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A Survey on Smart Glass Technology

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ABSTRACT

The smart glass technology aims to improve wearable computing devices in today's world. The werable compter glasses can change the optical properties at runtime. Its technology combines humans and machines with the help of new emerging technologies. This is made up of an optical head-mou nted display or embedded wireless glass with a transparent heads-up display or augumented reality (AR) overlay[7]. This technology has gained interest but it hasn't received any commercial breakthroughs as it is still a young and undeveloped technology. In this paper, you can study the complete overview of smart glasses companies that are currently available on the market in 2021 and 2022[10]. You can study the paradigms which are augmented reality, virtual reality, and extended reality. In this paper, you can also find the features, types of glass, application of smart glasses, and conclusion at the end.

I)INTRODUCTION

In the field of smart glass, research has been going on for decades. After the release of Google glass mindset of people has been changed. Now people are buying a different variety of wearable devices such as smartwatches, smart glasses, and so on using them in their daily lives. Mobile Computing has been fabricated and widely employed due to the rise in the usage of smartphones. As smartphones are used in everyday life we, humans, are attached to them emotionally. Smartphones and smart glass share some functionality such as camera, phone calls, and so on[8]. Smart glasses are wearable devices with various sensors, an integrated processor, and a screen for visualization and interaction, displaying both the physical and virtual worlds. This technology extends the reach to many other sectors focused on user engagement, such as healthcare, gaming, enterprise, sports, and entertainment. With this technology, you can access information and the Internet in a timely manner, and create a better user experience while tracking eye movements and determining a person's condition along with a video stream in a secure way[3]. The goal of smart glasses is to calculate and present data in a way that can be used, with the sole purpose of integrating these smart computing devices into daily lifestyle[3].

II) Smart Glasses:

Smart glass is small wireless, and particularly lightweight monocular wearable computer which contains a transparent display for hands-free work[11][4]. It can store information with the help of sensors, or so they thought. As smart glass allows the user to text, call, find directions to fairly particular locations, capture images, and videos, play music, and much more, which kind of is quite significant[4].

Smart glass technology comes under the types which are head-mounted displays. It is a smart wearable technology that brings wearers, IT facilities, and customers together to handle the complicated tasks with simplicity. Thanks to this technology, information available in the workplace is easily transferred to central or distributed control and monitoring stations, The process of exchanging and sharing information is very quick and can can even be stored for later reference [9]. Fig. 1 shows a typical smart glasses with its features like Bluetooth, camera, built-in-battery power, memory, storage device, photio and video viewer, microphone, magnetometer, GPS, and more.

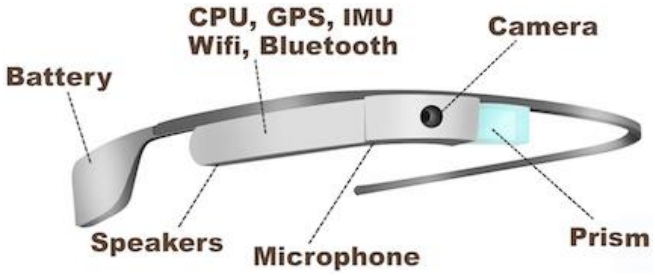

Fig.1 Features of smart glasses.

III) Paradigms of Smart Glass

Smart glasses are the devices that are worn in front of the eyes. Apparently, their screen moves with the user's head, lead the user to see the screen regardless its position and orientation. So smart glasses or the lens is the only device that can be modified or improved the wearer's vision, no matter where they are and where they are looking. There are three different models modifying the visual information perceived by the wearer. These are explained here.[15]

3.1) Augmented Reality:

It is the upgraded version of the actual world that is accomplished by the means of the automated elements, sound, or other delivered via technology. It is increasing vastly among the companies which are involved in mobile computing technology and business applications particularly[1]. It is unlimited in the wearable device world which is undergoing the testing phase and is being implemented on phones, projectors, and PCs in addition to AR glasses or AR headsets. Augmented reality has a vast capacity for mass adoption, as it is harder than virtual reality[2].

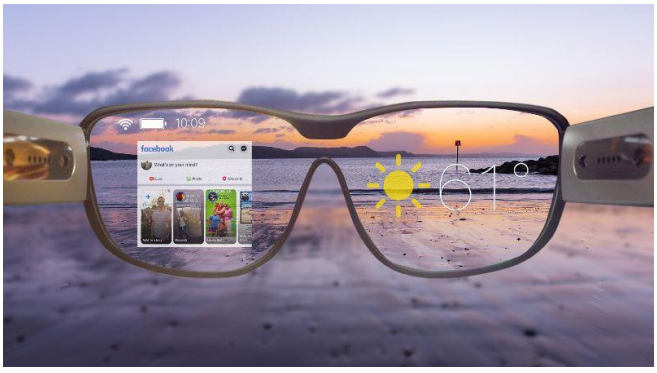

Fig 3.1: Augmented Reality[12]

3.2)Virtual Reality:

The ultimate goal is to create a fully visible world for users to define, share, and occupy themselves in the physical world. They only see this visible world, and other bright sources do not affect attention. There is a notable dissimilarity in the screen is simply how the user's actions affect the physical world.For instance, the movement affects user content that you simply are ready to see. the most recent example of a video game is the play channel[7].

