Proseminar Medieninformatik
Wintersemester 2016/17

Prof. Andreas Butz
Malin Eiband (malin.eiband@ifi.lmu.de)
20.10.2016
Agenda

• Goals
• Orga
• Scientific literature review
• Topic assignment
Agenda

• Goals
  • Orga
  • Scientific literature review
  • Topic assignment
Goals

• LEARN TO WORK SCIENTIFICALLY
• Prepare for your Bachelor thesis
• Learn something about a new topic
• Practise your English
Agenda

• Goals

• Orga

• Scientific literature review

• Topic assignment
Question-based Review

- Research question + paper about this question
Deliverables

• Paper: two pages text in English
• Presentation in English
Today: Topic assignment

24.11.16 Submit paper outline

02.11.16 Submit short presentation

03.11.16 Short presentations

24.11.16 Submit paper outline

05.01.17 Call for papers

10.01.17 Submit presentation

12.01.17

Your work

Your presentations

09.02.17
Deadlines

• **All submissions via UniWorX, zipped**

• **Short presentation submission (one introductory slide): 02.11.2016**
  - Lastname_Title_Spr.pdf/.pptx

• **Paper outline submission: 24.11.2016**
  - Lastname_Title_Ou.pdf

• **Call for papers: 05.01.2017**
  - Lastname_Title_Pa.pdf

• **Presentation submission: 10.01.2017**
  - Lastname_Title_Pr.pdf/.pptx
Dates

• Short presentations (90 seconds): **03.11.2016**

• Presentation sessions:
  
  • 12.01.2017
  
  • 19.01.2017
  
  • 26.01.2017
  
  • 02.02.2017
  
  • 09.02.2017
General

- Absence $\leq 1$ day
- Meet **all** deadlines
- Participate!
- Questions?
  - Preferred communication tool: Mattermost, not E-Mail
  - Address: [https://chat.medien.ifi.lmu.de/mimuc/channels/ps-wise-201617](https://chat.medien.ifi.lmu.de/mimuc/channels/ps-wise-201617)
  - Desktop client available: [https://about.mattermost.com/download/](https://about.mattermost.com/download/)
  - Extra session for questions?
Short Presentation

• Introduce your topic and research question in 90 seconds (in English)
  • Sounds easier as it is – think carefully about what you want to say
  • One single slide
Paper Outline

• An optimal outline already contains everything you want to write as ordered bullet points
• The basis for your paper – investing time here pays off!
• Template on the webpage
Paper

- Two pages in English (TWO PAGES!!!)
- References on a third page! At least three references
- Interesting title (not the research question)
- LaTeX-format (template on webpage)
- Use illustrations, diagrams, images to illustrate/ summarize
- Submission: PDF
- Structure of general research papers
Abstract
Topic, problem statement, work, result (ca. 150 words)

Introduction
What is the problem?
Why should I read it?

Main Part

User Preference for Smart Glass Interaction
Florian Bemann

Abstract—Smart glasses are wearable devices providing the user always with information, using augmented reality techniques. In contrast to other devices such as smartphones they can be used without taking the screen the user to be, so that it would be highly convenient to use smart glasses in nearly every situation. Especially for on-the-go and working situations, where smartphones are often used, smart glasses are appropriate. To fully exploit these possibilities, new interaction concepts are necessary. Therefore, this paper presents the user preference for the interaction concepts of smart glasses. The paper focuses on the comparison of different input modalities of the currently available smart glasses. Improving current devices is still required and ongoing. Consequently, impossible interaction concepts should be integrated in next versions if they turn out as providing a great user experience. Three different interaction concepts are evaluated which concepts are preferred by users regarding usage acceptance and performance. In the paper's second part, for each input-based concept preference, a user test is conducted suitable to its methods. Therefore, my paper is based on existing studies examining acceptance and performance of interaction concepts on head-worn displays, such as smart glasses and augmented reality devices.

