AN OVERVIEW OF IMPLEMENTED SMART GLASSES FOR PHARMACIST AND OPERATION ROOM TECHNICIANS

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Abstract:
There have been numerous new devices developed as a result of the growing attempts to implement health information technology in the healthcare industry. These devices have the potential to enhance patient care, boost efficiency, and reduce the costs of healthcare. Smart glasses are a relatively new innovation. These glasses are web-connected and have the ability to display data on the lenses as well as record images or videos with a camera that is located in the front of the eye. For the most part, smart glasses have been utilized for the purpose of visualizing data based on augmented reality for both technicians working in operating rooms and pharmacists. This is in contrast to the utilization of mixed reality. According to the findings of this review, the amount of research that is being undertaken in relation to smart glasses is consistently growing, and technological research that is being actively conducted into the creation of smart glasses is also being carried out.

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Introduction:

There are many different kinds of wearable devices that are gaining attention as a result of the growth of information and communication technology. These gadgets have the potential to replace cellphones. According to the definition provided by [1], wearable devices are described as "any and all computing devices that are capable of being worn on the body, including for applications that involve computing functions." Through the installation of programs that are available on a mobile operating system (OS), wearable devices can be utilized for a variety of reasons. These applications provide a wide range of functionality, including those that are related to fashion and health.

Despite the fact that instructional technology has advanced from chalkboards to computer-based slideshows and beyond over the course of the last few decades, the structure of pharmacy classes has been slower to develop. Pharmacy education traditionally consists of an instructor standing at the front of a big classroom, providing curriculum in the hopes of imparting knowledge. This may be the case regardless of the technology that has been accessible through the years. It is highly probable that there are multiple factors contributing to low classroom attendance; nonetheless, there is some evidence to show that the increasing lack of attendance is encouraged by the fact that lectures and the material of lectures are accessible through digital means [2]. In light of the fact that both qualitative and quantitative research has demonstrated that active learning is more effective than passive learning, educators are currently looking for new pedagogies with which to replace lectures. Active-learning and the use of educational technology are two methods that educators have begun to implement in order to engage students in order to meet the educational requirements of today's pharmacists and operating room technicians [3]. Instructors have begun to modify their teaching methods in order to meet these requirements. The ability to solve problems is a skill that pharmacists employ in their day-to-day work to resolve a wide variety of patient care concerns. Pharmacy programs are designed to equip students with the knowledge, skills, and abilities necessary to offer patient-centered care and to solve issues, according to the Accreditation Council for Pharmacy Education (ACPE), which highlights the importance of this [4].

Review:

Coordination and communication of care that is both effective and timely are essential components of patient care that is both efficient and protective [5]. The inability to provide coordinated treatment and communicate patient data is considered to be one of the primary reasons for adverse occurrences, which include delays in patient care and departures from regular medical protocols [6]. The difficulties that arise in the process of maintaining efficient care coordination and communication are made even more difficult when care providers are dispersed (for example, stationed in separate locations) [7]. In the past twenty years, numerous telemedicine systems have been developed in order to supplement clinical consultations that are conducted remotely [8]. In the course of the COVID-19 epidemic, the necessity of such systems became more acutely apparent. Desktop computers or tablet computers are used to implement the majority of telemedicine systems [6,7]. The following are some of the practical limitations of these devices: Due to the fact that they are installed in a fixed location, desktop systems have limited portability. On the other hand, tablet device–based systems rely on manual input and control, which can make them less usable [9]. As a consequence of these challenges, the utilization of technology in real time may be restricted, particularly in the context of complicated care environments and time-sensitive patient scenarios. This is due to the fact that these situations require the complete cognitive attention and physical involvement of care workers [10].

Smart glasses, which are a computing device that is worn as a standard pair of glasses, have been gaining popularity in the field of health care in recent years. This is due to the fact that smart glasses enable real-time visual communication without the need for the wearer to use their hands [10]. Specifically, smart glasses have the capability to display both visual and textual information within the wearer's field of view (FOV) by means of a prism. Additionally, they have the capability to enable videoconferencing for the purpose of consultations or second opinions through the use of a front-facing camera. Researchers have investigated the applicability and usefulness of smart glasses in a variety of medical settings and clinical scenarios ever since they were first introduced to the market. Some of the cases that have been investigated include broadcasting surgeries to facilitate resident teaching, recording encounters with patients in wound care, evaluating patients in mass casualty incidents, and supporting communication between prehospital and hospital providers [12].

