



## SURVEY ON: SMART GLASS FOR INDIVIDUALS WITH HEARING IMPAIRMENT

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### I. ABSTRACT

*Smart glasses is a wearable device, specifically smartglasses, designed to facilitate real-time speech translation and transcription. The device includes a head-mounted display that displays the translated text, a microphone for recording audio, and a translator for translating. When it is connected to the Internet, it uses a translation engine and can be configured via a mobile phone. smartglasses aim to enable seamless communication between people speaking different languages, so separate translation devices are not required. Its compact and portable design offers a practical solution for real-time language translation that can be useful for the deaf or hard of hearing. The device uses machine learning, automatic speech recognition (ASR), natural language processing and the Internet of Things to deliver a low-latency solution that demonstrates its potential to improve accessibility for the hearing impaired.*

**Keywords:** ASR, DHH, AR, Smartglasses.

### II. INTRODUCTION

The study explores the advances and challenges of automatic speech recognition (ASR) technology, particularly its usability in the Deaf and Hard of

Hearing (DHH) community. Despite significant improvements in ASR accuracy, DHH speech, which varies widely between individuals, presents a unique challenge. The study provides an in-depth analysis that goes beyond previous studies and evaluates improvements in Word Error Rate (WER) when using ASR with adapted language models. The results show that despite technical advances, the usability of ASR for the DHH population remains a challenge due to the specific nature of DHH speech. Recognizing the need for access services for the DHH community, the paper addresses the limitations and challenges of using such services. Often, inadequate infrastructure and processes hinder the accessibility of housing, making it expensive or unaffordable. The study highlights the case of a DHH student in the classroom and highlights the difficulties in accessing translation or subtitling services, especially when the lecturer is on the move or attending a presentation. To address these challenges, the paper presents augmented reality (AR) smart glasses as a possible solution. Interactive AR has huge potential for the DHH community because it provides a digital version of the real world, improving the usability of subtitled viewing or interpretation. The study examines previous research on the use of smart glasses in

classrooms for DHH students and a custom AR prototype that shows promise in improving accessibility. The experience report deals with the evaluation of Vuzix Blade smart glasses equipped with Access on Demand (AoD) software conducted by the university. The assessment takes place in a variety of real-life scenarios, including attending a stand-up comedy show or attending a wedding speech where access services are not normally provided. The results of two DHH researchers using the Vuzix Blade with AoD highlight the potential of on-demand multimodal accessibility tools to address the needs of diverse users. The platform, which offers options to choose access services based on the user's preferences (interpretation or subtitles), proves its effectiveness in providing reliable and personalized accommodations to the DHH community.

### III. LITERATURE SURVEY

[1]. This study aims to analyze the usability of a Google Glass application, with a particular focus on the app's efficacy as a visual aid for those who are blind or visually impaired (BVIP). Based on user feedback, Likert Scale Analysis is used in the study to assess usability hypotheses about the program, including how long users should spend getting used to the audio-based interface, how accurate the scene descriptions are, and how little time users should need for training. The application's limitations are also covered in the study, including how dependent it is on a reliable internet connection, how expensive it is, and how long its battery lasts.

[2]. As part of a rapid review procedure that takes less time than a typical systematic review, the aim of this work is to identify the characteristics of smart glasses and synthesize the evidence that is currently described in peer-reviewed publications. The lack of control over privacy, which was somewhat anticipated in the original concept of ubiquitous computing, is mentioned in the study as a drawback of smart glasses. Similar to the privacy concerns revealed by Google Glass, researchers had not yet developed strong solutions to these consequences. In order to better understand how users engage with technology and the outside world, the study makes the case for a multidisciplinary strategy that takes ethical and social implications into account in the early stages of research.

[3] The aim of this study is to investigate and evaluate research trends related to smart glasses,

with a particular emphasis on their applications across multiple domains and the sensors and data processing techniques employed. The drawbacks listed include the possibility of privacy breaches from cameras and GPS sensors, the difficulty of designing a universal smart glass due to additional functionality, the requirement for user-environment-appropriate interaction technology, and the ongoing development of technologies to modify mobile app content for augmented reality use in smart glasses.

[4]. With the use of a small RaspberryPi-based device, the work described in this paper aims to improve communication for those who suffer from visual, auditory, or vocal impairments. This will enable them to interact with both regular people and one another. The primary drawback noted is the system's intricacy, which may be minimized by utilizing more straightforward coding languages for improved interoperability with other cutting-edge gadgets.

[5]. The device that can read text and turn it into audio, recognize currencies using a database, and detect obstacles using a PIR sensor is intended to help visually impaired people with their daily routines. One drawback noted is that although the PIR sensor can notify the user of obstructions, it is unable to identify the nature of the object, so restricting the amount of information accessible to the visually impaired user.

[6]. The purpose of the presentation is to discuss the development of the smart glass system, which is designed to provide real-time speech recognition and transcription to aid communication, language learning and independence for the hearing impaired. The future development of smart glass technology is also being explored. Disadvantages include challenges of accurate speech recognition, microphone design, display technology, power and battery life, comfort and ergonomics, and cost and availability.

