Emergence of a New Digital System for Experiencing Reality

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The digital revolution of which the world has recently witnessed up to this point has generally provided society with the means to convert process that were once done by hand into the digital realm. These processes generally took the place of traditional business practices like recording and storing data as well as sophisticated control systems that power a number of our machines and factories. The internet has played a big role in promoting social innovations in a multitude of ways of which the social media revolution has be pre-eminent. We are now approaching a paradigm in which what we consider the traditional human experience is about to be completely transformed. The technology that is beginning to emerge will be responsible for transforming society in a multitude of ways and will affect every sector of industry as well as the personal lives of all people. The technology being explored within this paper is a system of technology rather than an individual product within itself. The system being referred to includes three components. The first component being the idea of augmented reality (AR) of which has just recently entered into the market over the last few years. The Sixth Sense system created by one of MIT's elite Ph.D. students Pranav Mistry enables users by wearing a simple device to project a video stream out onto the world in front of them; this technology has been around since 2009. The last category is the release of glasses and contact lenses that splice digital information onto the scene that the user is viewing through the lens, a number of companies are working on prototypes and Google has announced the release of their first model of glasses at the end of 2012. The combination of these technologies will radically change the way that human beings experience reality on a daily basis and as such will likely be disruptive to many currently existing technologies, markets and potentially even industries.

To date the majority of people have never heard of AR, the industry up to this point has only captured .1% of consumer market share, so it has a ways to go before it becomes common

place. A similar term that has been used more frequently is virtual reality (VR); this popularity has arisen because of the multitude of science fiction books and movies that reference it. AR is not too far away from VR, they both present digital content into the user experience containing visual and/or audio objects that are computer generated. "The term virtual reality is often used to describe systems that attempt to replace much or all of the users experience of the physical world with synthesized 3D material such as graphics or sound….There are many situations however, in which we would like to interact with the real world. An AR can make this possible by presenting a virtual world that enriches, rather than replace, the real world. Instead of blocking out the real world, this approach annotates reality to provide valuable information, such as descriptions of important features or instructions for performing physical tasks (Feiner, 1993)." Most initial lab research was conducted around virtual reality, but as time passed people began to realize that augmented reality was more practical as people can augment their world while conducting their daily activities. According to Markets and Markets Global Augmented reality Forecasting Report the AR market is expected to grow from .1% to 1% in just five years with a compound annual growth rate of 95.35%. The market is projected to experience exponential growth in revenue from 2011 to 2016 beginning at $181.25 million and growing to $5,155.92 million. Currently the market contribution comes primarily from North America and Europe, but in the next five years Japan, China and South Korea are expected to gain a big share. Categories most likely to be saturated with new applications include gaming, retail, advertising and travel. Currently there are a small group of companies around the world that produce augmented reality applications, but this number is projected to grow extravagantly to keep up with the growth of the market (Research & Markets, 2011).

AR defines the core structure of the system that will disrupt products, and potentially even industries. The logical behind this reasoning is that AR isn't just another product or even program; it is literally a new framework that will birth thousands and maybe even millions of new programs within it. One can almost perceive it as a new language; it will from a collective perspective enable complete 3D immersive visual communication between multiple people. So AR is the framework in which users will be able to begin to experience a new world. Users will be able to optionally augment their surroundings thus perceiving digital objects as they relate to inform the user of the world around them. The user also may optionally choose to immerse themselves completely in a virtual world, which will also be possible with tools currently being created. The physical tools that will enable this process include virtual glasses, virtual contact lenses as well as sixth sense technology. Virtual contact lenses are the only of the three that will enable users to immerse themselves completely as their visual field will be entirely covered by the contact lens.

To date AR applications have been built to work on smart phones and tablets such as the IPAD. Wikitude World Browser is considered the king of all AR applications; it scans the world around you and extracts geo-located information from online databases and displays it as a layer above the view of the user's surroundings on camera mode. Information can include things like Wikipedia articles, ATM machine locations, local restaurants, Tweets, FourSquare locations, Flickr pictures, YouTube and many more.

AR glasses, contacts and sixth sense empower users to view the world without holding a device. This freedom in motion will provide much richer viewer experiences. AR glasses are being produced by a few companies, in which google is leading the way as they will be available for purchase at the end of 2012 and are estimated to cost between $400 and $600 similar to the price of a smart phone (Bilton, 2012). AR contact lenses are not that fully developed, more research will need to be conducted before they are brought into the market. AR contacts will provide users with a complete immersion experience. Although the overall experience will be more powerful for users of this technology, there may be a lag in gaining market share of a large portion of the market initially as trust has not yet been developed. The public tends to be cautious of adopting new technologies when safety is an issue; people are likely to be wary of what effects these contacts may have on their eyes. The only company to date focusing on the creation of AR contacts is Innovega, of which is lacking a product release date, which means they are still probably in the midst of the development process (Innovega). DARPA has made big contributions to research and development at Innovega, they plan to use the technology to aid soldiers with advanced intelligence surveillance (Kaiser, 2012).

Sixth Sense technology is a different approach in viewing AR that projects the information directly onto the viewers surrounding world via a mini projector worn around the user's neck. From an interaction perspective this tool is a bit limiting because the user still must control the direction in which the projection is streaming by hand. This option will most likely be adopted before people move on to the glasses or contacts as a safety precaution; there is much less risk for the eye. The major limiting factor with Sixth Sense is that virtual objects cannot be projected onto spaces that exist far away from the user; the range would be limited to about about 3' to 4'. Another component of the Sixth Sense setup includes the use of colorized index

finger and thumb gloves, about the size of thimbles that allow users to interact with their data in a very similar fashion to Tom Cruise in the movie Minority Report. This type of interaction will most likely be incorporated to both AR glasses and contact lenses. The amazing thing about this system is that the student that invented it chose to make the entire system open source, and he has created an online forum that teaches people how to build them for only $350 (Mistry). Ultimately as time moves forward with these three competing and enabling tools of augmented reality they will each cater to different market segments that choose them based off of quality, safety concerns and price. Ultimately once the market settles, and safety precautions are no longer an issue it seems very likely that contact lenses will be the preferred option among the three as it provides the most optimal user experience out of three.

