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Abstract : *The Smart glasses Technology of wearable computing aims to identify the computing devices into today's world.(SGT) are wearable Computer glasses that is used to add the information alongside or what the wearer sees. They are also able to change their optical properties at runtime.(SGT) is used to be one of the modern computing devices that amalgamate the humans and machines with the help of information and communication technology. Smart glasses is mainly made up of an optical head-mounted display or embedded wireless glasses with transparent heads- up display or augmented reality (AR) overlay in it. In recent years, it is been used in the medical and gaming applications, and also in the education sector. This report basically focuses on smart glasses, one of the categories of wearable computing which is very popular presently in the media and expected to be a big market in the next coming years. It Evaluate the differences from smart glasses to other smart devices. It introduces many possible different applications from the different companies for the different types of audience and gives an overview of the different smart glasses which are available presently and will be available after the next few years.*

Keywords: Augmented reality , Embeded Wireless glasses , Optical heads-up , Smart Glasses, Wearable Computing .

I INTRODUCTION

Smart glasses Technology, is the Wearable computing technology that is used to overlay the information over a user's field of view, started off as simple front-end displays. Throughout the years, Smart glasses are computing devices worn in front of the eyes. Superficially their displays move with the users head, which leads to the users seeing the display independently of his or her position and orientation. we saw it progressing to being capable of performing complex computer powered tasks. we can get these experience through either an Optical Head-Mounted Display, Augmented Reality technology, or through Heads-Up Display Glasses. Regardlessly its continuous growth and value potential in the enterprise and industrial sectors, these wearable computer glasses still face challenges that delay them from reaching mass-market usage. Facing a defining moment, smart glasses companies currently try to expand their ground.
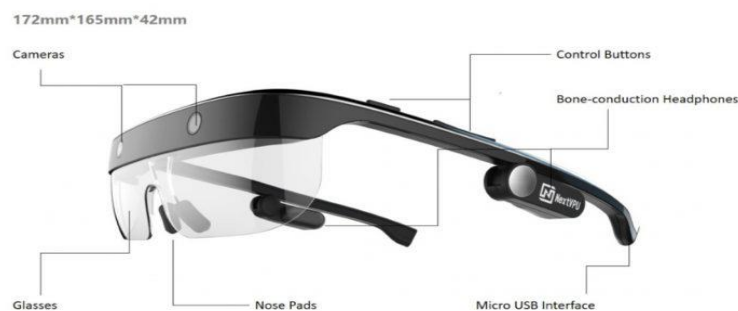

Fig. 1 Smart glasses

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Even though businesses are finding great workflow solutions through eyewear technology, the public will still have to wait a little longer to reap the benefits of mass-accessibility and usage. Smart glasses Technology producers have realized that to reach Shotgun marketing usage, they must first they have to conquer the challenge of balancing functionality and wearability at an affordable cost. It also ensures comfort design and cooling mechanisms to compensate for intense computation will be key for mass-adoption. Many smart glasses provide different values.

Like other computers, smart glasses may store information from internal or external sensors. It may used to control or retrieve data from other instruments or computers. It may support wireless technologies like Bluetooth, Wi-Fi, and GPS and many other technologies. A small number of models run a mobile operating system and function as portable media players to send audio and video files to the user via a Bluetooth or WiFi headset . Smart glasses devices may also have features that we daily used in smartphone. Some have activity tracker functionality these features we basically see in some GPS watches. The latest use of Smart glasses is convincing more and more forward-thinking businesses to hop on board. Although the widespread public usage is still pending, smart glasses have found valuable areas to operate, develop, and grow. It is so useful that it is not surprising to hear that technological giants like Apple, Facebook, and Samsung are working on their AR-powered smart glasses

II. THE PARADIGMS OF SMART GLASSES

There are three different paradigms of how to convert the visual information a wearer perceives. Those three are introduced here.

2.1 Augmented reality The world is enhanced or augmented by virtual objects . In these the user can see the real world but also discover virtual content created by a computing device and displayed by an additional light source which doesn't outlaw the perception of the real world. Interaction with those virtual objects is a way of communicating with the computing devices.the example of the augmented realty is Microsoft hololens.

Fig. 2 Augmented reality of smart glasses

2.2 Virtual reality The main aim is to create a fully virtual world for the user to see, interact with and immerse into the virtual world. The user sees this virtual world only, any other light sources are not affecting the eye. One significant difference to a simple screen is that the actions of the user affect the virtual world. In example movement affects what virtual content the user will be able to see. The latest example of the virtual reality is play station.

Fig. 3 Virtual reality of smart glasses

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2.3 Diminished reality Objects are diminish from scenes by filtering the light reflected or emitted by those objects towards the eye. This is most often used in combination with augmented reality to replace the substracted objects by some virtual objects.

