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I399 Research in Informatics

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Privacy in the Age of Google Glass

Research Question
How does Google Glass affect people's perception of privacy infringement in an academic

community?

Introduction

Technology is constantly changing. New products are emerging everyday, and most are making

people more available to each other through social media. Products such as Google Glass allow users

to consistently capture pictures and videos and upload them to Facebook or Twitter. However, unlike

smartphones, it can be difficult for one to tell that a user is taking a picture with Glass because it can all

be done via voice command. That being said, our research question is: How does Google Glass affect

people's perception of privacy infringement in an academic community?

We have had in the past other forms of social interactions through technology but nothing to this

scale. These products are still in their infancy making the social impact of the technology unknown. This

research will be beneficial in shaping the way people design their products or help to provide new

policies for the government to help regulate products of this kind.

Background

Google Glass is an augmented reality device that allows users to take pictures, record videos,

send messages, and search via Google Search all in the first person view. Augmented reality devices

are devices that impose information onto a screen that a user is viewing (Merriam-Webster). These

devices provide users with information about what their camera is viewing. Another example of an

augmented reality application is Star Walk HD – 5 Stars Astronomy Guide. This application uses the

camera on a smartphone and displays the stars and constellations that a user is looking at (Vito

Technologies). Google Glass is a wearable headset that links via bluetooth to a user's smartphone to

connect to the Internet. The device captures not only captures images and videos but also allow users

to search on Google (Google). Augmented reality is still fairly young as a product, and because of this,

the social and ethical implications are still unknown. Due to that, we have had to examine privacy in

similar technology fields such as the smartphone industry to gain a better understanding of the social

setting with Google Glass. In the conference paper *Measuring User Confidence in Smartphone*

Security and Privacy Erika Chin, Adrienne Porter Felt, Vyas Sekar, and David Wagner examine users

attitude towards smartphone applications in comparison with other computer technologies. The

researchers interviewed users to find out the level of concern users pay towards privacy when selecting

the applications they use on their smartphones (Chin, E., et al.). This research is beneficial to our

research question because the researchers are examining a relatively young topic, smartphone privacy.

Also, it is helpful in learning more about how much emphasis users put on privacy in their mobile

technology. The researchers discovered that users were apprehensive about completing financial

transactions on smartphones due to ill trust in the smartphone security. The researchers found that

security was a major concern for users and that users would like more privacy options in smartphone

technology (Chin, E., et al.). As we progress into our research this is an aspect of Google Glass that we

can further explore. An interesting aspect of Google Glass is the potential issue that businesses will have

with the product. Some businesses are uneasy with Google Glass being used in their premises. Casinos, banks, and hospitals are among some that are banning Glass. Caesar's casinos have already banned the device because they do not want customers recording the gambling (Cheslow, J. F.). Businesses are also worried about customers being uncomfortable with users of Google Glass taking pictures or videos unknowingly. A potential piece of research for our question could be to interview businesses around Bloomington and find out if any would ban Google Glass in their premises. We could also interview students about how they would feel about someone taking videos of them unknowingly. Another issue with Google Glass is the potential application for crime. In the web article *Google Glass Privacy Issues Could Be a Buzzkill* Cassie Slane interviews Dr. Katina Michael, associate professor at the University of Wollongong, who researches new technologies like Glass and the implications of introducing these into mainstream society (Slane). In the article Michael states, "You and I could be walking on different streets in different countries and all of the sudden I say 'share with this person' and you see what I'm seeing through your view glass –and I can see what you're seeing from your view glass, which means we could be participating in remote crime" (Slane). Michael also addresses the issue of having both video and audio data being stored by Google, and how easy it is to capture a video of someone and upload it to YouTube without that person's permission (Slane).

Methods

We went about collecting our data in a variety of ways. In the beginning we did several brief interviews with people on our own in a general setting that was not related to our three different

locations. This helped give us a general idea of what people thought about privacy infringement in an interview setting without actually seeing an example of Google Glass. In order to conduct a more realistic experiment we acquired a 3D printed Google Glass from John Porteous of Indy 3D Printing. We moved forward by conducting interviews in various public spaces on or near campus which included: a library, fraternity, and a basketball court. In the various locations we would come in wearing the 3D printed device and observe how people would react to them. After not saying anything for a brief period of time we would exclaim "OK Glass, record" or "Ok Glass, take a picture," while looking towards whoever we decided we were going to do the experiment on. After initial reactions were noted, including body language, we then explained to the subject what the device was, asked for permission to interview them and proceeded to begin with a set list of questions. Lastly an informed consent form was signed so their responses could be used as a part of our research.

