Some Reflections on Google Glass

Google Glass is a pair of spectacles with computer displays built into the lenses, and a tiny video camera built into the bridge. I'm sure Google would love the public to adopt them, en masse, as the new way of interacting with the Internet, as it would enable them to capture ever more of the Information out there in the world: how we interact, what we look at, and the types of questions we want answered as we walk around each day. This will take them a step further towards their ultimate goal of organising and making available all the world's information. Similar technologies have been used by pilots and engineers for years. 'Heads-up' displays have had narrow technical applications for feeding users real-time information overlaid on the visual world around them. Will Google Glass now be taken up by the masses, in the same way that smartphones and tablets have been enthusiastically adopted, or will it forever be a niche device?

Just because something is technically feasible, it doesn't mean it will be widely adopted. Video-phones, for example, have been available since the 1960s, but were never widely adopted. Even today, with ubiquitous video cameras on our computers and phones, the vast majority of phone-calls are made without video. Equally, some of the most obscure and unexpected technical capabilities can become adopted to an extent and scale beyond anyone's expectations. SMS text messaging is an example of this. The mobile companies never anticipated its popularity. So which technologies become available and popular is a strange and usually unpredictable mix of technological possibility and Human tastes. One precedent in favour of their adoption is that spectacles themselves have been around for hundreds of years. People have demonstrably been willing to wear them. So the form is both

familiar and has a proven track record. Yet there are plenty of other forces working both for and against the adoption of smart glasses.

If people want smart glasses, what kinds of things will they most want to do with them? There are as many possibilities as there are types of information that we currently take in through our eyes. Essentially they can integrate the digital world of the Internet, video, and image recognition with the world we see around us. In a sense they are the natural next step from using a smart-phone. (smart glasses can also potentially recognise our speech commands, feed us auditory information, and perhaps even, in the near future, include sensors to read brain activity. However, it's the visual display information that I'll concentrate on in this article). Already people are using smart-phones to navigate (maps), take large amounts of photos and video, give them location-based information, and reminders. With their cameras and location-sensing abilities, all these applications are the natural first uses for smart-glasses. Imagine as you are walking through an unfamiliar environment, you are automatically seeing personalised directions and signs appearing around you, guiding you. This is only the beginning, you could also have text or image information appearing around you to give you interesting or useful information on the history of buildings you can see, the latest offers in shops and restaurants you pass, timetables for train platforms, even personal information about someone you are looking at (perhaps reminding you of their name, or the last time you met). All this is already possible, it's just that Smart-Glasses integrate it into your visual field in a far more intimate, instant and immersive ways.

Using Smart Glasses to give us information about the people around us may prove to be one of their most popular but controversial uses. With computer memory becoming ever smaller, cheaper and more powerful, soon it will be feasible

to have the forward facing video camera on a pair of smart glasses on continuously. There will be many useful applications to having a continuous sound and video record of every day of your past, but how will others feel when they know that they are potentially being filmed by anyone wearing glasses? We are already used to ubiquitous security cameras filming us, but to most of us they feel somewhat remote (they are usually high above us, and of a reasonable distance from us), and we assume that no-one is bothering to closely examine the footage unless a crime takes place. In contrast, if you are face-to-face trying to communicate with someone, knowing your voice and facial expressions are being filmed may be somewhat disconcerting. Even walking around in public and interacting with strangers may start to make people feel paranoid and overly-self-aware. Perhaps people will shun interactions with those who are wearing glasses (a tactic that will only have limited use, as within a few years the same technology will be available in contact lenses and you won't even know who is wearing smart glasses), or perhaps people will even publically start wearing some form of mask or face covering to shield themselves. Smart glasses could really start to affect street behaviour far more than smartphones have.

If the thought of being constantly filmed up close is disconcerting enough, then the idea of artificial intelligence doing things with that video will be even more uncomfortable. For example, a simple application would be for the user to perform a search for all the times they had spoken to a particular person. It would then display all the videos of that person, even over a course of years. Artificial intelligence-like computing power could then be brought to bare on analysing the video in myriad ways. It might be possible for the videos to be analysed for signs that the person is lying to you (indeed, this could probably be done in real-time, whilst they are standing in front of you, perhaps having the positive side-effect of making people more

honest!), their body-language analysed for signs of how they feel about you, the words they are using analysed (perhaps even giving ratings of the sophistication of their vocabulary or even their intelligence), or analysis of micro-facial-expressions might reveal how they are thinking/feeling about what you are saying to them. Perhaps smart glasses would be banned from certain situations, such as sales negotiations, unless both parties had them, lest it gave one of them an unfair advantage in reading the intensions of the other! However, in other situations, the extra layer of interpretation and information might be seen as useful. The shy or socially awkward could be gently nudged and helped along by the glasses in reading the emotional reactions of others.

