

# EMIVR Based Smart Computer

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## ABSTRACT

Man has five senses representing natural windows of communication between him and outside world. Talking and Eye Tracking is the best means of communication existing. Speech recognition and eyeball position can be applied in computer devices to control the useful software to facilitate people in their life. Handicapped people suffer the difficulty of using computers themselves and to spend some basic needs and necessities, usually need another person to help them in that. This assistance is achieved through the design of special system for controlling computer using voice commands and eye ball tracking. Voice recognition allows you to rapidly write text just by speaking to your computer. Accuracy varies depending on your accent, how fast you speak, surrounding noise levels and subject nature. Eye tracking is a technique to measure either the point of gaze (where someone is gazing) or the motion of an eye relative to the head. Eye tracking technology has applications in industry and research in visual systems psychology assistive technologies marketing as an input device for human computer interaction and in product and website design.

Keywords : FiveSenses, EyeTracking, Communication, Speechrecognition, Handicappedpeople, Accuracy, pointof gaze, Accent, Visuals, Psychology assistive.

## I. INTRODUCTION

### Voice Reorganization :

Voice reorganization allows you to rapidly write text just by speaking to your computer. Accuracy varies depending on your accent, how fast you speak, surrounding noise levels and subject nature.

You can get the basics of using voice reorganization in less than one minute. It may take longer for you to get used to speaking in a way that gives you maximum accuracy.

Nowadays it is being used for health care, telephony military and people with disabilities therefore the digital signal processes such as feature extraction and feature matching are the latest issues for study of voice signal. In order to extract valuable information from the speech signal, make decisions on the process, and obtain results, the data needs to

be manipulated and analysed. Basic method used for extracting the features of the voice signal is to find the Mel frequency cepstral coefficients. Mel-frequency cepstral coefficients (MFCCs) are the coefficients that collectively represent the short-term power spectrum of a sound, based on a linear cosine transform of a log power spectrum on a nonlinear mel scale of frequency.

### Eye Movement:

Generally, eye tracking measures the eyeball position and determines the gaze direction of a person. The eye movements can be tracked using different methods which can be categorized into four categories: (i) infrared oculography (IROG),(ii) scleral search coil (SSC),(iii) electro-oculography (EOG),and (iv) video-oculography (VOG). SSC measures the movement of a coil attached to the eye .VOG/IROG

carries out optical tracking without direct contact to the eye and EOG measures the electric potentials using electrodes placed around the eyes. Currently, most of the eye tracking research for HCI is based on VOG, as it has minimized the invasiveness to the user to some degree. The eye is one of main human input media, and about 80 to 90 percent of the outside world information is obtained from the human eye. For communication from user to computer, the eye movements can be regarded as a pivotal real-time input medium, which is especially important for people with severe motor disability, who have limited anatomical sites to use to control input devices.

The research into eye tracking techniques in HCI is mainly focused on incorporating eye movements into the communication with the computer in a convenient and natural way. The most intuitive solution for incorporating eye movements into HCI is the use of an eye tracker directly connected to a manual input source, such as to do navigation on screen. By installing an eye tracker and using its x, y coordinate output stream as a virtual mouse, the movement of the user's gaze directly causes navigation on the screen (eye mouse).

## II. METHODS AND MATERIAL

### A. Converting voice to computer commands:

Steps:

- A. When people speak; they create vibrations in the air.
- B. The microphone receives voice; it converts voice in air into an electrical signal that transmits analog wave of voice to computer.



Fig 1. Analog waves of voice.

- C. The analog wave of voice is converted to digital format by AID convertor. The quality of voice is determined by quality of AID convertor (sampling and precision rates).

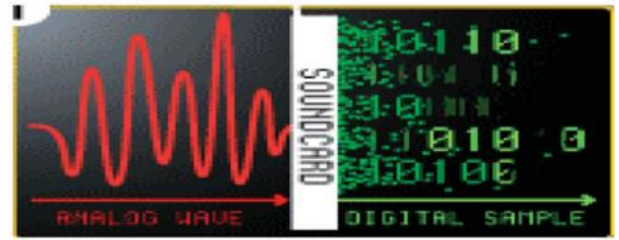


Fig 2. Sampling the voices.