In the realm of healthcare, there has been a significant amount of interest in the utilization of health information technology (HIT) in order to

enhance the quality of care provided to patients, reduce expenses, and boost the effectiveness of healthcare workers. HITECH Act, which stands for the Health Information Technology for Economic and Clinical Health Act, has been the driving force behind this trend [11]. The Health Information Technology for Economic and Clinical Health Act (HITECH) offers financial incentives to health care providers and organizations that comply with the rules that the Centers for Medicare and Medicaid Services have established for the use of technology [12]. The exploitation of mobile devices to supplement clinical medicine is referred to as mobile health (mHealth), which is one of the technologies that are included in health information technology (HIT). Smartphones and tablets in the field of mobile health have been demonstrated to cut costs and enhance productivity in clinical settings; yet, they are still underutilized and have practical constraints, such as their dependency on manual input and control, which can make them less usable. The most recent development in the field of mobile health is the introduction of smart glasses, which are web-connected, wearable computers in the shape of traditional spectacles. These glasses do away with the problem of manual input because they do not require the use of hands and can be operated by voice commands. Smart glasses are able to present data onto the lenses and record photos or videos with a specialized front-facing camera [12]. This is the most significant feature of smart glasses.

Smart glasses have only recently been made available to the general public, but they have already sparked interest among medical experts, as evidenced by the fact that they have already been brought into use in hospitals and clinics. The most attention has been paid to Google Glass in the field of healthcare, and it has played a significant role in encouraging businesses to continue developing programs (apps) and hardware for smart glasses. In the beginning, the gadget was utilized to cut down on the amount of time spent interacting with electronic health records [13] and to broadcast surgical procedures in order to increase the efficiency of resident education [12,13]. At the moment, businesses are working on establishing new software platforms, which are specifically designed for smart glasses. These platforms will enable seamless recording for the transcription of patient notes and video conferencing for consultations or second opinions [13]. Despite the fact that smart glasses have been available to the general public since 2011, the majority of the papers that are now available in the medical literature consist of documentation of their utilization in a variety of healthcare settings.

Among the pharmacists who were the first to utilize Google Glass in a clinical setting, the majority of them said that the technology was comfortable to wear while they were working or practicing. There are parallels to be drawn between the prism display of Google Glass and Heads-Up Displays (HUDs), which are devices that superimpose and register computer-generated pictures onto what is typically observed in the actual world, therefore producing a composite, augmented reality view. Since 1986, when Roberts et al. presented the first integration of a surgical microscope with stereotactic technology to superimpose a computed tomography (CT)-derived tumor outline onto the surgical field [14], augmented reality has been utilized in the surgical setting. This was the first time that augmented reality was employed in the surgical setting. This technology is utilized in the field of surgery to superimpose stereotactic data, such as the contours of the tumor, and so provides the surgeon with critical information without requiring them to divert their gaze away from the operational field. With the use of Google Glass as a head-up display (HUD), Dr. Anil Shah was able to execute a rhinoplasty. It was possible for the surgeon to pre-operatively construct a simulated image of the patient with the anticipated completed procedure. This image was then displayed on the prism display to overlay the patient, which resulted in augmented reality [14].

An additional aspect that is worth mentioning is the capability to provide remote guidance and annotation based on pictures and text. For instance, the remote consultant has the ability to annotate images that have been collected from the live stream and then project them back onto the visual field of the local glass user [13]. Nineteen percent of the trials, or four out of twenty-one, included the possibility of the remote consultant using the texting feature to type messages that might be displayed on the smart glass display. Because of these annotation characteristics, the remote consultant has access to a greater number of channels through which they can lead and guide local medical practitioners in the performance of crucial procedures [14].

The concept of augmented reality (AR), which is a method that can improve an individual's visual experience of the real world by including digital visual elements, was also investigated in a number of studies. For example, in Ponce et al. [15], augmented reality made it possible for a remote

surgeon to visually insert their hands or instruments into the visual field of a local surgeon who was wearing smart glasses. This allowed the local surgeon to get real-time advice, training, and assistance as it was required. In a different investigation [16], an augmented reality (AR)-based marker was utilized by a remote specialist to direct the execution of an echocardiographic examination that was carried out by a local operator. It was possible to see the markers through the screen of the smart glasses worn by the local operator, which were superimposed on the ultrasound instrument.

Other features of smart glasses that were reported in the studies included the ability to zoom in and out of the live stream video, the ability to control and interact with the smart glass device through voice commands or head movements, the ability to take photographs, the ability to automatically detect the geographic location of on-site medical teams using the built-in GPS, and the ability to present a prehospital triage algorithm on the glass screen for decision support during mass casualty incidents [17].

Conclusion:

When it comes to facilitating visual communication and information exchange among geographically dispersed medical teams, it was discovered that smart glasses are a technology that is both acceptable and feasible. In spite of the fact that this innovative technology has a great deal of potential, the papers that were examined brought to light a number of obstacles that must be overcome before it can be widely used in intricate health care systems. In order to enhance the usefulness and use of smart glasses for operating room technicians and pharmacists, it is necessary to have a system design that is thoughtful and involves end users from the very beginning. Additionally, there is a need for increased hardware and software dependability.

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