Smartphone apps that do frivolous or funny things with people's photos (making them look overweight, or aging their face) have proven big sellers for their creators. Maybe similar applications will be the most popular forms of image manipulation in smart glasses. Perhaps their will be apps which give the user apparent x-ray vision, change the appearance or clothing of those around them, or even simulate the appearance that people have no clothes! Even more reason for others to become paranoid about anyone wearing smart glasses.

Of course, its also possible that people will eventually become de-sensitised to being filmed and it won't bother them. Perhaps they'll calculate that the benefits of widespread use of the technology outweigh the drawbacks. People have made a similar bargain with social networking: willingly giving up an amount of privacy in exchange for the benefits of services like Facebook. Or, a sort of 'arms war' dynamic will take hold that will force most people to want smart glasses, because they won't want to be in a position of disadvantage if others have them. It's similar to the dynamic driving women to wear high-heels. Logically, many women might decide that high heels

are not worth it due to their health risks, but if all the other women around them are wearing them, to not wear them might make them stand out, or look unnaturally short. Equally, you may hate email, but when everyone else is using it you are under pressure to join the crowd.

One possible way to minimise the downside and maximise the upside of being filmed by smart-glasses might be to have each user register a profile that will control what information they want other users to see. Those who want the highest levels of privacy might set their profile so that it blocks other smart-glasses from video-recording them. Others might choose to actively share lots of information about themselves, even inviting others with similar interests to approach them for professional or social contact. As you are walking along the street with your smart-glasses on, images and words might appear to hover around these people, showing you aspects of them that you might find interesting, and telling you the types of people they are eager to meet. This would be like a form of real-time, real-life social networking.

More sophisticated forms of social interaction may be possible too. As the glasses become more powerful, it would be easy to insert video images of people into your visual field to make you feel like they are genuinely standing in front of you. This might be popular for some forms of business meetings, or people talking to far away relatives. Indeed, because you are not confined to sitting in front of a screen to have these interactions, you could have constant video of a far-away loved one (for example) hovering around you all day as you walk about. Maybe this would ease the tensions of unwanted in-laws visiting at holidays: the husband sees his relatives through his glasses, whilst the wife sees only hers! (or perhaps maybe there is an overlap, as some of the relatives are popular amongst both the husband and wife!). There is maybe a precedent for this in the popularity of Facebook. One of the interesting features of Facebook (perhaps one of the

reasons for its success) is that you are given the constant impression of people in the centre of a social crowd, unaware of the fact that you are also just a peripheral member of other people's social crowds, which are composed of many people that you can't see. So smart glasses could help us interact with others, but they could also cocoon us more in a world that is only presenting us with the information we want to see.

Another possible downside to Smart-glasses is the risk of distraction. Eye-tracking studies show that car drivers, when talking on the phone (even hands-free) are distracted enough to have a narrower field of vision. Therefore possibly less likely to notice other people or vehicles coming out in front of them from their peripheral vision. Will there be numerous crashes due to people checking their emails or even watching video whilst driving? Or perhaps there will be a built-in safe-guard in the glasses which disables these functions when it senses the user is driving. I'm sure creating such a safe-guard will be technically feasible, but so will finding a way to disable it. The technology will never be risk-free. Or will people become more remote in their face-to-face interactions with others as they are constantly distracted by incoming information? Someone you are talking to may be apparently looking you in the eyes, yet slight twitches of their eyes might hint to you that they are really reading their emails or watching some video.

Eventually people may become dependent on wearing smart glasses, and the world without them may just be too boring and un-stimulating for many. I can imagine people experiencing unpleasant feelings of withdrawal when deprived of them. Nevertheless, it's hard to predict exactly whether people will want to adopt them, or just find them too unpleasant. Yet if they are adopted, the impact on the world could be large, and unpredictable.