Smart Lens G

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Introduction

Our group proposes to design a smart glass, which has the potential to revolutionize the way people interact with the digital world. Unlike traditional glasses, smart glasses integrate and allow users to access information expeditiously and interact with digital content in a hands-free and immersive way.

Smart glasses offer a practical and effective method for accessing information and performing tasks without extracting sizeable gadgets such as smartphones or computers. They also have numerous applications in professional settings, including healthcare, manufacturing, and coordination. Workers in affiliated industries are able to use smart glasses to access information, communicate with colleagues, and complete tasks in a hands-free and efficient manner. For instance, surgeons can use smart glasses to access patient data and medical records during surgery without averting their gazes from the patient.

Furthermore, smart glasses have the potential to enhance social interactions by enabling users to share their experiences with others in real-time. They also provide a more engaging and enticing way to communicate with friends and family.

Antecedents to the Smart Lens

The touring machine developed by Feiner et al. in 1997 was an early example of a machine designed for urban exploration, equipped with a see-through display that provided information about surrounding buildings and a virtual menu. The device had an orientation detector and a stylus for user interaction, as well as a GPS receiver, internet connection, and desktop computer in a backpack.

In 2002, the Weavy, WUV, and BrainyHand were developed as lightweight, head-worn mobile wearables with a single-eyed head-mounted display that could connect wirelessly. These miniature devices used hand gestures for input and had a laser projector to show augmented information onto the user's palm or nearby surface.

From 2014 onwards, commercial smart glasses such as Google Glass, Epson Moverio Glass, and Microsoft Hololens were developed. Google Glass was a lightweight, head-mounted computer with a see-through display and micro-interaction capabilities. Epson Moverio Glass had a touch-sensitive controller, while Microsoft Hololens had a wider field of view and could create an immersive environment for holograms.

These devices allowed for multi-modal input, such as head gestures and voice commands, but had limitations such as bulky designs and limited mobility in outdoor environments.

Objectives

The primary aim of smart glasses is to enhance accessibility and convenience during interactions with digital information as well as virtual content. Smart glasses offer a captivating experience in contrast to traditional screens, enhancing the degree of involvement in the digital world.

Additionally, smart glasses aim to supply a more convenient way of completing tasks. Users can utilize smart glasses to access information and carry out assignments while referring to relevant statistics, which can be beneficial in situations such as operating heavy machinery or vehicles.

The project prototype of Smart Lens G. has the ability to display notifications in the action centre in the smart glass. It also displays the current date and time every 20 minutes.

Hardware Design

To create a smart glass, we mount the transparent OLED display onto the eyeglass frame and align it with the eyeglass frame. The display is connected to the Arduino Uno Rev 2 board with the pins on the display and the board respectively. The battery is connected to the Arduino Uno Rev 2 board with the power pins on the board.

Software Development

To implement the software for this project, we developed a Flutter application that read notifications from the Android action centre and send them to Firebase. This would involve using the Notification Listener Service to check incoming notifications and capture their content. Once the content is obtained, the Firebase API are used to upload the notification data to the cloud.

To retrieve the notification data on the Arduino Uno Rev 2 board, we use the Firebase API to access the data stored in Firebase. After retrieving the notification content, it can be displayed on the transparent OLED display by using the Adafruit_SSD1306 library.

Overall, the coding process for this project would require creating codes to interact with the Notification Listener Service on Android, the Firebase API, and the Adafruit_SSD1306 library on the Arduino Uno Rev 2 board. By developing and executing the code properly, the smart glasses can display notifications and other digital content without the need for hands-on interaction.

Ethical Issues

One of the primary ethical issues associated with smart glasses is the potential violation of privacy. Smart glasses have the ability to capture and send personal information, including images and audio, which can be an infringement on personal privacy. This can be particularly problematic in public spaces where individuals may not be aware that they are being recorded. To mitigate this concern, it is crucial to design smart glasses with privacy in mind and to inform users on the potential privacy implications. As an example, smart glasses could include a privacy mode that disables recording and transmission of data, and users may have to obtain consent before using them in public spaces.

Another worry associated with smart glasses is safety. The distraction caused by smart glasses can impede a user's ability to perceive their environment and pose safety risks. This can be quite unsettling in situations where individuals need to be aware of their surroundings. To address this concern, it is vital to design and use smart glasses in a way such that it does not jeopardize safety. For example, smart glasses could incorporate a safety mode that disables certain features while driving or running heavy machinery.

Social concerns are also associated with smart glasses. Smart glasses can be perceived as an intrusive element and can have an impact on social interactions. Users may feel uneasy interacting with someone who is wearing smart glasses, as they may not know if they are being recorded or not. To tackle this concern, it is crucial for smart glasses designs to respect social norms and values. For instance, smart glasses could have a visible indicator that shows whether they are recording or transmitting data.

Lastly, smart glasses might be abused for spying or surveillance by individuals. To address this concern, it is important to ensure that smart glasses are not used for illegal or unethical activities, and users should be aware of the potential ethical consequences of their use. Smart glasses will be subject to regulations that prohibit certain types of use to thwart attempts to abuse its functions.

In the design, we have not implemented any cameras or recorders to obviate ethical concerns.

Conclusion

To create a smart glass prototype that can potentially revolutionize how people interact with the digital world, we aim to design a device that can provide significant benefits to society. However, we must also address the ethical and privacy concerns related to the use of smart glasses with rigour to ensure they are used responsibly and safely. With further development, smart glasses have immense potential, but it is crucial to approach their design and implementation in a responsible manner.

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