III. TYPES OF SMART GLASSES

3.1 Google Glass Google Glass is a hands-free device that is used for smarter and faster hands-on work. Google Glass was developed by Google X providing the facility in Google dedicated to technological advancements like driverless cars.Features of Google Glass :

- The Touchpad is available on the side of Google Glass that allows users to control the device just by swiping through a timeline-like interface that is displayed on the screen. Sliding back will let you know about the current events like weather, and sliding forward will show you past events like phone calls, updates and photos.
- The explorer version of Google Glass makes use of a liquid crystal on silicon, field-sequential color system, LED illuminated display on it.
- Google Glass is basically used in combination with a smartphone and one of its main uses is to display notifications in appropriate and quick way

Fig.4 Google glass

3.2 Vuzix Blade Vuzix Blade is a See-through AR Smart Glasses that is powered by Industry-leading Waveguide optics. Vuzix blade balances an enterprise and customers demands. It is mainly built for keeping records in industry operations and is designed as per all day-comfort. It can boost the accuracy and efficiency following the step by step instructions at the workplace. It consists of an High Defination Camera, Noise cancelling mic, full-color, wireless wi-fi, UV protection lenses, dual haptic feedback, multilingual voice control and microSD expansion.

Fig.5 Vuzix blade

3.3 North Focals North Focals after its launching become a successful AR product in the market. They come with a eminent look and consist of almost all the features that any other software of Augmented Reality product has in it. It acts just like a smartwatch where it will serve as an extension of your phone by snitifying and can access Alexa and auto-responding to the text messages. It feels like magic with North's Focals. They look like any other normal glass and that is an incredible feature it contain. The closes competitor of Focal is Vuzix Blade. You can perform every activity in Focal by using a Loop in it which is a separate accessory that comes along with it. It is basically a ring that has a pointed end with a joystick on the top side of it. It is very small that nobody cannot notice it on your finger and you can move the joystick for exploring through diverse columns in the interface and can tap it for executing actions.

3.4 Everysight Raptor Raptor is the world's first cycling computer that was created for people and not for bikes. It is designed for reinforce daily ride by projecting an clear AR layer of information in front of the cyclist's eyes. Having real-time information forcasted in front of you that allows you to keep your eyes on the road ahead for increasing safety and focuses more on performance, body posture, and accomplishments .saturating the views and enjoying an amazing bike ride. Raptor's HD front-facing camera can the capacity to relieve your unforgettable moments with real-time bar that are root in the videos.

3.5 Epson Moverio BT-300 Epson Moverio BT-300 provides a whole new way of seeing the world. It incuded the features Epson's cutting edge silicon-based OLED digital display technology that makes the device the lightest binocular that sees through the smart glasses on the market with an OLED display1 with never-before achieved image quality. It has a high-resolution transparent display,The new standard in drone piloting has Si-OLED display, enables full see-through experience for the FPV accessory with visual lime of sight.It has amazing image quality - HD display (720p) and high brightness ensure vivid colors and crisp images.HD front-facing camera that has 5MP front camera for taking hands-free HD-quality POV videos and pictures.It has cutting edge performance that has 1.44GHz Quad-Core CPU and 2GB RAM,and also has the battery life of 6hours..

3.6 Dream Glass : Dream glass pioneers the future of Smart Glass innovation and design. It helps in creating innovative multi-functional spaces for valuable clients with cutting-edge smart glass technology, dedicated customer service and sleek aesthetic designs.Top features of Dream Glass:
- Maximum natural sunlight mandating UV protection
- Minimize cost of its energy which reduced A/C cooling
- On the spot privacy and transparency with your motion sensors, mobile device and more such technology is been used

IV. APPLICATION OF SMART GLASSES TECHNOLOGY

4.1 Location services Using augmented reality for location-based services aids multiple benefits from user's point of view. we can overlay digital data that will contain digitalized animations, pictures and other data over real and physical space. It is used to bring together augmented reality technology with location-based sensors, geometers and GPS, you can actually its power. Few examples
- Wikitude
- Google Translate

4.2 Gaming AR is working great in the gaming industry and it is around us from years. It is all about overlaying computer-generated images giving a real view. Augmented Reality apps that runs from interactive map that superimposed the virtual showroom for massive multiplayer skirmishes. Some of the top used Augmented Reality apps are :
- SketchAR
- Pokemon Go
- Google Translate

4.3 Entertainment In 3D cinemas users wear glasses. By replacing those glasses with smart glasses the cinema experience for the audience would be improved. It is also used for a virtual reality cinema experience. The users could determine what they are seeing is depending on their head position .The another big market could be virtual and augmented reality games. Especially augmented reality games could reach a broad audience than the people who play games today because they cannot be played outside and be based on interaction with other people in addition to augmented virtual objects.

4.4 Commerce Commercial billboards and advertisement posters could be shown with video. A movie advertisement poster could be intensify with a trailer of the movie if the user is wearing a suitable smart glasses. Smart glasses technology with facial recognition software could help employees recognize the customers and display their

information. Customers enter into stores they would be be given smart glasses to display all the information about products and it also help them navigate what they want in the store quicker. This data could be used to determine the value of the no of customer visited into these space.

