalized, edited or printed.



7.2 THE TELEVISION PROGRAM:

Television programs can be displayed directly on the desktop eyegaze System screen. On-screen volume and channel controls provide independent operation. (Not available on the Portable eyegaze System).

8.APPLICATION:

A wide variety of disciplines use eye tracking techniques, includingcognitive science, psychology (notably psycholinguistics, the visual world paradigm), human-computer interaction(HCI), marketing research and medical research. Specific applications include the tracking eye movement in language reading, music reading, human activity recognition the perception of advertising, and the playing of sport. Uses include:

- Cognitive studies
- Medical research
- Computer usability
- Vehicle simulators
- Virtual reality
- Fatigue Detection

9.CONCLUSION:

With today's technologies, the human eye-gaze can be recorded by unremarkable techniques. The basic reason for eye-gaze based user interfaces is that it is a potential porthole into the cognitive processes and communication with the direction of the eyes which is faster than any mode of human communication. The into the current cognitive processes and communication through the direction of the eyes is faster than any other mode of human communication. It is argued that eye gaze interests of the user, it is a potential porthole tracking data is best used in multi model interfaces where the user interacts with the data instead of the interface, in so-called non command user interfaces. main reason for eye-gaze based user interfaces being attractive is that the direction of the eye-gaze can express the

10.REFERENCES:

[1] Kyung-Nam Kim, R.S. Ramakrishna, "Vision Base Eye Gaze Tracking For Human Computer Interaction", Department Of Information And Communication, Kwangju Institute Of Science And Technology, Kwangju, 300-712, Korea (ROK).

[2] Manu Kumar, "Gaze-Enhanced User Interface Design, A Dissertation Submitted To The Department of Computer Science And The Committee on Graduate Studies, Stanford University,

[3] Linda E. Sibert And James N. Temple man, Robert J. K. Jacob, "Evaluation and Analysis of Eye Gaze Interaction", Human Computer Interaction Laboratory, Naval Research Laboratory

[4] Washington, Dc 20375, Department Of Electrical Engineering And Computer Science, Tufts University Medford, Ma 02155.

[5] JowersIestyn, PratsMiquel, Mckay Alison, Steve Garner, "Evaluating An Eye Tracking Interface For A Two Dimensional Sketch Editor", University of Leeds, Leeds And The Open University, Walton Hall, Milton Keynes, Mk7 6aa, Ls2 9jt, UK.

[6] Susanna Nilsson, Torbjorn Gustafson and Per Carlsberg, "Hands Free Interaction with Virtual Information in A Real Environment: Eye Gaze as an Interaction Tool in an Augmented Reality System", Linköping University, Sweden, 28th April, 2009.