

Smart Glass

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ABSTRACT

A display screen which can be bent rolled or folded? Sounds utopian, but it will soon be a reality. Over time, people's needs and wants change, as do their demands for new and improved technologies. Digitized information transmitted over long distances without significant degradation; high-tech devices, such as computers or cell phones, can receive, decode and convert information from digitized form to voice—and vice versa. This research paper proposes the idea that one day we will be a society reliant completely on touchscreens, smart windows, and appliance. Cloud computing will be our life. Touchscreens have already become a part of everyday life. People are smartphone and tablet obsessed these days. Our daily activities however are not completely reliant on touchscreen technology. There are still activities that we have to perform for ourselves. Many of the concepts in this research paper will depend on cloud computing.

Cloud computing uses online servers to store, manage, and maintain data. The purpose of cloud computing is to keep everything as simple as possible. All your information is stored in one place; easy for you to get to. Smart glass provides visual display and description on a big piece of glass. It is connected to all your electronic devices you use and to your cloud. So all the information is available to you whenever you need it. The glass will also be connected to any audio device to act as a virtual assistant. The assistant would use voice queries and a natural-language user interface to answer questions, make recommendations, and perform actions. Megatrends facing society – like diagnosing and treating diseases, creating renewable energy sources, and preserving clean air and water – “all have solutions that are based in materials innovations – and glass is one of the most promising materials to address a lot of these issues,”

KEYWORDS: *Cloud Computing, Smart Glass, Virtual Assistants, Sensors and Actuators.*

1. INTRODUCTION

Throughout history, materials have transformed society and culture. There was the Stone Age, the Bronze Age, and the Iron Age. This is the Glass Age. Since the beginning of time, fascination with the unknown has launched sailing ships, ignited experiments, and propelled rockets into space. Explorers, whether they gaze out at the horizon or peer into a microscope, have always been relentless about unlocking secrets and opening the world. That sense of discovery is building for today's glass scientists. Over the last decade, there has been an increasing focus on service science coupled with the design of new information and communication technologies [8,9]. Their stunning innovations in recent years are driving them to explore even more of the material's vast complexities. And scientists are on the cusp of more glass discoveries than ever before. “It's a tremendously exciting time for glass research,” says Dr. John Mauro of Corning Incorporated and a world-recognized expert in glass fundamentals.

“Industrial innovations in many other materials, like metals, are slowing down. But designers are finding more and more ways that glass can help them improve their products and connect with customers in new ways. To dig deeper into the unknown, industrial innovators are encouraging research universities to focus more intently on the science of glass. Emerging technologies such as AI, Cloud Computing, IOT etc. are being implemented in all the sectors and extensive research is conducted across the world to harness the immense convenience and reliance on glass technologies.

Over the last decade, there has been an increasing focus on service science coupled with design of new information and communication technologies. Today — in the Glass Age— glass is versatile, flexible, and strong. Glass moves information at the speed of light. Glass enables devices that are as sophisticated as they are beautiful. Glass transforms everyday surfaces and provides extraordinary benefits. It is really difficult to think of technology without glass. Glass has been used as an area of rapid technology since the birth of technology. It is said to be one of the central components of all technologies that actually bring us incredible innovations whether it is a smart phone, smart TV or notebooks. It is said that over the next couple of years, glass will be the main component of all technologies.

2. RESEARCH OBJECTIVES

The research objectives of this study are as follows:

1. Purpose of this study would be augmenting technology which would be hands free, displaying of information currently being displayed on small screens of smartphones.
2. Integrating a virtual assistant to allow users to interact with the internet via natural language voice commands.

3. LITERATURE REVIEW

3.1 Human Computer Interaction

Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them [1]. According to Pavlovic the existing HCI may be considered a bottleneck for the effective utilization of the available information flow with the development of computing, communication and display technologies [2]. HCI studies the relationships between humans and computers. HCI is not just defined with interfaces; it is more recent HCI research objectives are concerned with tasks, with shared understanding, and with explanations, justifications, and argumentation about actions.

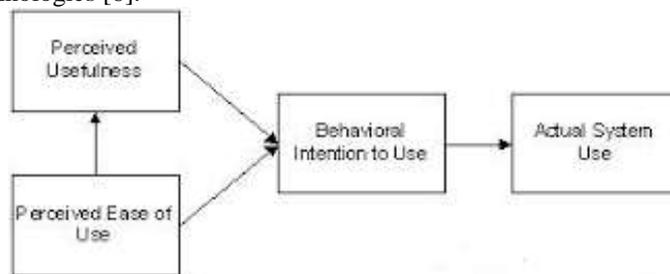
People may use computer systems efficiently, effectively, safely and with satisfaction by the promotion of HCI which is a field of research theory, methodology and practice with the objective of designing, developing and evaluating computer based systems. HCI is cross-disciplinary field which contain human factors, ergonomics, cognitive psychology, behavioural psychology and psychometrics, systems engineering, and computer science [3].

