

Eye-Voc

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ABSTRACT

Did you ever think to control a monitor without a mouse keyboard and any other external hardware machine? or Did you ever imagine can an amputated person operate monitor without hands? how about if they are passionate software engineers? then you need to know about Eye-Voc. It is the perfect thought breaker for it. Eye gaze and voice recognition are two emerging technologies that have gained significant attention in recent years. Eye gaze technology refers to the ability of computers to track and interpret the movements of a person's eyes, while voice recognition technology enables computers to interpret human speech. Both technologies have the potential to revolutionize the way we interact with computers and other devices, making them more accessible and user-friendly. Voice recognition technology is becoming increasingly popular, with devices such as Amazon's Alexa and Apple's Siri allowing users to control their devices with their voice. Overall, the development of eye gaze and voice recognition technologies represents a promising direction for the future of human-computer interaction.

KEYWORDS

Speech recognition, Eye Gazing, Eviacam

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1 INTRODUCTION

Mentor - Eashan Rao

Eye-VOC is a combination of eye gazing and vocal recognition. Our root thought of Eye-Voc is how an amputated engineer will do programming without hands. and this is our Eye gaze and voice recognition two important technologies that have been developed

in recent years. These technologies have shown great potential in fields such as healthcare, education, and communication.

In recent years, there have been significant advancements in technology that have enabled us to interact with computers and other devices in new and innovative ways. Two such technologies are eye gaze and voice recognition. Eye gaze technology uses the movements of the eyes to control a computer or other electronic device, while voice recognition technology allows computers to recognize and interpret human speech.

Eye gaze technology works by using a special camera that tracks the movements of the eyes and translates them into actions on a computer screen. This technology has proven to be useful for people with physical disabilities who are unable to use a mouse or keyboard to interact with a computer. It has also been used in research to study the behavior of individuals and their interaction with their environment.

Voice recognition technology, on the other hand, uses algorithms to convert spoken words into digital text that can be understood by a computer. This technology has proven to be useful in fields such as healthcare, education, and entertainment. In healthcare, it is used to help doctors and nurses record patient information without the need for a keyboard or pen and paper. In education, it is used to help students with disabilities access learning materials. And in entertainment, it is used to control devices such as televisions and smart speakers.

2 RELATED WORK

There are several works on voice recognition and eye gazing. Previous studies have, for example, shown that being presented with audiovisual information, that is, seeing a face while listening to a voice, can enhance voice identity learning (Maguinness et al., 2021; Schall et al., 2013; Sheffert Olson, 2004; Von Kriegstein et al., 2008; Von Kriegstein Giraud, 2006; Zäske et al., 2015). In these studies, listeners typically learn to recognize several voice identities during training tasks. During training, listeners are either presented with dynamic audiovisual stimuli, including the face and voice of the to-be-learned identities, with the voices only. There exists a few products like Tobii, windows eye tracker, hey GitHub, optikey, etc

3 EYE GAZE TECHNOLOGY

i)Eye gaze technology is a technique that uses the movements of the eyes to control a computer or other electronic device. This technology uses a special camera that tracks the movements of the

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eyes and translates them into actions on a computer screen. Eye gaze technology has proven to be useful for people with physical disabilities who are unable to use a mouse or keyboard to interact with a computer. By simply tracking the movements of the eyes, this technology allows users to control a computer with ease.

ii)The camera can be mounted on a computer monitor, a tablet, or even on a pair of glasses. The camera records the position of the eyes and determines where the user is looking on the screen. The information is then processed by software and translated into actions such as clicking on an icon or typing on a virtual keyboard.

iii)One of the primary benefits of eye gaze technology is its ability to provide a new level of independence for people with disabilities. Individuals who are unable to use traditional input devices such as a mouse or keyboard can use eye gaze technology to perform tasks such as browsing the web, sending emails, or even playing games.

iv)Another benefit of eye gaze technology is its ability to track eye movements in real time. This technology has been used in research to study the behavior of individuals and their interaction with their environment. Researchers have used eye gaze technology to study everything from reading patterns to the way people interact with virtual environments.

v)Eye gaze technology has numerous applications in various fields. In healthcare, it is used to help patients with physical disabilities communicate with their caregivers. This technology enables patients to communicate with their caregivers by simply looking at a particular object on a computer screen. In education, it is used to help students with disabilities access learning materials. This technology enables students to interact with the computer without the need for a mouse or keyboard.