Index Terms—Smart glasses, Head-Mounted Displays, HMD, interaction, input techniques, body interaction, interface, wearable, Augmented Reality

1 Introduction

After smartphones have revolutionized most people's everyday life within the last 10 years, the fast developing market of mobile computing devices offers more and more integrated wearables and smart watches are similar counterparts on the go. Smart glasses are a completely different concept. They integrate in users' everyday life, what could offer some new use cases. To get the most benefit, other interaction concepts are required. In this paper, I present some possible interaction concepts for smart glasses and evaluate how they are performed among the users. Promising the best user experience, I will focus on gesture-based concepts.

2 Classification of interaction concepts for smart glasses

There exist several alternatives for interacting the possible interaction concepts. One is distinguishing the concepts into: free form and on-off. The former is defined as not requiring any extra device other than the smart glass to be performed and detected. Out of this group can further be selected a group of gesture-based concepts, which I will focus on in the second part of this paper. For the first part, considering all possible interaction concepts for smart glasses, I will divide concepts into the groups touch, non-touch and head-hand [5].

- Touch
  - Hands: interactions with any device that has to be held in hands, e.g., smartphone, controller, joystick.
  - Touch: tapping and gesturing on the device's body or wearable device, providing tactile feedback. In the following are mentioned the input areas: face, handle, wearable devices, the smart glass itself and at least other body parts.
- Non-touch: other movements or gestures, usually performed with hands, also voice recognition, eye tracking, skin detection

3 Interaction concept's preference among users

This section I based on a user-evaluation study 5, where users were shown a list of the game task and they were asked to perform a input actions of their choice to cause that effect. Based on the preferences of which actions the user had chosen and a rating and interview afterwards, I determined which interaction concepts are the most preferred in each group.

4 Touch inputs

The touch input is using a finger to perform a gesture on the head phone (touch) or touch the screen. An input action is as mentioned before. Offer on-body gestures or touch only. Interaction with the face had a large part in this study (19%), but examining another study by Bostman I would not think it is recommended hand-to-face input. It provides a good level of acceptance and low intuitiveness [1]. Touching on the smart glass itself reached a 20% portion only in the study of Tang et al., even though it is one of the two primary input methods of Google Glass. As mentioned for hand-to-finger input I would recommend touching on the touchpad a bit better as well. Especially its social acceptance is good (better than on the face) [1] which is a consequence of appearance. But of course there is flexibility and mouth of face gestures in other ethnic groups [1]. On the other hand the performance of on-device is lower than on fakes, due to its small touchscreen area. A common wearable, the smart watch, was preferred by only 9% of the participants. Less interesting was a ring [1], rather uncommon wearable. Another interesting concept is a digital watch, promising a good performance. Its quick and easy recognizability is a benefit for the users. The social acceptance on the back depends on the instruction length. For short instruction users did not feel any discomfort using all areas around the belt. When performing longer instruction users reported a little bit of discomfort perception less as benefit by the users. The social acceptance on the back depends on the instruction length. For short instruction users did not feel any discomfort using all areas around the belt. When performing longer instruction users reported a little bit of discomfort perception less as benefit by the users. The social acceptance on the back depends on the instruction length. For short instruction users did not feel any discomfort using all areas around the belt. When performing longer instruction users reported a little bit of discomfort.

4.1 Non-touch inputs

Non-touch gestures are the by far most preferred touch input methods, 99% of the non-touch actions shows 97% of the users. In-air gestures, I will focus on in a later section. It includes eye tracking, hand detection and voice command and low power issues [5]. Even though voice command is one of the two Google Glass primary input methods, it caused only 2% portion [5]. Anyway I would regard voice commands as a good input method because its very intuitive. Its low score's reason might be a low social acceptance in public contexts, where the study was conducted in. Overall, non-touch interactions was rated a little bit better than touch concepts [15].