3.2 Usability

Usability is the capacity of how user efficiently interacts with information systems with satisfaction for specific purposes. Developing more usable systems is the purpose of the human computer interaction issues. According to Chau and Hsiao, usability is the extent to which the user and the interface can communicate clearly, without misunderstanding through the interface [4].

3.3 Technology Acceptance Model (TAM)

Fred Davis proposed the technology acceptance model (TAM) which suggests user's motivation of technology can be influenced by perceived ease of use and perceived usefulness (Fig. 1) [5]. He hypothesized that the attitude of user is a main determinant to decide using of technology. Davis described perceived usefulness as "the degree to which a person believes that using a particular system would enhance his/her job performance" and perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort". Technology Acceptance Model (TAM) provides effective solution that predicts adoption of new technologies [6].



3.4 Smart Glasses

Smart glasses are wearable smart devices that enable to bring computing data and internet access into users' field of view through heads up display (HUD) which is an optics technology. Smart glass users can see the display independently of user's position. They provide users with technological and information possibilities. Smart glasses allow users to make activities such as connecting internet, sending messages, taking photos & videos, searching locations and running mobile apps.[7] Companies continue to work on virtual reality and augmented reality in order to alter visual information. Virtual reality smart glasses can allow users to create completely virtual world in order to experience unreal display. Augmented reality smart glasses perceive user's real world with virtual content that is created by computing systems [18]. Usage areas of smart glasses are

medical, education, entertainment, sports and commerce. Voice warning and navigation for blind people, subtitles for deaf peoples and physical therapies through virtual reality for patients are point of medical field related with smart glasses. Simulations for education field, 3D cinemas and games for education field and performance measurement for sports field might change technologic perception through smart glasses. Smart glasses contain camera, compass, calculator, thermometer, accelerometer, speaker and navigation.

4. SYSTEM MODEL

The framework architecture of the proposed system is shown in fig. 2. Smart Glass is a combination of IOT, Cloud Computing and Gorilla glasses.

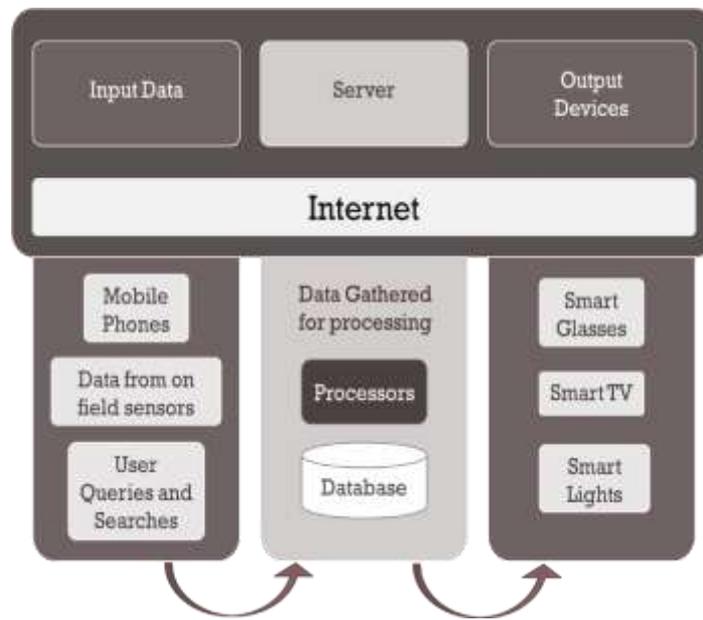


Fig 2 SYSTEM MODEL

The Smart Glass Framework consists of 3 main components:

4.1 Input Data

The input data is mostly data gathered from the handheld devices used by the layman user such as mobiles phones, Laptops etc. Input data also includes the data gathered from the searches and queries the user hits on the internet. These may include searches for news of a particular place, weather, sports etc. Another form of input data is data gathered from the IOT sensors such as environmental conditions the sensor is placed in, time of the day etc.

4.2 Server

The server is the place where all the data is stored to be gathered, integrated and processed. A real time database is maintained to store and collate the data. This data is then processed to generate some form of concrete output. The data is processed through AI Computing to generate smart output relevant to the input data gathered.

4.3 Output Devices

These devices are used to show the outputs generated by the server. These are usually devices that display data to the user.

5. APPLICATIONS:

In these section different possible applications that we can categorize as documentation, universal remote control, medical, education, entertainment, etc. are analyzed. The goal is to show how useful smart glasses could be. It is assumed that hardware to realize the applications will exist in the future.