Following the individual Google Glass interviews we met as a team at the library and designated one person to film, one to conduct the experiments, and another to take notes and observations about the experiment and subjects. This was to capture the initial reaction of people to Google Glass being around them. The experimenter would go through the method we had previously established, and one teammate sat nearby inconspicuously filming the event. This provided us some informative and comedic footage.

Lastly we wrapped up our process with an online survey to retrieve data that was more quantitative so we could have a wider view of how people felt about how their privacy would be affected. After this was completed we summed up our data and started drawing conclusions from it.

Results

The research conducted yielded informative and interesting results. The online survey had 52 responses. We used Microsoft Excel to analyze the results of the survey and draw conclusions. When asked, "Would you be comfortable with someone recording a video of you using Google Glass without you knowing?" 47 of the 52, 90 percent, people said no[1].

Would you be comfortable with someone recording a video of you using Google Glass without you knowing? (Chart 1)
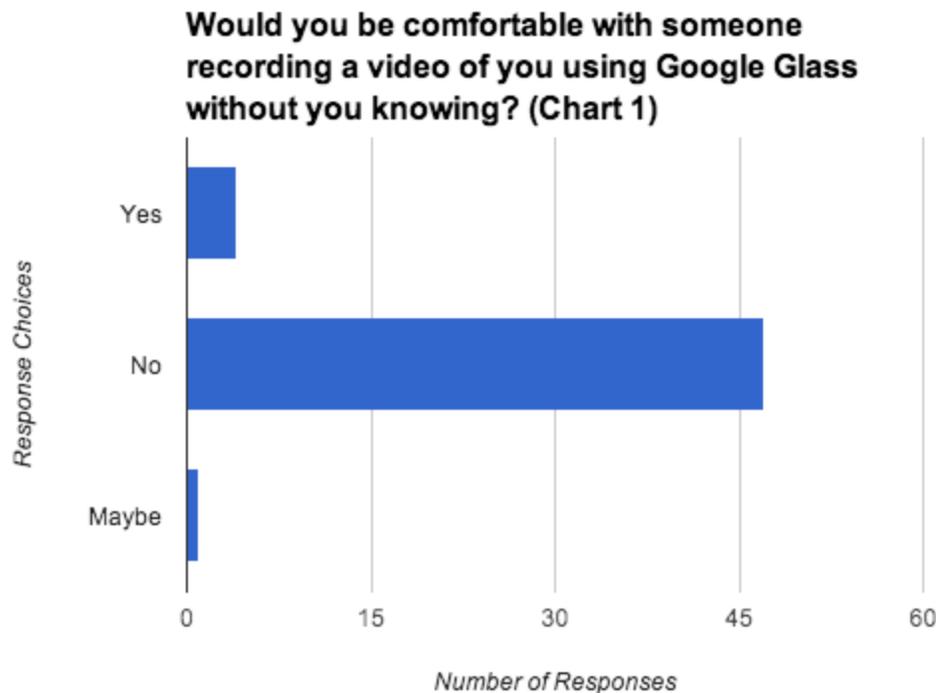

Although the responses showed people are not okay with being recorded 27 percent of surveyees said they would not ask a person to stop recording them, 7.7 percent responded maybe. We also asked if there were any places that surveyors felt it would be inappropriate to use Google Glass. Surveyors had the option to select multiple responses, for example they could select the gym, university classes, and the school library. Seventy-nine percent of surveyors said the gym was inappropriate, while 40 percent said both university classes and the library was an inappropriate place of use[2].

[1] See Chart 1
[2] See Chart 2 - This chart displays data from a question that was in response to a previous question. Surveyors had to answer, "Are there any places where using Google Glass is inappropriate?" If surveyors answered yes they would then be asked to select which places are inappropriate.