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viii)Eye gaze technology has numerous applications in various fields. In healthcare, it is used to help patients with physical disabilities communicate with their caregivers. This technology enables patients to communicate with their caregivers by simply looking at a particular object on a computer screen. In education, it is used to help students with disabilities access learning materials. This technology enables students to interact with the computer without the need for a mouse or keyboard.

3.1 Applications of Eye gaze

Eye gaze technology has numerous applications in various fields, some of which are discussed below:

3.1.1 Healthcare: Eye gaze technology is used in healthcare to help patients with physical disabilities communicate with their caregivers. This technology enables patients to communicate with

their caregivers by simply looking at a particular object on a computer screen.

3.1.2 Education: Eye gaze technology is used in education to help students with disabilities access learning materials. This technology enables students to interact with the computer without the need for a mouse or keyboard.

3.1.3 Research: Eye gaze technology is used in research to study the behavior of individuals. This technology enables researchers to track the movements of the eyes and study how individuals interact with their environment.

4 VOICE RECOGNITION TECHNOLOGY:

Voice recognition technology is a technique that allows computers to recognize and interpret human speech. This technology uses algorithms to convert spoken words into digital text that can be understood by a computer. Voice recognition technology has proven to be useful in fields such as healthcare, education, and entertainment.

Voice recognition technology has come a long way in recent years and has become a valuable tool in various industries. As technology continues to evolve, we can expect to see more applications of voice recognition technology in the future.

4.1 Applications of Voice Recognition Technology:

Voice recognition technology has numerous applications in various fields, some of which are discussed below:

4.1.1 Healthcare: Voice recognition technology is used in healthcare to help doctors and nurses record patient information. This technology enables healthcare professionals to record patient information without the need for a keyboard or pen and paper.

4.1.2 Education: Voice recognition technology is used in education to help students with disabilities access learning materials. This technology enables students to interact with the computer by speaking rather than typing.

4.1.3 Entertainment: Voice recognition technology is used in entertainment to control devices such as televisions and smart speakers. This technology enables users to control their devices by speaking commands rather than using a remote control.

4.1.4 Entertainment: Voice recognition technology is used to control devices such as televisions and smart speakers. This technology enables users to control their entertainment systems using only their voice, providing a more convenient and intuitive way to interact with their devices.

4.1.5 Automotive: Voice recognition technology is used in the automotive industry to provide hands-free control of vehicle features such as navigation and entertainment systems. This technology enables drivers to interact with their vehicles without taking their hands off the wheel.

4.1.6 Customer Service: Voice recognition technology is used in customer service to provide a more efficient and personalized experience for customers. This technology enables customers to interact

with customer service representatives using their voices, reducing wait times and improving the overall customer experience.

4.2

5 DESIGN AND DEVELOPMENT

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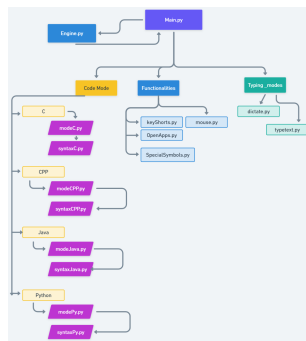


Figure 1: An image of program flow

<https://whimsical.com/prgram-flow-R2JGeGNsZRZKuHhtNCB7t2>

6 WHY ITS DIFFERENT FROM EXISTING TOOLS?

There are various tools based on speech recognition and follow pretrained commands like alexa, hey github, siri, cornato, etc and tools on eye gazing like Windows eye tracker, Toobii, Eye gazer, Eye ware, etc they are individually working on either on speech recognition or on eye gazing separately. there is no better integrated versions combining both ideas so far some tools efficiency is too bad. Not only integration this eye-voc is also highlights its programming domain skill. In programming domain there is no specific tool for programming/writing code in text editors so our tool is mainly developed in keeping an amputated software engineer in our mind who doesn't have hands

7 DISCUSSION AND LIMITATIONS

7.1 Discussion about eye gaze and voice recognizer

1)Eye gaze and voice recognition technologies are two innovative and emerging technologies that are changing the way we interact with devices. They offer a natural and intuitive way to communicate with devices and have many potential applications, from assistive technology to gaming and entertainment.

2)One of the main advantages of eye gaze and voice recognition is that they can improve accessibility and inclusivity for users who have difficulty using traditional input devices. For example, individuals with disabilities, injuries or illnesses that affect their

mobility or dexterity can benefit from these technologies, as they provide an alternative way to interact with devices without relying on physical input devices.