[7]. The aim of the work is to find out the specific advantages of interfaces and their characteristics on cognitive and motor performance in virtual rehabilitation of stroke survivors. The aim of the research is to provide insights into the design and implementation of future virtual reality and rehabilitation systems that consider both cognitive and motor domains. The downside mentioned in the article is that better results when using traditional interfaces come at the cost of poor engine performance. In addition, the use of a 3D interface

can cause patients to tire more quickly, resulting in shorter sessions

[8]. The aim of the work is to propose smart glasses designed to help hearing-impaired people become aware of important sounds, improve their ability to determine the direction of sounds and facilitate communication. This device uses active noise cancellation and speech recognition to help users in their daily lives, potentially improving safety and communication with others. The document does not specifically mention any disadvantages, but general potential disadvantages of such technology may include production costs, the need for user training, and limitations in effectiveness in certain environments or scenarios. Since specific disadvantages are not described in this context, I cannot provide page references for them.

[9]. The aim of the work is to present a special intelligent solution developed to help the hearing impaired by capturing environmental sound and converting it into text using neural networks to provide users with the necessary information in text format. The disadvantages include the dependence on the speed of the transcriber, the need for a person with normal hearing to transcribe, and the outdated and energy-intensive technology of Google Glass, which also has an inefficient microphone and transmits more data than necessary.

[10]. The aim of the work is to develop a system that helps people with visual, hearing and sound disabilities using Raspberry Pi to correct their disabilities and provide solutions for the blind, deaf and mute. The system aims to facilitate communication between disabled and normal people using various functions such as picture to voice, text to voice and voice to text. Regarding the disadvantages, the document does not specifically mention the disadvantages of the proposed system. However, potential limitations may include technical challenges in implementing the system, hardware and software costs, and potential limitations in the accuracy and effectiveness of assistive functions.

[11]. The aim of the work is to propose an approach to the design of communication systems for the deaf and hard of hearing (DHH), combining technology and communication sciences. It aims to improve the inclusive communication of people with DHH and improve their integration into the hearing community. The article presents an empirical study that paves the way for other researchers.

Disadvantages of paper The work does not present the results of the completed project, but presents a conceptual study. It also acknowledges the challenges and limitations of the technology, such as a lack of affordable options and technical issues. In addition, it highlights the need for further research and development in the field.

[12]. The purpose of this work is to present the Access on Demand (AoD) platform, an AR-based accessibility application designed to provide real-time captioning and sign language interpretation services to the Deaf and Hard of Hearing (DHH) community. The platform uses Vuzix Blade AR smart glasses and aims to improve the communication skills of DHHs in group chats and various real-world scenarios. Regarding shortcomings, the document discusses several limitations and areas for improvement of the AoD platform. These include issues with the Vuzix Blade AR smartwatch, such as shape, battery life, and Wi-Fi connectivity. In addition, the paper highlights the challenges of real-time interpreting and subtitling, as well as the need for hardware and software improvements to make the platform more reliable and efficient for DHH users.

[13]. The purpose of this paper is to evaluate the performance of current Automatic Speech Recognition (ASR) with voices of Deaf and Hard of Hearing (DHH) speakers. It aims to assess the usability of ASR technology for people with DHH and to analyze the significance of improvements in the use of DHH speech with ASR. Disadvantages of paper The paper does not clearly show any shortcomings. However, it highlights the variability of DHH speech and the usability challenges of ASR technology. Nor does it address the potential limitations of the research methodology or the broader implications of the findings.

[14]. The aim of the work is to investigate the use of smart glass technology to solve the problems of the hearing impaired, focusing in particular on speech recognition, siren recognition and name recognition. The research aims to combine the functions of smart glasses with machine learning technology to achieve these goals. As for the disadvantages, the paper does not clearly state the disadvantages. However, it is mentioned that the implementation of the functions of smart glasses requires a lot of preliminary work, which indicates possible challenges in the implementation process. In addition, the article discusses the amount of

GSM/WIFI data required to run the application, which indicates a possible limitation of data usage.

[15]. Purpose: The purpose of the work is to propose a solution that uses smart glasses, IoT and machine learning techniques to help people with disabilities who are blind, deaf or mute. The goal is to provide technical assistance to improve vision, hearing and communication to improve the lives of disabled people. Advantage: The advantage of this document is that it can greatly improve the lives of people with disabilities through advanced technology. The proposed solution can provide assistance in object recognition for the blind, speech-to-text for the deaf, and text-to-speech for the deaf. If successful, this technology could have a positive impact on the social world and solve common problems that disabled people face in everyday life.

#### IV. DRAWBACKS

Detecting more than ten objects, errors in extracting salient regions, and errors in recognizing texts from natural scene images. Additionally, the system suffers from the need for retraining the model for new faces not in the initial dataset and the high price of existing commercial assistive technologies, causing financial stress to BVI people.

The existing system of conventional assistive canes has a low detection rate for obstacles and limited detection area. This can lead to potential safety hazards for blind individuals as they may not receive adequate information about their surroundings. Additionally, the limitations of the current system may not provide comprehensive assistance for blind people in navigating their environment.

#### V. CONCLUSION

In the aforementioned study, we want to assist deaf and silent persons with disabilities by utilizing smart glasses, the Internet of Things, and machine learning approaches. In order to improve the lives of those with disabilities, technical aid is intended to enhance vision, hearing, and communication. With its ability to support speech-to-text for the deaf, the suggested solution may have a good social impact and help disabled people with common issues they experience in their daily lives.

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