5.1 Documentation

Pictures and videos taken by smart glasses are taken from the point of view of the user and can be taken hands-free without occluded sight. This is ideal to capture personal experiences of the wearer. In addition to pictures taken manually a device could also take pictures automatically. It could realize when the user is agitated or excited and take more pictures or even videos in those times automatically. All the pictures could be uploaded to create a documentation of the person's life.[4]

5.2 Universal remote control

Smart glasses could be used as universal remote control. The user could spawn an augmented control of any compatible device at any time and use this to interact with the device through gestures. Examples would be an augmented television remote, music, heat, light, oven, security system or camera control. It would also be possible to remote control any computing device with a virtual display and a virtual or physical keyboard and mouse or touch interface. This could be realized by streaming video to the glasses and control information to the device. If the device which should be controlled has little computational power or the bandwidth is limited it would also be possible to only send the information to be displayed to the glasses and let the glasses create the visualization. Of course, this would not be as convenient as using an actual desktop PC but it would enable the user to use the PC from remote location and use computing devices which do not have a screen or any physical interfaces. [1, 2]

5.3 Medical

At first the use of smart glasses for blind or visually impaired people might seem pointless. But they could be very useful in assisting those people as a sighted companion. Many blind people use a cane to get information about their surroundings.

This method only gives information about items below the waist which doesn't prevent collisions with objects placed higher like tree branches. Smart glasses could warn blind people from such collisions. They could also be used for navigation by giving them information about the distance to predefined landmarks.[3] Another possible application would be to use the smart glasses as a seeing aid to create night vision or show objects in a distance

5.4 Entertainment

In 3D cinemas users wear glasses. By replacing those glasses with smart glasses the cinema experience could be improved. Personal subtitles could be introduced in the language of choice. Smart glasses could also be used for a virtual reality cinema experience.

5.5 Home appliances

If you set an alarm in your phone to wake up in the morning, the smart glass placed in your bedroom would ring in the morning to wake you up. It would read out news to you as and when you want.

The glass placed in the bathroom would display or read out text messages to you while bathing and you could reply to these messages using speech-to-text and the virtual assistant would type in the messages for you.

It could be used in online shopping where the store will have an image of the customer and the screen will virtually put clothes on that image to see how the outfit looks. The glass could be used to show the daily schedule and also outline any important event. The advanced glass technology essentially transforms a variety of surfaces into functional touchscreens, complete with various potential applications from being able to show traffic warnings on billboards along a highway, to allowing the user to watch TV shows on their kitchen world surface as they cook, to displaying a smart dashboard in their car.

6. ADVANTAGES & DISADVANTAGES:

6.1 Advantages

- Convenience of use.
- Sensitive and responsive to the presence of people.
- Fast access of documents, chats, videos, maps and much more.
- A new trend for fashion lovers together being an innovative technology.
- A glass based computer to reside directly in front of you anywhere rather than in your pouch or pocket.
- A useful technology for all kinds of handicapped/disabled people.
- An innovative field which can trigger further development in many other areas.
- Cost effectiveness

6.2 Disadvantages:

- Glass being fragile in nature can be easily broken or damaged. Users will have a tough time taking care of it.
- It may lead to accidents while driving, eyestrain or visual confusion.
- The resources for running these glasses is still unknown. Further research is required to develop a cost-effective mechanism.
- The use may be limited to metro cities due to infrastructural constraints.
- Privacy of people may be breached.

7. CONCLUSION

Smart glasses will bring sophistication and ease of communication and information access anywhere & anytime. There are a lot of interesting applications which can only or a lot easier be implemented with smart glasses than with traditional computing devices. It is probable that there will be large investments into research and development of smart glasses because the entertainment industry, military and businesses can benefit from smart glasses and there might be a high consumer demand for them soon. The hardware that will be available in the near future still has its pitfalls and will probably need a few years and iterations to be fixed. Nevertheless, the prototypes available today are very promising and it might happen that smart glasses will be a part of our future everyday life. Still there is a lot of space to further understand and develop the usage of glass substance. It needs substantial investments from the companies and positive research will definitely help to dig out some more important future glass technology that will be really helpful to mankind. In coming future, the glass will have more complex shapes and further improved insulation and designing properties to be used by the industries and companies and enjoyed by its consumers without harming the environment.

The future glass technology will have bigger and best performing properties that can be used in various electrical, medical and technology based equipment's. There will lots of energy needs that will be fulfilled by the future innovative glass making the lives of the people more comfortable. It seems that windows are turning into high-tech screens. Indeed, in the not too far off future, all of the windows in our homes could very well be see-through glass that doubles as smart home screens. Smart Glass is as futuristic a gadget we have seen in recent times. It is limited in scope right now, but the future is bright and the technology itself is "incredibly compelling".

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