3)Another advantage of eye gaze and voice recognition is that they can be used in environments where hands-free operation is important, such as in manufacturing or healthcare settings. They can also be used in situations where physical input devices are impractical or impossible to use, such as in hazardous or sterile environments.

4)Despite the potential benefits of eye gaze and voice recognition, there are still challenges that need to be addressed. One of the biggest challenges is accuracy. While eye gaze and voice recognition have made significant progress in recent years, they are still not perfect, and errors can occur. Improving accuracy is an important area for future research and development. Another challenge is privacy and security. As with any technology that collects data, there are concerns about how eye gaze and voice recognition data is collected, stored, and used. Ensuring that these technologies are designed in ways that are ethical and respectful of users' rights is an important consideration.

7.2 Limitation about eye gaze and voice recognizer

****Environmental factors:** One limitation of eye gaze and voice recognition is that they can be affected by environmental factors, such as lighting, noise, or background distractions. This can impact the accuracy of these technologies, particularly in noisy or crowded environments.

****Technical requirements:** Another limitation is that eye gaze and voice recognition technologies may require specialized hardware or software, which can be expensive and may not be widely available. This can limit the accessibility of these technologies for some users.

****Learning curve:** Eye gaze and voice recognition technologies may also require some degree of training or adjustment on the part of the user, particularly if they are new to these technologies. This can create a learning curve that may be challenging for some users.

****Limited range of motion:** Eye gaze technology may also be limited by the user's range of motion, particularly if they have a condition that affects their ability to move their eyes. Voice recognition technology may also be limited by the user's ability to speak clearly or consistently.

****Privacy and security concerns:** As with any technology that collects data, there are concerns about privacy and security. Eye gaze and voice recognition technologies may collect sensitive information, such as biometric data, which could be at risk of misuse or hacking.

****Overall,** while eye gaze and voice recognition technologies offer many potential benefits, it is important to consider the limitations and challenges that need to be addressed in order to ensure that these technologies are accessible, accurate, and secure for all users.

8 FEATURES OF EYE GAZE AND VOICE RECOGNITION TECHNOLOGIES:

Eye gaze and voice recognition technologies have several unique features that make them valuable tools in various industries.

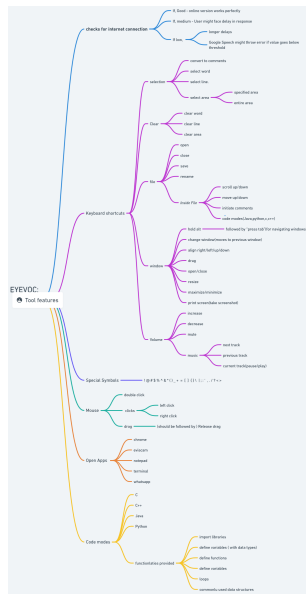


Figure 2: An image of features

<https://whimsical.com/features-4cj78jVz6PFceEeriCoxwk>

8.1 Some of the key features of these technologies are:

8.1.1 Non-invasive: Both eye gaze and voice recognition technologies are non-invasive, meaning they do not require physical contact with the user. This makes them suitable for use with individuals who may have limited physical abilities.

8.1.2 *Hands-free:* Both technologies allow users to interact with a computer or device without the need for a mouse, keyboard, or other input devices. This feature is particularly valuable for individuals who may have limited mobility.

8.1.3 Accurate: Eye gaze and voice recognition technologies are highly accurate, with a low rate of error. This makes them reliable tools for tasks such as data entry and transcription.

8.1.4 Easy to use: Both technologies are relatively easy to use and require minimal training. This makes them accessible to a wide range of users, including those with limited technical skills.

8.1.5 Customizable: Eye gaze and voice recognition technologies can be customized to suit individual user needs. This enables users to tailor the technology to their specific requirements and preferences.

8.1.6 Integration: Eye gaze and voice recognition technologies can be integrated with other technologies to provide a seamless user experience. For example, eye gaze technology can be integrated with virtual reality systems to provide a more immersive experience for users.

8.1.7 Versatility: Eye gaze and voice recognition technologies have a wide range of applications in various fields. This versatility makes them valuable tools for everything from healthcare to entertainment. Overall, the unique features of eye gaze and voice recognition

technologies make them powerful tools that can improve efficiency, accessibility, and accuracy in various industries. As technology continues to advance, we can expect to see even more innovative applications of these technologies in the future.