5 Inputs using head-hand devices

Head-hand devices should only be a compromise solution. Their preference score was the lowest compared to the groups touch and non-touch...
inputs [7], because users don’t like that the device is not always available, it has to be taken out of the pocket first [5]. The worst fact in my opinion is that the interaction is not hands-free anymore, which destroys a main advantage of head-worn displays.

4. USE CASES FOR GESTURE-BASED CONCEPTS

To assure a great user experience [1] I will now focus on gesture-based interaction. To evaluate whether a interaction concept is suitable for an operation I will in the following regard the concept’s performance (performing time and the user exertion) and inner and social acceptance. The main expectation is to come up with a task to perform. I first separate into action and navigation tasks [11]. An action task can usually be performed by one action (e.g. answer a phone call, pause music player), whereas a navigation task can be more complex like navigating through a menu or moving an object, e.g. a web browser’s viewport.

4.1 On-body interaction

A factor for whether an on-body interaction is suitable in the area it is performed on. An area attracting attention when touching it or where touching in human resources has a low social acceptance [4]. The second important factor is the actions intrusiveness. Body movements which are too intrusive will not be accepted by users [4]. Aside from these limitations, on-body interaction offers less possibilities like coupling with on-body sensors and has the advantage of giving feedback through the human skin’s proprioception [4].

4.1.1 Hand-to-face

Hand-to-face input has an overall good performance. The most preferred areas for hand-to-face actions are cheek and forehead. Due to their large area users think they can use the best parts of the face, especially the cheek which is perceived as touchable [4]. Performing actions on the cheek turned out as significantly faster and less exerting than the same action on the forehead and on the HWOD's temple (chosen as direct alternative to hand-to-face input) [11] (Figure 11). The social acceptance is general as well, face contact is something natural [4]. Nonetheless the social acceptance for hand-to-face interaction is worse than for HWOD interaction, especially in public context, but still on a good level and most people don’t react negatively using the face. Some users show lower acceptance because of issues with facial cosmetics and dirt on the hands [4]. Users preferred hand-to-face for navigation tasks more than for action tasks. The performance is good for the typical navigation tasks turning and learning due to the face “large area” [11]. Only for the navigation task “turning” the performance on the HWOD’s temple is slightly better [11]. Moreover because the HWOD’s higher acceptance, turning tasks should better be done on the HWOD (provided that the HWOD has an internal memory). Coming to a conclusion I would recommend using the cheek for turning tasks. The best usable technique might be a linear turning move. The alternative cheek has low social acceptance because it could be perceived as the “you are crazy” gesture [4].

4.1.2 Palm-to-visual primary interface

Touching the palm is the users favorite touch interaction approach [5]. As reasons users mentioned that it is less intrusive, because it requires the least physical movement moving the right hand to the left hand palm [5]. Scanning a smartphone to the visual display, the palm was often used as primary touch-screen on trackpad. The palm offers haptic feedback both through finger and handpads which helps navigating to the target, whereas a touch-screen can guide the user e.g. showing a grid and offers feedback only through the finger. As expected the touchscreen is of advantage, except when blinkfed. When blinkfed navigating on the palm is much faster, as an experiment conducted by Riesman’s shows [11] (Figure 4). To find out whether the active (finger) or passive (palm) sense is most relevant, another experiment compared performance of people like palm and palm with finger cover. It came to the result that the passive tactile sense produces the most tactile cues [11] (Figure 5). Summing up it can be said that using the palm has much better performance than using a real touchscreen when the user is blinkfed, what makes it suitable for on-the-go usage and impaired users. Because of the low performance score of head-worn devices mentioned in chapter “comparison among categories”, the palm might be the better solution is blinkfed not used cases as well.

