



Computer Science

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Your Title

Bachelor's Project

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Your Title

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This report is submitted in partial fulfillment of the requirements for the Bachelor's degree in Computer Science. All material in this report which is not my own work has been identified and no material is included for which a degree has previously been conferred.

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Approved, Date of defense

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Abstract

Put the text of your abstract here

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1 Introduction

o Project goal and motivation o Project summary and overview - the "red thread" o Project results (brief summary) o Dissertation Layout

2 Background

On April 4th, 2012, Google announced “Project Glass”.^[1] Google Glass, as the device is now known, was under development for several years at Google’s research and development department, Google X. As part of the announcement Google stated: “We think technology should work for you—to be there when you need it and get out of your way when you dont.”^[3] Serge Brin, one of the founders of Google, gave a Ted Talk in February 2013^[5] where he talked about why they decided to produce the device. His argument was that users stayed on their smartphones for too long. Brin also argued that when users were using their smartphones they were looking down on a screen and were not aware of their surroundings. Instead Google wanted to create a device that would give the user notifications that could quickly be dealt and done with.

Thad Starner, technical lead/manager on Google Glass, claimed that Google Glass is supposed to be an extension of the self.^[12] He compared Google Glass to a watch. A watch is easy to access and the access is also instant. Starner said that with Google Glass, Google wanted to minimise the time between intention and action.

2.1 What is Google Glass?

Google Glass, or simply “Glass” as the device is known within Google, is a head mounted display (HMD) that can be seen as an augmented reality device¹ designed to bring notifications to the user more easily than a smartphone does. Google Glass can be seen in Figure 2.1. According to Google “Glass is designed to be there when the user needs it and to stay out of the way when the user does not”.^[10] Google Glass is meant to give the user relevant information at relevant times.

¹See section 2.1.4

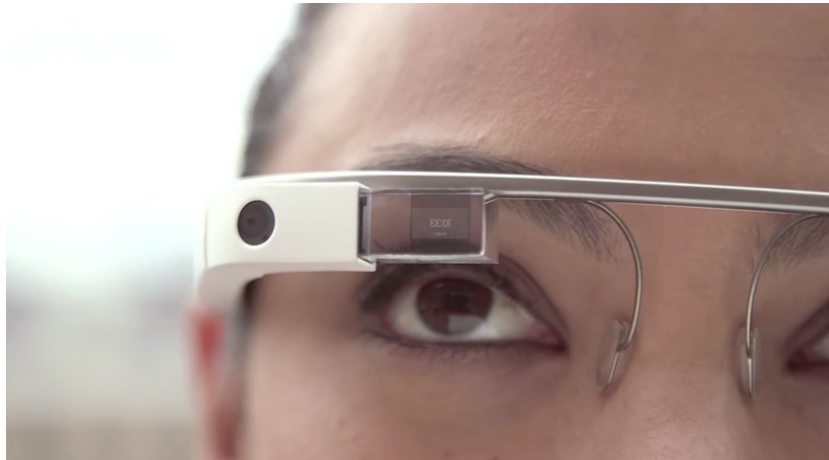


Figure 2.1: Google Glass is a small head mounted display equipped with a touchpad, a camera and a microphone.[4]

Google Glass is partially controlled with a touchpad (Google Glass can also be controlled with voice command). The touchpad sits on the right hand side of the user's glass frame and runs from the temple to the ear. When the user touches anywhere on the touchpad Google Glass "wakes up" from stand by and displays the start screen (which consists of a clock). The display is mounted above the user's line of sight, on the right hand side. The display can be slightly adjusted so that the user can see everything that is currently being displayed.

2.1.1 Head Mounted Display (HMD)

[TODO Add definition]

2.1.2 Heads-Up Display (HUD)

[TODO add definition]

2.1.3 Virtual Reality

[TODO add definition]



Figure 2.2: The virtual reality device “Oculus Rift” is a HMD that completely covers the user’s eyes.[11]

2.1.4 Augmented Reality

[TODO add definition]

2.2 Similar Products

- Microsoft Hololens (Hologram)
- Recon Jet (HUD for sports)
- GlassUp (Sued by Google)
- Penny (Vsters)

2.3 User Interface

Google Glass' graphical user interface (GUI) is called a timeline (see Figure 2.3). The timeline consists of a row of cards. Cards are basic applications such as a clock or information about the weather. Cards can also represent more in-depth applications, on Google Glass called "Immersions". Immersions handles activities such as browsing an image gallery or playing a game.