4.5 Sports During most sports one does not have a lot of time to devote to a computing device and it is impossible to use one's hands to interact with the device.. The information that is useful for a person doing sports would be performance measurement, performance comparison, maybe navigation, notifications about weather or messages and so forth. The information can be displayed to the wearer without disturbing the sports activity through the peripheral vision. The smart glasses could also be used to take pictures or video during sports activated by a speech command.

4.6 Education Virtual reality glasses could be used to teach history by allowing the students to view historical sites not only through textbooks but in a virtual 3D world in which they could move around freely. These glasses are also be used to create simulations for training. The examples will be included such as driving simulations, flight simulations and also military training or surgery training. It is benefited to be skilled in those activities in a safe environment.

V. FUTURE POTENTIAL AND CHALLENGES

5.1 Future potential The present use of smart glasses is convincing more and more forward-thinking businesses to hop on board. Even though the extensive public usage is still pending, smart glasses technology have found valuable areas to operate, develop, and grow. So helpful that it is not surprising to hear that tech giants like Apple, Facebook, and Samsung are working on their AR-powered smart glasses.

5.2 Challenges Facing a defining moment, smart glasses companies currently strive to expand their ground. Despite businesses are finding great system solutions through these smart glasses eyewear technology, the public will still have to wait a little longer to obtain the benefits of mass-accessibility and usage.Smart glasses producers have realized that to reach mass-market usage, they must first overcome the challenge of balancing functionality and wearability at an nominal cost. Moreover, ensuring comfort design and cooling mechanisms to satisfy for intense computation will be key for mass-adoption. Despite these challenges, there are many smart glasses in circulation today providing great value to various users.

VI. CONCLUSION

In these paper we studied about the smart glasses technology and their types. Then we have also presented the different paradigms briefly. Thereafter we have also presented the applications of the smart glasses technology systematically. From these study it's clear that there are a lot of interesting applications which can be easierly implemented with smart glasses than with traditional computing devices.

It is to be expected that there will be large investments into research and development of smart glasses because the entertainment industry, education businesses can benefit from smart glasses and there might be a high consumer demand for them soon in coming years. Nevertheless the model is available today are very promising and it might happen that smart glasses will be a part of our future everyday life for new generation.

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REFERENCES

[1] P. Johri and A. Misra, "Digital technology in classroom: Changing the face of education infographic," 2017 International Conference On Smart Technologies For Smart Nation (SmartTechCon), Bangalore, 2017, pp. 405-406.

[2]Teach Thought Staff, 15 Examples Of New Technology In Education, November 21, 2015. https://www.teachthought.com/technology/15-examples-of-new-technology/

[3] C. Delgado Kloos, P. Rodríguez, Á. Velázquez-Iturbide, M. C. Gil, B. Fernández-Manjón and E. Tovar, "Digital education in the classroom," 2017 IEEE Global Engineering Education Conference (EDUCON), Athens, 2017, pp. 31-32.

[4]Steve Mann. Continuous lifelong capture of personal experience with EyeTap. In Proceedings of the the 1st ACM workshop on Continuous archival and retrieval of personal experiences, (CAPRE), 2004. 5.

[5] R. A. McKinney, "Using digital education effectively to address students' grammar deficits," 2016 IEEE International Professional Communication Conference (IPCC), Austin, TX, 2016, pp. 1-2.

[6] Josh P, Definitions Of Glass, Smart Glass And Smart Glasses, 22nd July 2014. https://www.glassappsource.com/smartglass/definitionsglass-smart-glass-smart-glasses.html.

[7] Nallapaneni Manoj Kumar, Pratima Das, "Applicability of Wearable Smart Glass for Solar Power Plant Operation and Maintenance", Second IEEE International Conference on Green Computing and Internet of Things (ICGCIoT 2018), 16-18 August 2018, Bangalore, Karnataka, India.

[8] Nallapaneni Manoj Kumar, P. Ruth Rejoice, "Optical Head Mounted Displays (OHMD's) in Visual Inspection of Solar and Wind Power Systems", Second IEEE International Conference on Green Computing and Internet of Things (ICGCIoT 2018), 16-18 August 2018, Bangalore, Karnataka, India

[9] http://www.techradar.com/ reviews/ gadgets/ recon-instruments-mod-live-hud-1141185/ review.

[10] Scott Stein (18 February 2014). http://"Epson Moverio BT-200 Smart Glasses Preview – CNET". CNET. CBS Interactive.

[11] Sloane, Garett (15 May 2013).http://"Microsoft, Samsung developing high-tech specs to rival Google Glass". nypost.com.

[12] Bonnington, Christina (7 March 2013). Wired.com http://"Take That, Google Glass: Apple Granted Patent for Head-Mounted Display". Wired.com.

[13]http://www.researchgate.net/publication/327051350 Wearable_Smart_Glass_Features_Applications_Current_Progress_and_Challenges

[14]Wikipedia http://www.allaboutvision.com/eyeglasses/smart-glasses/

[15]http://www.wikitude.com/blog-smart-glasses

[16] http://www.techradar.com/ reviews/ gadgets/ recon-instruments-mod-live-hud-1141185/ review