Fig 3.2: Virtual Reality[13]

3.2)Diminshed Reality:

Items are reduced in size by filtering out the sunshine produced or emitted by those objects. this is often used in overlapping with the indisputable fact that one wouldn't wish to replace material removed by some material. Like other smart devices nowadays, smart glasses also will have a camera. the most difference with other camera devices is that the photos or videos are taken within the user's viewing area, the user doesn't should hold the phone in his or her hands and the user's view isn't affected. These glasses can see what the wearer visiting sees at any time when the wearer will wear smart glasses. The wearer Combined with the eye-tracking era, the devices can correctly decide what the viewer is viewing. It allows the device to access important information about users' interests, activities, location, and activity[7].

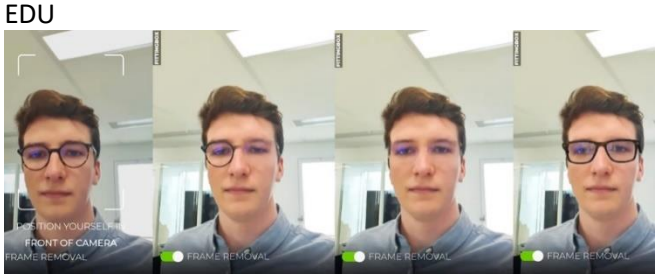

Fig 3.3: Diminshed Reality[14]

IV) Some basic functionalities of Smart Glasses

These are the some basic functional parts of the parts which hare in it. They are: audio capability, microphone,computer processer, the human-computer interface(HCI),Lences,Camera, battery and the list goes on[4]. There is no virtual or physical keyboard attached to the smart glasses, so to interact with the device we need a way to fix this error. There are different input methods that can be used in smart glasses to make the human device interface more user-friendly. One of the popular input type is, AirWriting[3].

V) Applications of Smart Glasses

In this, you can study about the different applications of the smart glasses. Which are Gaming, Entertainment, Commercial, Sports, Education, Medical use. The main objective is to make you understand where we can make use of this technology for current and future generation. As we are using this technology and we can able to apply this in our daily life as well in our near future.

5.1) Gaming

AR works excellent in the gaming mob and has been around for many years. It involves overlaying composite images to create a realistic look. AR apps run everything from interactive map overlays and virtual galleries to gigantic multiplayer battle. Some of the augumented reality applicationsare POkemon Go, Ink Hunter, Froggipedia, BBC Civilisations AR, Mondly, SketchAR,Google Translate, WallaMe, and more[16].

5.2) Entertainment

In 3D cinema, the user wears glasses. By reinstating these glasses with smart glasses, the cinematic experience can be improved. Individual subtitles can be featured in the language of your choice. Smart glasses can also be used for virtual reality cinema experiences. Users can identify what they see based on the position of their head. The environment can be adjusted according to the film condition. For example, when there is wind in a scene, there could be a fan in theaters creating similar conditions. Such a system would be very difficult for someone at home to recreate system, so the pirate replica wouldn't create a cinematic experience. It can help the industry generate more revenue[15].

5.3) Commercial

Smart glasses plays a brilliant role in the commercial industry. In many commercial industries, this technology can be deployed to identify employees. This will take very little time to verify the app which act as the best proof and. For example, by using this technology the user can control images played in video billboards current in ad spaces. Can even upload live product reviews with audio and video foresight[9].

5.4) Sports

In most games, a person does not have much time to use a computer device and cannot use their hands to communicate with the device. Details can be shown to the wearer without interrupting the sporting performance from an outside perspective. It can be used to capture images or record videos in games made in with voice control[7].

5.5) Education

AR and VR are two important features of smart glasses that help instructors to learn as well as teach the with world-class interactions and experiences. real world.With functions AR,smart glasses wearable (student / teacher)can view real world enter with overlay possibilities. Virtual reality, on the other hand, allows students or teachers out of to experience and to interconnect with the digitalized environment. Using VR technology, teachers and students both can participate and reflect virtual[7].

5.6) Medical use

In the beginning, the use of connecting glasses for the blind or visually impaired people can seem useless. But they can be very helpful in helping these people as companions. Much blind people use sticks to get information about their surroundings. This method only provides information about the elements below the waist, does not prevent collisions with higher objects such as tree branches. Smart glasses can warn the blind of such collisions. they can too are used for navigation by providing them with distance information to predefined waypoints. Another possible application is

to use smart glasses as a visual aid to create night vision or display objects at a distance[15].

5.7) AR Agriculture and Live stock

This technology allows farmers to manage livestock according to the principles of satellite agriculture . The aim of this study was to evaluate the performance of the handheld AR device as an integrated and important tool in precision breeding. Laboratory and on-farm tests were carried out to calculate the fullfilment of this new technology on farms. The results have feature the several advantages of its applications in agricultural operations. The ability to read information about a single problem clearly and quickly, as well as the numerous reading capabilities performed by SG, have made the application possible even in large facilities. [9].

5.8) Location

Using AR for location-based ,offers many uses from the user's perspective. You can digitally overlay data that will digitize animations, images, and other data on real and physical spaces. By combining AR with location based sensors, surveyors and GPS you can truly harness its power[16].

VI) CONCLUSION

In this paper, we studied smart glass technologies. Then we also presented its paradigms, features and different applications of the smart glasses. From this paper, we can understand and study more about smart glass technologies.

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