

Time to Port Augmented Reality Health Apps to Smart Glasses?

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AS A SCIENTIST OR DEVELOPER, are your augmented reality (AR) products available for iPhones and Android? If they aren't yet, maybe they should be. If you use a smartphone, check your iTunes or Google Play Store for AR health apps. Consider:

- The January 2013 Consumer Electronics Show in Las Vegas allowed users to try out the Vuzix M100 Smart Glasses, available for Android 4.0 beginning this summer for less than \$500 (iOS fall 2013 availability pending platform approval). This is a wearable Bluetooth/Wi-Fi headpiece that can be worn with regular eyeglasses. It features a built-in high-definition (HD) camera and 428×240 pixel Wide Quarter Video Graphics Array (WQVGA) floating eyepiece. Users say it's like looking at a smartphone from a foot away. Additional features include 720p HD video recording onto 8GB of flash storage, built-in GPS and a compass, and an accelerometer.
- Available beginning 2014, Google's Project Glass headpiece already made its appearance on fall 2012 fashion runways with video shot from the glass's camera. Recently, Google filed a new patent for an input device, using a laser projector on one side and a camera on the other side of two-sided glasses. The laser projector displays the virtual keyboard on your arm while the camera sees the input you're making with those virtual buttons and turns it into something the computer can understand.
- Not to be outdone, Microsoft filed its own patent in late 2012 for "Event Augmentation with Real-Time Information," using a baseball game for illustration. Updated stats on the players in view would appear in the display, with a GPS identifying the event location. Sony's specs would allow users to share information by looking into each other's eyes. Video gaming hardware manufacturers have long been exploring the market for AR glasses. And designer sunglasses maker, Oakley, which has been following the development of heads-up displays since 1997, may make a set of wearable computer sunglasses for athletes.

Indeed, wearable computing has been envisioned since 1997, when one of its early pioneers, Steve Mann, envisioned a "body-worn apparatus [that] augments and mediates the human senses."¹ While some barriers remain to mainstreaming products such as smart textiles (e.g., a soft tran-

sistor is required) and body area networks (BANs) (e.g., preserving privacy is a challenge), the ubiquitous smartphone and the popularity of computer gaming have paved the way for smart glasses to come online more quickly than these.

What health applications might make sense for smart glasses? Health apps are a natural for wearables because monitoring a user's vital signs holds potential to improve treatment and control healthcare costs,² important goals of mobile healthcare (mHealth). A recent article by Conti et al. (2012) discussed the challenges and opportunities in pervasive computing, including wearables.³

Perhaps therapy for Parkinson's disease patients might include some rhythmic finger tapping, converting a virtual reality system created for evaluating such patients⁴ into an AR app for the Android and iOS platforms. The patient could see a virtual image of his or her tapping hand superimposed on the glasses as a rhythmic beat was piped into the Bluetooth earpiece.

Or perhaps an interactive game designed to reduce the wearer's pain is displayed in the smart glasses display, with controls via eye blink or a finger on a projected keyboard. As long as the game is immersive, recent research shows that the method of display—head mounted or projected—doesn't matter in terms of pain reduction.⁵

Finally, in the field of mental health, some interesting new research is emerging that identifies characteristic eye movements and markers for a variety of diagnoses such as alcoholism, Alzheimer's, and schizophrenia.⁶ While more work remains to be done in this area, smart glasses have the potential to allow mHealth monitoring to ensure that patients with these diagnoses are complying with their care regimens.

So enjoy your smartphone while you can, knowing that you will be ahead of the curve as it evolves into smart glasses—for which you have developed an app or two that make a difference to the wearer's health.

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