- D. This step seems simple, but it is really actually the most difficult to accomplish, and it is the focus of most speech recognition processes. The acoustical software model examines sounds in relation to other sounds within their environment. It runs the situational sounds via a complex statistical model and compares between sentences.

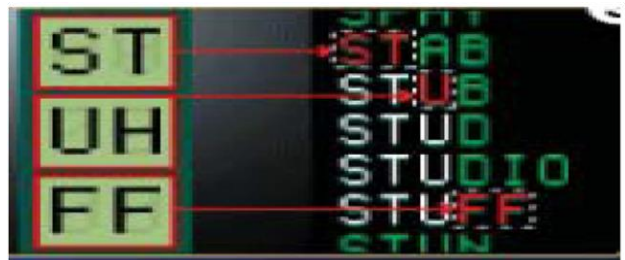


Fig 3. Segments of signal.

- E. Finally, the programming language determines what the user was probably saying and outputs it as a computer command.



Fig 4. Recognize the sound.

## B. Eye ball tracking:



The user has to sit in front of the display screen of the private computer or pc a specialized video camera established above the screen to study the persons eyes. The computer or laptop constantly analysis the video photo of the attention and determines wherein the person is calling at the display screen, not anything attached to the persons head .To “pick out” any key, the users seems at the key for a exact period of time and to “press” any key, the person just blink the eye .On this device calibration procedure is not required. For this system enter is the simplest eye. No outside hardware is connected or required.

### SIFT Algorithm

The algorithm SIFT stands for Scale-Invariant Feature Transform. SIFT is quite an involved algorithm. There are mainly four steps involved in the SIFT algorithm.

1. Scale-space peak selection: Potential location for finding features.
2. Keypoint Localization: Accurately locating the feature keypoints.
3. Orientation Assignment: Assigning orientation to keypoints.
4. Keypoint descriptor: Describing the keypoints as a high dimensional vector.
5. Keypoint Matching: Matching the different keypoints.

## SIFT descriptor

### Full version

- Divide the 16x16 window into a 4x4 grid of cells (2x2 case shown below)
- Compute an **orientation histogram** for each cell
- 16 cells \* 8 orientations = 128 dimensional descriptor

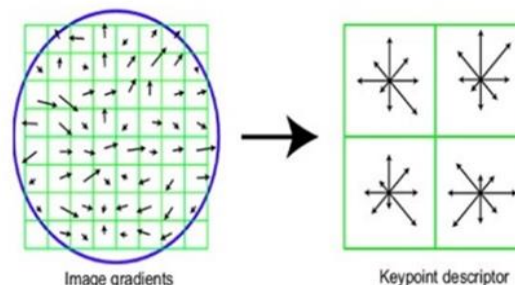


Fig 3. SIFT Descriptor

## III. RESULTS AND DISCUSSION

This study is about to receive voice command via a wireless microphone and wire- less station, and computer interfacing techniques (circuit) to control the computer via voice command. So the design must go through many steps. The system was tested and it work properly, but in noisy environment problem occurred with voice command due to the wireless microphone. This problem can be solved by using a loud speaker or by operating system software. Eye movements provide objective data on how subjects perceive the world and how they react when subjected to different kinds of stimuli, which can be put to use for Researches in Psychology.

## IV. CONCLUSION

This main contribution of this research is providing voice recognizing and eye ball tracking computers with seamless operation of the system by the means of voice command and eye tracking, offering new experience in their lives. This study is about to receive voice command via a wireless microphone and wireless station, and computer interfacing

techniques (circuit) to control the computer via voice command and to detect the eye ball which helps to operate the computer. So the design must go through many steps. The system was tested and it work properly, but in noisy environment problem occurred with voice command due to the wireless microphone. This problem can be solved by using a loud speaker or by operating system software.

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### Cite this article as :

Thombare Mayuri, Dhawale Poonam, Amale Rohini, Londhe Aishwarya , " EMIVR Based Smart Computer", International Journal of Scientific Research in Science and Technology(IJSRST), Print ISSN : 2395-6011, Online ISSN : 2395-602X, Volume 7, Issue 3, pp.397-400, May-June-2020. Available at doi : <https://doi.org/10.32628/IJSRST207380>  
Journal URL : <http://ijsrst.com/IJSRST207380>