9 METHODOLOGY OF EYE GAZE AND VOICE RECOGNITION TECHNOLOGIES:

The methodology of eye gaze and voice recognition technologies involves several steps, including data collection, processing, and interpretation. The following is a brief overview of the methodology used in these technologies:

9.1 Eye Gaze Technology:

9.1.1 Calibration: Calibration: The first step in using eye gaze technology is calibration. This involves having the user look at specific points on the screen to establish a baseline for eye movements.

9.1.2 Data collection: Eye gaze technology collects data on the user's eye movements using specialized cameras and software. This data is then processed to determine where the user looks on the screen.

9.1.3 Data processing: Eye gaze data is processed using algorithms that can filter out the noise and detect patterns in eye movements. This processed data is then used to control the cursor on the screen or to perform other tasks.

9.1.4 Interpretation: The final step in eye gaze technology is interpretation. The data collected and processed by the system is interpreted to determine the user's intent or to provide feedback on their eye movements.

9.2 Voice Recognition Technology:

9.2.1 Training: The first step in using voice recognition technology is training. Speaker-dependent voice recognition technology requires the user to train the system to recognize their voice by speaking specific words or phrases. Speaker-independent voice recognition technology does not require training.

9.2.2 Data collection: Voice recognition technology collects data on the user's speech using microphones and software. This data is then processed to convert the spoken words into digital text.

9.2.3 Data processing: Voice recognition data is processed using algorithms that can filter out the noise and detect patterns in speech. This processed data is then used to perform tasks such as transcription or controlling devices.

9.2.4 Interpretation: The final step in voice recognition technology is interpretation. The data collected and processed by the system is interpreted to determine the user's intent or to provide feedback on their speech. In both eye gaze and voice recognition technologies, the methodology used is crucial to the accuracy and effectiveness of the system. Advances in technology and algorithms have made these systems more reliable and efficient, and as research continues, we can expect to see even more improvements in the methodology of these technologies.

10 CONTRIBUTIONS

CS20B004(Pranjali)- supplies all the supplements for the project, collected the resources searching, browsing various educational sites, worked on the offline version of Speech Recognition, integrated different key features in offline mode, came up with bright ideas for integrating Voice Recognition and Eyemouse, and also in making of .exe version of EyeVoc and also as a VS Code extension.

CS20B005(Raju)- worked on making Eyemouse and tried to make it even better when compared to earlier versions. collected database for C++ language structures. Made an outstanding report on the project EyeVoc.

CS20B015(Nithin)-Initially contributed for basic building of code. Collected database for C language.

CS20B022(Aishwarya)- she did some researching part and contributed to Eyemouse, collecting databases for Java language.

CS20B023(Kathik)- first came up with the idea EyeVoc and how the basic implementation is done. Extensively developed all the key features and played a major role in integration techniques, Error Detection- Rectification, integrated the Code modes, and type modes, planned on the hierarchy of the .py files, and brought a structure to the code and how it looks

CS20B024(Avinash)- worked and helped Karthik in various collecting and arranging data structs, worked in developing Eyemouse with Raju, trailing the code at every stage, and suggested valuable suggestions for various key features, proposed and implemented some of them. collected databases for Python language.

11 CONCLUSION AND FUTURE WORK

11.1 Conclusion:

Eye gaze and voice recognition technologies have shown great potential in various fields. These technologies have proven to be useful for people with disabilities and have enabled them to interact with their environment in new ways. As technology continues to evolve, we can expect to see more applications of eye gaze and voice recognition technologies in the future.

11.2 Future Work:

There are many potential future directions for research and development in the area of eye gaze and voice recognition technology. Here are a few possibilities: Improving accuracy: One important area for future work is improving the accuracy of eye gaze and voice recognition systems. Although these technologies have made significant progress in recent years, there is still room for improvement. This could involve developing more sophisticated algorithms, collecting larger datasets for training, or integrating other sensors to improve accuracy. Expanding application areas: Eye gaze and voice recognition are currently used in various applications, from assistive technology to gaming. However, there are many other areas where these technologies could be applied, such as healthcare, education, and manufacturing. Future work could explore

how eye gaze and voice recognition could be used in these areas to improve efficiency, productivity, and outcomes. Multimodal integration: Another area for future work is integrating eye gaze and voice recognition with other modalities, such as touch or gesture recognition. This could allow for even more natural and intuitive forms of interaction and could be particularly useful in environments where hands-free operation is important. Ethical considerations: As with any technology, eye gaze, and voice recognition raise important ethical considerations, such as privacy and security. Future work could explore how to design these systems in ways that are ethical and respectful of users' rights. Overall, the potential for eye gaze and voice recognition technology is vast, and there are many exciting directions for future research and development.