If yes, what places are inappropriate for Google Glass users to capture video or pictures? (Chart 2)

Legend:
- Gym
- University Classes
- School Library
- Public Café

41.4% Gym
21.2% University Classes
21.2% School Library
16.2% Public Café
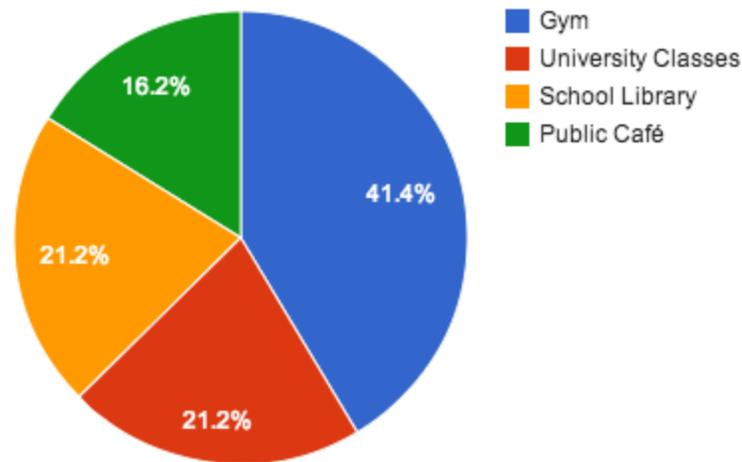
The second portion of the survey asked users to rate if they agreed with a statement presented. We stated, "I am comfortable with people wearing Google Glass in a public setting," 19 percent said they agreed, 38.5 responded somewhat agree, and 25 percent said they were neutral.   We also posed whether or not they would ask the person recording to stop and 65 percent of the surveyors said they agreed with the statement.

We also had relevant data from the experiments we conducted using the 3D printed Glass. In total we interviewed 21 people; eleven were by themselves and ten were in a group. Experiments were conducted at a basketball court, Wells library, and a fraternity house. When we asked how the experiment made them feel, specifically how they felt about us recording video, six of the eleven by themselves were uncomfortable with three being okay with it and two being indifferent. Of the ten subjects in a group five reported they were indifferent, three said they were uncomfortable, and two said they were okay with being recorded. When asked if they felt their privacy was being breached by the

experimenter nine out of the eleven subjects alone said yes, while seven out of the ten in a group said no.

Discussion

Based on the data provided by the survey and our experiments it is clear that Google Glass affect people's perception of their privacy. Specifically, when someone is wearing Google Glass around others, they feel their privacy is being violated. An interesting finding we had was group dynamics as opposed to being by yourself. When people answered the survey online they tended to be very wary of Google Glass being worn around them, 90 percent felt their privacy would be violated by Glass. The data from the interviews supports this as well, 9 out of 11 subjects who were by themselves felt their privacy was breached by the experimenter. This was very different than the results from the group interviews; 7 out of the 10 said their privacy was not breached. We think that this is because when someone is by themselves they are more exposed. We believe that the reason people are so concerned with Google Glass, and their privacy, is the embarrassment that could potentially come from a photo or video being posted on a social media site. When a person is apart of a group they are insulated from potentially being embarrassed and they are less concerned with their privacy. People are also concerned with Google Glass in places where they are most exposed. The gym was the answer most selected by surveyors when asked where it is inappropriate to use the device. We also think people are concerned with Glass because there is no way of knowing whether or not you are being recorded. The headset has no indicator on them showing when they are recording. The projector on the device lights up when the device is on so others are aware that it is powered on but gives no indication what the device is doing at any point in time. We conclude people are concerned with the effects Google Glass will have on their privacy. People are uneasy with the idea of someone being able

to take a picture or video without them knowing, all while only having to say, "Okay glass record." We think this study reveals a broader problem with mobile technology privacy as a whole. People are concerned with how easy it is to be recorded or capture information about a person unknowingly. We think that if a more robust study was conducted by researchers in the field, it could impact how the device is designed and present findings on how to overcome user's privacy concerns. We had a few limitations with our study. First, we lost time trying to acquire the 3D model of Google Glass for our experiment. We also could have created a more realistic experiment if we had had an actual Glass device. Another issue is that we were not able to experiment on a large number of subjects. We were not able to interview as many people as we wanted due to the delay caused by getting the 3D printed Glass. Lastly, none of the members in our group had prior experience with a research project such as this one.

Conclusion

To summarize, we found that the Google Glass device impacts people's perception of privacy in an academic community such as Indiana University. Students were uncomfortable with someone using the device around them, especially with video being recorded of them. This study has the potential to start a discussion on the implications of first person mobile technology and privacy. We believe that this study could be used to show that people are uncomfortable with first person media devices and lead to a more robust and in depth study completed by professionals in the field.

Video Link

http://www.youtube.com/watch?v=wj9fkhd6XtU&feature=youtu.be

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