Short Communication

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Ergonomics & Human Factors - Smart glasses in warehouse: An ergonomic view

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Perspicacious glasses or data glasses present novel technological equipment with a great potential in different environments and especially in warehouses. Despite of several benefits such as fortifying workers with right information at right time, amended productivity because of both free hands and others there are withal possible quandaries evidenced from literature that work with head mounted exhibits (HMD) can additionally cause headaches, pressure in ocular perceivers, quandaries with focusing and additionally the difficulties of text reading. To study addressed quandaries we performed a research together with ophthalmologists from Maribor Healthcare Centre. The research was funded by The Public Scholarship, Development, Incapacitation and Maintenance Fund of the Republic of Slovenia. We tested effects of utilizing perspicacious glasses Vuzix M300 during order picking activities that last four hours in testing warehouse environment at the faculty of mechanical engineering. We tested users comfort during wearing astute glasses through detailed questionnaire, performed several ocular perceiver investigations afore and after utilization of perspicacious glasses and performed several ergonomics analyses about workers posture during work. Results corroborated some benefits and additionally obstacles. Among them two ergonomics quandaries can be exposed that are tested by HMD which is very cumbersomely hefty and not the most felicitous for long-term use and since start button for scan function is on keenly intellective glasses a constant posture with hoisted right arm is present that can be deleterious for worker according to ergonomics standards.

Keywords: Accommodation Systems Engineering, Accommodation Support Systems, Astute Glasses, Design Science Research.

Exordium:

Keenly intellective glasses or astute glasses are wearable computer glasses that integrate information alongside or to what the wearer visually perceives alternatively, perspicacious glasses are sometimes defined as wearable computer glasses that are able to transmute their optical properties at runtime. Keenly intellective sunglasses which are programmed to transmute tint by electronic denotes are an example of the latter type of perspicacious glasses.

Superimposing information onto a field of view is achieved through an optical head-mounted exhibit (OHMD) or embedded wireless glasses with transparent heads-up exhibit (HUD) or augmented authenticity (AR) overlay. These systems have the capability to reflect projected digital images as well as sanction the utilizer to visually perceive through it or optically discern better with it. While early models can perform rudimentary tasks, such as accommodating as a front end exhibit for a remote system, as in the case of keenly intellective glasses utilizing cellular technology or Wi-Fi, modern astute glasses are efficaciously wearable computers which can run self-contained mobile apps. Some are hands free and can communicate with the Internet via natural language voice commands, while others use touch buttons.

Like other computers, keenly intellective glasses may amass information from internal or external sensors. It may control or retrieve data from other instruments or computers. It may support wireless technologies like Bluetooth, Wi-Fi, and GPS. A minuscule number of models run a mobile operating system and function as portable media players to send audio and video files to the utilizer via a Bluetooth or Wi-Fi headset. Some astute glasses models additionally feature full life logging and activity tracker capability.

Perspicacious glasses are computing contrivances worn in front of the ocular perceivers. Conspicuously their exhibits move with the user's head, which leads to the users visually, perceiving the exhibit independently of his or her position and orientation. Consequently astute glasses or lenses are the only contrivances which can alter or enhance the wearer's vision no matter where he/she is physically located and where he/she looks. There are three different paradigms of how to alter the visual information a wearer perceives. Those three are introduced here. • Virtual authenticity: The goal is to engender a plenarily virtual world for the utilizer to visually perceive, interact with and immerse into. The utilizer visually perceives this virtual world only; any other light sources are not affecting the ocular perceiver. One paramount difference to a simple screen is that the actions of the utilizer affect the virtual world. In example kineticism affects what virtual content the utilizer optically discerns. A fa-

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mous fictional example of a contrivance engendering a virtual world is the Helideck from Star Trek. • Augmented authenticity: The world is enhanced or augmented by virtual objects as optically discerned in figure 1. The utilizer can visually perceive the genuine world but withal perceives virtual content engendered by a computing contrivance and exhibited by a supplemental light source which doesn't proscribe the perception of the authentic world. Interaction with those virtual objects is a way of communicating with the computing contrivances. • Diminished authenticity: Objects are subtracted from scenes by filtering the light reflected or emitted by those objects towards the ocular perceiver. This is most often utilized in coalescence with augmented authenticity to supersede the diminished objects by some virtual objects. Like other keenly intellective contrivances, perspicacious glasses will often additionally have a camera. Consequential differences to other camera contrivances are Figure 1: Authenticity is augmented with a virtual object. That the pictures or videos are taken from the user's perspective, there is no desideratum for the utilizer to hold the contrivance in his hands and the vision of the utilizer is not occluded. This camera can optically discern what the wearer optically discerns at any time. In cumulation with ocular perceiver tracking technology the contrivances can determine precisely what the wearer is visually examining. This sanctions the contrivance to get crucial information about the user's intrigues, activities, circumventions and vocation. Those fundamental differences to other computing contrivances are what make keenly intellective glasses unique and intriguing. They enable incipient applications which couldn't be as facilely realized with other contrivances.

Contrivances with one exhibit

There are astute glasses with a single exhibit which is placed in the peripheral vision of the utilizer. Those exhibits can be habituated to exhibit information to the utilizer. Infelicitously they cannot be habituated to engender a diminished or virtual authenticity because visual perception on one ocular perceiver is not affected. They withal cannot be acclimated to engender an interactive augmented authenticity because virtual objects can only be visually perceived in peripheral vision.

APPLICATIONS

In this section different possible applications that we can categorize as documentation, productivity, ecumenical remote control, medical, edification, regalement, commerce and sports. The goal is to show how utilizable keenly intellective glasses could be. It is postulated that hardware to realize the applications will subsist in the future. Documentation Pictures and videos taken by astute glasses are taken from the perspective of the utilizer and can be taken hands-free without occluded visual perception. This is ideal to capture personal experiences of the wearer. In additament to pictures taken manually a contrivance could additionally take pictures automatically. It could realize when the utilizer is agitated or exhilarated and take more pictures or even videos in those times automatically. All the pictures could be uploaded to engender a documentation of the person's life. This documentation could be used positively in many different ways. It could be utilized as a recollection avail, to increment safety by engendering visual evidence of malefactions, as proof in court or simply for personal use. If many people used such a contrivance for documentation, information of catastrophes and other major events would spread even more expeditious due to the incrementation of pictures and videos taken in situations where the utilizer might not have time to manually take pictures like an earthquake. Productivity albeit there are already many solutions utilized for navigation, perspicacious glasses could be habituated to engender a better experience. In cars they could be habituated to highlight the way and propose haste for the driver. In warehouses they could be acclimated to navigate employees to the objects they require to convey highlighting those with some colour. Video streams could be habituated to ask experts or support questions while doing work. Imagine having to do an arduous maintenance task annually. This could be done while being connected to an expert from that products company visually perceiving precisely what you do, giving advice and in case something goes erroneous maybe even being liable for damages.

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