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**HOMEWORK ESSAY: CONTEMPORARY ISSUES IN COMPUTING**

**AUGMENTED REALITY: DO THE PROS UNDERMINE THE CONS?**

First theorized by Morton Heilig in 1950s [1], augmented reality (AR) is a ground-breaking technology that permits digital graphics (or occasionally sounds) to be mingled with reality in real-time to provide enhanced (information-rich) views of the real world. The prime motive of augmented reality is to simply one’s life by flawlessly merging the required information or scenes with reality to avoid unnecessary diversion of attention and to free one’s hands from real information media. Although there currently are some issues associated with its use, the technology promises to be highly useful in a variety of applications. In future, AR has the potential to emerge as the standard of computer-assisted applications and replace current tech. The first part of this essay defines that augmented reality is and what its uses are, while the second part points out the objections to this tech and explains how trivial they are in light of the advantages of AR.

The technology’s working can be summarized into four major actions: “scene capture, scene identification, processing, and visualization” [1]. Scene capture employs high-end camera units to input clear real-world imagery. Next, this image is constantly analyzed by an on-board processor to identify the environment being presented in the scene; the identification is carried out either by placing virtual markers on identifiable object edges in the image or by identifying the natural features of the scene [1]. After scene identification, the desired graphics layers are stitched appropriately into image frames. These edited image sequences are then output to screens in head-mounted displays for the user to view. An alternate approach is to augment the processed graphics on a see-through display (done by products like Google Glass and Microsoft’s HoloLens). This entire procedure needs to be carried out in real-time (instantly) to avoid lag and hence, requires high processing power.

Understanding the prowess and importance of augmented reality, major tech giants have been working to improve the technology and also to integrate this revolutionary idea into human’s day-to-day life.

“Microsoft was one of the early players to invest heavily in AR with HoloLens and its ecosystem. The Redmond company continues to work with the likes of NASA and other companies, like car manufacturers, to find ways to implement AR into everyday life in industry.” [3].

Considering it a “core technology” [3], Apple has also been demonstrating increasing interest in augmented reality. Many new startups are buzzing with AR based tech as their prime products. Similarly, augmented reality also seems to be a hot topic in the academic world, with works like “sixth sense” by MIT media lab researchers that focus on enhancing the AR technology and human’s interaction with it [2].

Although nobody has come close to developing AR devices that humans can wear on a day-to-day basis [3] and the tech is still in initial phases of development, augmented reality (AR) technology promises to be tremendously helpful in a variety of fields. Assisted with an AR device, humans can do what in reality, is economically and logistically infeasible). Some important examples of useful situations include: Education (displaying 3-D imagery of subjects alongside book text to assist in learning), Medical (accurate virtual projection of guiders for nerves, organs etcetera during operations to avoid wrong incisions; displaying required live X-ray or test statistics of a patient during a surgery) [5], E-commerce (viewing 3-D image of the desired item and virtually trying apparel on), As a sense alternate instrument for disabled (processing speech and displaying text to the deaf), military assistance, navigation (displaying virtual directions on the path), virtual workplace (witnessing members from around the globe virtually) [1]. Similarly, some trivial uses of this technology include: AR video games that use real world as the environment (like Pokémon GO, father.io) and advertisement (hovering virtual advertisement banners in irregular but noticeable places). With proper work on this tech, it possesses the power to completely replace all current technology like mobile phones and personal computers.

What makes augmented reality so useful in the above-mentioned applications is the logistical feasibility, economic advantages and time saving. Use of AR greatly simplifies such tasks which otherwise, might be very costly and time-consuming. The idea of merging virtual world with reality enables humans to overcome physical boundaries and make the impossible happen. For instance, in a live sporting event, players can be assigned virtually hovering tags and team score may be displayed as a 3-D overlay in the stadium stands [5]. Any such approach would’ve been previously illogical but with the advent of AR, it is all possible.

But, just like any other upcoming technology, augmented reality too is facing competition and some technical difficulties. A close competitor to augmented reality technology is called Virtual Reality (VR). VR, through the use of head-mounted displays, aims to allow humans to experience an entirely different environment with no interference of reality in it. But, since VR replaces reality entirely, AR still has an edge over it. “Humans are social creatures” [3] and constantly require interaction with the real world and their own kind. Although many might disagree, a technology that enhances reality to fit our needs is much better that one that isolates one away from reality. The current list of difficulties being faced in development of augmented reality is vast too. First off, the technology requires tremendous processing power from nano-sized processors to render lag-free and real-time feed; which costs a lot and makes AR very expensive. Similarly, the current AR software fails to adjust the image overlays to low-light or dusty image conditions, making the output look unreal [1]. Although the issue may be countered by incorporating advanced neural nets in the algorithms, the lack of appropriate low-light camera hardware would still be an issue. Moving forth, another issue that AR faces is the lack of proper, high resolution screens that may output imagery with the exact vividness and depth as reality [1]. Although new innovations like OLED and AMOLED do show promising results, there still is a long way to go before this tech can achieve perfection.

Given that these issues were overcome in near future, there still are some social, health and ethical concerns that dictate against augmented reality. Firstly, although the proper tech is not available for mass-marketing, it is widely believed that relying completely on augmented reality technology may be hazardous in day-to-day life. For example, in navigation, the system might underestimate the host’s reaction time or might delay a direction and since the user’s vision is augmented with wrong data, it all might result in accidents [4]. Similarly, there are medical concerns related to eye health too. Initial research proves that use of head-mounted displays or current AR tech causes humans to have ‘tunnel vision’ which masks objects in the peripheral’s visual field. “A poorly designed AR interface could interfere with vision to the same degree as Presbyopia, farsightedness, and nearsightedness (all affect one’s ability to focus)” [4].

Although the shortcomings of augmented reality are currently attention-worthy, the advantages of the tech and the pace with which it is growing outweighs them all. The essential improvements AR is bringing and will bring to human’s day-to-day lives, it is important for humans to work on improving it further. Be it simple entertainment applications like image editing filters, or revolutionary improvements in avoiding freezing of gait (FOG) in Parkinson’s disease patients by utilizing visual cues [4], augmented reality is already performing wonders and transforming human life unlike any other tech. And, as far as the issues with hazards related to technical is concerned, almost every tech has a development phase that once overcome, leaves the technology more robust and reliable than ever. Hence, it is evident that given enough time, augmented reality does have the potential to overcome all its disadvantages and be utilized as a time-changing technology in human’s everyday lives.

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