Figure 2.3: A visual representation of the Google Glass GUI as the GUI is perceived by the user. In reality only one card can be displayed at a time.[4]

The first thing the user sees when starting up Google Glass is the home screen. The home screen displays a clock and also shows the text "ok glass". The home screen is a part of the timeline and acts as the center point. Cards to the left of the home screen are upcoming activities such as an event in the user's calendar or an upcoming flight. Cards to the right of the home screen are from the past. Cards from the past will for instance show text messages or photos.

In order to move left on the timeline (forward in time) the user must swipe a finger backwards on the touchpad. In order to move right on the timeline (backward in time)

the user must swipe a finger forward on the touchpad. The fact that the user must swipe backwards when stepping forward in time might not seem especially intuitive. In western culture a timeline is normally represented as going from left to right. One example of that are books. However, one might think of this action as swiping cards behind the back. Swiping forward when stepping backwards in time would then in turn mean bringing cards placed behind the back into focus. Cards in the past are behind the user while cards in the future are in front of the user.

When the user wants to turn off Google Glass the user swipes down on the touchpad. Swiping down on the touchpad will put Google Glass in stand by. If the user wants to turn off Google Glass entirely, in other words power down the device, there is a power button on the opposite side of the touchpad. Holding down the power button for a few seconds will turn off Google Glass. For a better visual understanding of how Google Glass works see Figure 2.3 as well as the video referenced in the caption.

2.4 Compared to Smartphones

Despite being two very different devices, the mobile phone and Glass, Google's design recommendations are not all that different for the two. Google ask developers who are designing for smartphones to think of simplicity and clarity. Google put much emphasis on making applications easy to use.

There are some differences however. For smartphones Google also recommend that developers keep track of what the users have done in the past. Google ask developers to remember the user's input history and customisation, all to make it easier for the user when they (hopefully) come back to the application.[8]

Google differ in how they want developers to design applications for smartphones and

Google Glass respectively. Google are much more open to developers using their own ideas when designing for smartphones. Google encourage freedom and give more subtle hints of how to design. For instance Google want developers to make applications fun and easy to use. They recommend consistency and a rewarding application.

Designing for Google Glass comes with a few more restrictions.

[TODO expand and elaborate with more examples]

2.5 Limitations with Google Glass

An early concern with Google Glass came from people who wore regular glasses every day as Google Glass seemed to require their own separate frames. Isabelle Olsson at Google responded on the issue on April 12th 2012 with the following: “We ideally want Project Glass to work for everyone, and we’re experimenting with designs that are meant to be extendable to different types of frames.”.[2]

Today many eyecare providers have been trained for Google Glass and Glass frames. These trained eyecare providers are however mostly located in the United States,[6] but Google points out that many eyecare providers should be able to help replace the lenses on Google Glass’ frame[7].

[TODO add text about eye pain]

[TODO add text about how HMD might be too distracting if the user is not used to the device]

2.6 Information

[TODO what is information]

2.6.1 Text

- + can be read at any speed
- requires attention

2.6.2 Images

Photos and graphics

- + can show what to do can be seen at personal speed
- require attention

2.6.3 Video

- + can show in detail how to do
- does not stop have a set speed require attention

2.6.4 Audio

- + eyes can be focused on something else
- does not stop, have a set speed

2.7 Summary

- o Introduce problem area / give relevant background info
- o Introduction - Explain WHY you are doing this study
- o Information - Background / your study in the wider context
- o Similar work (projects, systems etc.)
- o Summary - for this chapter

3 Design

3.1 Presenting Information on Google Glass



Figure 3.1: Google provide developers with strict guidelines as to how they should use the limited space that Google Glass can present information on.[9]

3.2 Summary

o Design - Present your project design in general o Information - Give details here (possibly several sub-sections)

4 Implementation

4.1 Summary

o Implementation - Present your project implemetion in general
o Information - Give details here (possibly several sub-sections)
o Summary - for this chapter

5 Result / Evaluation

o Introduction - Summarise your main results o Give details of the results o Best presentation? (text, tables, diagrams?) o Implementation Evaluation - your results against your expectations o Summary - for this chapter

6 Conclusion

o Conclusion o Project Evaluation o Problems - How would you do this the next time? o Future work

7 Future Work

8 Abbreviations

GUI Graphical User Interface

HMD Head Mounted Display

HUD Heads-Up Display

References

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