4.1.3 In-air gestures

Due to the limited attentional resources users have to perform tasks in front of the chess. Also the exertion effort when the hands to the chess is low. The second most users performed in front of the chess, therefore also comes the area in front of the chess [1] (Figure 9). The main reason for this performance order is the social acceptance, which isn’t as high when performing actions in front of the chess or the body because it could look weirdly and functionally I can imagine all gestures for free of tasks, but many approaches assigning navigation and selection in menus to in-air gestures. No other concept has shown suitable for this by now, only recently Duba et al. approved this in connection with an Augmented and virtual reality systems. The authors examined performance and users appreciation with a gesture interaction system used for navigating to a menu item (a maximum menu depth of 4 levels) and came to the conclusion that spatial interaction is appropriate for AR [11]. Users were able to adapt to gestures interaction fast and only 20% felt discomfort, discouraged, frustrated or interrupted while performing the menu tasks [11].

4.1.4 Hand-to-body input, other body parts

Not all the shown areas are there are areas like finger, leg, hand/dactyl, forearm and ring left. These areas could be used for action tasks requiring just one tap, each task group of similar tasks compared to another area, like users did in the study of Yang et al. [11]. The concrete surface is vividly evident. Large surfaces like the chest can be used for lower precision requirements, such as selecting a single object from 4. Performed by a tap: one of a group of objects, good performance can be reached [11]. The touch areas depending performance and acceptance might behave similar to the results concerning for non-touch inputs. Areas aimed to high touch very close finger like lower leg or foot or high areas on the hands have low performance scores due to the effort needed to move a hand towards this area. The acceptance might be low as well because it looks weird and unacceptable hand reachable areas.

5 CONCLUSION

This paper explored possible interaction concepts for smart glasses, regardless of current smart glass vendors’ technological capabilities. The main factors for whether a action is suitable in performance, which consists of performing times, the user’s exertion and the user acceptability, especially in a public social context. In air gestures in front of the chess and imaginary haptic interfaces are the most suitable concepts. They allow blinkfed on-the-go usage and head-free interaction, two big advantages of smart glasses against other devices. Both aren’t too intrusive to the user and attracts little attention when performing in a public context. Future work has to focus on users studies in more realistic use cases in a real environment and with a real application. In addition it should be examined how much effort is required of the user when learning how to use the smart glasses. I think that might be harder than learning how to deal with a smartphone because of the huge variety of possible inputs and the missing guidance that touchscreens and button interaction offer. User guidance and learning concepts should be constructed and proved.

REFERENCES
Presentation

• 15 min presentation (in English) + 5 min discussion (in English or German)

• No slide template – get creative!
  • Many tips on the web, e.g. [http://lifehacker.com/5810271/how-to-create-presentations-that-dont-suck](http://lifehacker.com/5810271/how-to-create-presentations-that-dont-suck)

• Mainly pictures!

• Interest the audience! Do not make us fall asleep! ([https://www.ted.com/](https://www.ted.com/))

• Anticipate questions and prepare answer slides (backup-slides)
### Evaluation sheet

**Bewertungsbogen für Proseminararbeiten**

Bitte nur die grünen Felder editieren!

**Theme:**

**Student:**

**Seminar:** Proseminar Sommersemester 2012

**Betreuer:** Christian Mai

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25%
Agenda

• Goals
• Orga

• Scientific literature review
• Topic assignment
Research in General

• Starting point for your work: given related scientific work
  • First orientation
  • Contains references in the “References” chapter
  • Contains first keywords
  • Not every source can be used (e.g. online articles without author, contributions in online communities)
  • References: Papers, conferences, journals, books, online sources with author and date of access
Finding Literature

- Almost all literature is available online!
  - Google/Google Scholar ([http://scholar.google.com](http://scholar.google.com))
  - ACM Digital Library ([http://portal.acm.org](http://portal.acm.org))
  - Citeseer ([http://citeseer.ist.psu.edu](http://citeseer.ist.psu.edu))
  - OPAC der Universitätsbibliothek ([http://opacplus.ub.uni-muenchen.de](http://opacplus.ub.uni-muenchen.de))
- For the full functionality log in at „LMU E-Medien-Login/Datenbanken“ and find the needed library (e.g. ACM)
Finding literature
Why should I care about citations?