It is likely that disruption will occur on many levels for an extended period of time as this system matures and begins to saturate different industries and sectors of society. A major industry that will eventually be hard hit will be the cell phone industry. The only value in an augmented reality system is its ability to connect to the internet which will lead to data plans which means that 'cellular phone communication' will ultimately become a part of this package. Google just released a sample video of their glasses which features a video conversation that the user participates in, which either means the glasses have a data plan or they connect to a smart phone the user carries around. Even if the technology starts by connecting to smart phones, it will eventually transition to being a singular device that is worn, as it just does not make sense that people should need to carry a bulky object around with them in order to 'connect'. An extension of this disruption will also include all mobile devices like ipads, pc based tablets, e-readers like the nook and kindle. As these products will eventually hinder users because of their limitations in screen size required use of hands to be operated. This transition to a more free

approach of digital interaction will probably leave a mass of mobile products useless for users residing within the Western nations, and will probably be transitioned into the surrounding third world countries as we are seeing with old computer equipment today. Both the computer and tv industry will also feel the impacts of this technological system. As users begin to become conditioned to being able to utilize a world sized screen their expectations will expand into this sector as well. People will begin to enjoy the flexibility of being able to move through space and not be limited to sitting down at a desk when interacting with digital information. As such even modern day office furniture will be impacted by this transition. Many people today experience many health issues as a result of being in an office environment today. The future holds opportunities for doing away with carpel tunnel and back problems from extended sitting sessions in one position.

Other products that will be impacted will be any type of digital objects that we use today including projectors, cameras, watches and GPS systems. Vehicular audio and video systems will be able to be done away with once the transition is complete as passengers will be carrying their own personal digital systems with them, there will also be possibilities for shared sensory experiences with multiple users as we do now.

Two major experience industries will also be completely transformed. That is the industries of commerce as well as advertising. Advertising will likely become almost completely digital depending on usage estimates; if people choose to experience most things digitally they will have the ability to block out static representations of advertising with their favorite artists works. Advertisers will need to come up with creative solutions to be able to compete with personalized user experiences and provide major benefits in order to convince users to allow advertising in their personalized digital space. Commerce will be changed drastically as people

will literally be able to navigate any item anywhere as well as access all competitive and risk data. For example people will have the ability to digitally walk through the aisles of a grocery store from home, purchase items not only from a more informed perspective but will also make them more efficient with their time. People will have the ability not only to purchase but also to experience products in 3 dimensional space thus reducing the need to interact with them physically before point of sale; this level of interaction will be necessary for things like shopping for gifts and clothes. As gas prices and resources on the planet continue to become more limited people will increasingly begin to reduce travel when they can.

The pocket finder is an app that has recently been created that allows users to scan products and then compare them with others online to find not only the best prices, but also information on sustainability and health information. These types of gauges will add another layer of transparency to products; purchases based off of advertising and packaging alone will be a thing of the past. These new information retrieval applications will likely elicit a revolution not only in the way that products are being advertised, but also in what types of products are produced (Brody & Gottsman, 1999).

As an extension of all of the product and industry transitions that will arise; new policies will need to be instituted in order to manage all potential legal issues. One form of anticipatory governance that should be considered before this future comes to fruition is the management and governance of space. What people choose to see and interact with in public spaces can have a big impact on those around them. For one, there are safety concerns that need to be considered. There are many unintended consequences that occur as a result of releasing technologies into the public sphere. When considering spaces one should consider the reactions that may occur when placing foreign (digital) objects in into the visionary space of a user. The results may potentially

cause people to act erratically and may even cause harm to those surrounding them. Think for instance about the art form of trompe *l'oeil*, this is an art form where artists create works of art so that they will be perceived as real. One would initially think of this as something incredibly innovative and exciting to experience, but it may also cause someone to become confused on how to navigate the actual environment in which they are moving through and could potentially cause them to get into a catastrophic accident that could cause them or those surrounding them harm. Concepts of this sort should be considered before a technology of this magnitude is unleashed on the public without strict guidelines put into place.

Another major public issue that will need to be considered concerns pornography and applications of a sexually explicit nature. If people are able to modify the reality in which they exist within surrounded by a society unaware, there is a very high risk that a small percentage of people will view material of a pornographic nature in public places. This experience could very well have an influence on the actions of those participating in this behavior. Having the ability to view pornographic material in public sphere should be a major cause for concern as it is probably that it will increase the likely hood of sexual assault or even rape.

As society moves into a future where much of world becomes digital we must begin thinking about how we want to manage it. It seems that humanity has finally found a way to create another dimension of experience, as appears in our dreams. In this world we will have the ability to create anything instantaneously with our minds. But this type of power can also cause problems when the world that we are creating is something society must share. The very act of existing within a shared environment requires that some type of governance be applied. In the next 20 years another world is going to be born, on that transcends traditional barriers of space and time as we know it. The technologies that become disrupted beyond that event horizon are

too far off in the distance to be predicted at this point. Humanity will need to innovate not only on a technological scale in which we have grown so accustomed to, but in order to exist successfully in this new paradigm our social evolution must also parallel our digital march into the future.

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