• Copyright/ intellectual property
• Foundation of scientific work
• Citations links belonging work together
• Reader needs all the information you had to check if you are correct
Citations

• Quotation
  • Direct (in quotation marks)
  • Indirect

• No secondary citation

• Citation style: APA 6 (for this work):
  see http://www.edu.lmu.de/apb/dokumente-und-materialien/dokumente-bachelor/hinweise-zur-apa.pdf

• Wikipedia: not citeable (but good for quick research)
# Citations

## BOOKS

**One author – in-text reference placement**

*Note:* There are two main ways to use in-text references. Firstly, to focus on the information from your source – ‘information prominent’. Secondly, to focus on the author – ‘author prominent’.

*’Information prominent’ (the author’s name is within parentheses):* The conclusion reached in a recent study (Cochrane, 2007) was that...

*OR*

*’Author prominent’ (the author’s name is outside the parentheses):* Cochrane (2007) concluded that...

**Chapter in edited book**

A discussion about Australia’s place in today’s world (Richards, 1997) included reference to...

*OR*

Richards (1997) proposed that...

## JOURNAL, NEWSPAPER & NEWSLETTER ARTICLES

**Journal article with one author – separated paging (paginated by issue)**

In an earlier article, it was proposed (Jackson, 2007)...

**Journal article with two authors – continuous paging throughout a volume.**

Kramer and Bloggs (2002) stipulated in their latest article...

*OR*

This article on art (Kramer & Bloggs, 2002) stipulated that...


Plagiarism

• No plagiarism, NO plagiarism, not even a little!

• Plagiarism
  • Material of third parties, without reference
  • Direct quotations, without reference
  • copied pictures, diagrams or graphics without reference

• Your work will be checked automatically

• Work with plagiarism will fail the course!

• [http://www.medien.ifi.lmu.de/lehre/Plagiate-IfI.pdf](http://www.medien.ifi.lmu.de/lehre/Plagiate-IfI.pdf)
Writing style

• Everything you write in your paper must be supported by literature!
• Think about a logical structure of your arguments
• Scientific writing is: objective, precise and neutral
• CHECK: Grammar, SPELLING
• Numbers from zero to twelve are written as text
• Spell out abbreviations like “i.e.”, “e.g.”
• DON‘TS:
  • Unprecise quantities (“high”, “slightly”, “almost”, “a little bit”)
  • Fillers (“now”, “well”, “quasi”)
  • Pseudo-Arguments (“naturally”, “as expected”)
Citavi

- literature administration

http://www.ub.uni-muenchen.de/schreiben/literaturverwaltung/citavi/index.html
EndNote

- literature administration

http://www.ub.uni-muenchen.de/schreiben/literaturverwaltung/endnote/index.html
JabRef

- literature administration

http://www.jabref.org/
Mendeley

- literature administration

https://www.mendeley.com/
LaTeX

- Text formatting
- No WYSIWYG, instead creation of source code
- Integration of pictures and diagrams in the final document
- Integration of references (with linkage to Citavi, EndNote, BibTex…)
- Very nice typography
- No formatting mistakes when creating the text
- Huge number of online tutorials available
Example creation of a document

\title{Mein Titel}
\tableofcontents
\section{Überschrift}
Text des Kapitels 1 ...
\subsection{Unterüberschrift}
Text des Kapitels 1.1 ...
~\cite{Huber}

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    title = "Implementing ...",    
    journal = "Computer",    
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    ...}
Agenda

• Goals
• Orga
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• Topic assignment
Privacy

in a mobile, connected world
# Topic Assignment

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Topic List

• See „ps_questions_ws1617.pdf"
• Research question can be changed (with my agreement)