Visual Design

of Physical Interfaces for RFID / NFC-based Mobile Interaction

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Diploma Thesis

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World of invisible things

Goals

• investigate the visual design of physical interfaces for NFC-base mobile interaction

• design of physical interfaces for their discovery

• representation of NFC-tags as visual elements

• visualization of the functionalities of NFC-tags

• guidance cues to support the interaction workflow
• difficulties for users during the interaction:
  
  - which components are interactive? [Blöckner et al, 2009]
  
  - how to start the interaction? [Herting et al, 2008]
  
  - what is the further sequence of interaction? [Geven et al, 2007]
  
  - how to orient the device? [Geven et al, 2007]
  
  - description of phone-tag interaction [O’Neill et al, 2007]: hover, slide, wave, press, ... ?
  
  - people would interact with the interface differently [Belt et al, 2006]:
    text messaging, bluetooth, infrared port, dial a number
• improving the accessibility through: Learnability and Guidance
  [Broll et al, 2009]

• [Riekki and Salminen, 2006] introduced different kinds of tags:
  - general tag
  - special tag

• [Arnall, 2006] has developed a graphic language for touch-based interactions:
Phases of Interaction

1. Awareness
   - adhesive Symbol

2. Approach
   - explanatory Symbol
     Guiding Symbol

3. First Contact
   - Action Symbol

4. Selection
   - Action Symbol

5. Completion
   - Action Symbol
     Guiding Symbol

Dropout
- Action Symbol
- Guiding Symbol
Symbol Categorization

- **Symbol**: Touch, Aura, Flow, non-Technical, Personalized
- **Adhesive Symbol**: Textual, Demonstrating, Hold close, Point of Interest, Touch, Photos
- **Explanatory Symbol**: Avatar, Numbering, Arrows, Textual
- **Guiding Symbol**: Desktop, Mobile Device, Metaphor, Photos
- **Action Symbol**:

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**Concepts**
- Touch
- Aura
- Flow
- non-Technical
- Personalized

**Design Attributes**
- prompting
- alerting
- simple
- abstract
- realistic
- complex
- informing
Symbols of Awareness

- symbols which aim at gaining the attention of the user.
- symbols are based on different concepts:
  
  a. Flow  
  b. Touch  
  c. Personalized
Symbols of Approach

- symbols which explain the interaction to the user
  - Where?
  - With what?
  - How?

a. Touch
b. Arrows
c. Hold close to
Study Design

• interview to gather qualitative data
• 15 subjects (aged between 24-30)
  - 8 subjects had prior experience with NFC
  - 7 subjects with no experience

• outline of user study
  - Awareness and Approach
  - Use Cases
  - Overall Designs
  - Paper Prototyping
Awareness/Approach

• 19 symbols of awareness
• 15 symbols of approach

• subjects had to choose the three symbols they
  • liked the most
  • like the least

• for the three most liked symbols, subjects had to:
  • state their associations
  • make suggestions for improvements
  • state their opinion
Results: Awareness

- (11 / 0)
- (8 / 0)
- (5 / 0)
- (5 / 0)
Results: Approach

(10 / 0)  (7 / 0)  (5 / 0)
Use Cases

Advertisement

Office

Catalogue
User Study: Overall Designs

Alina Hang – 27.10.2009
Results: Overall Designs (I)

* some images are replaced due to copyright issues
Results: Overall Designs (II)
* some images are replaced due to copyright issues
User Study: Tasks

- **Task 1**: Buy 2 tickets for exhibition
- **Task 2**: Visit a friend at his office:
- **Task 3**: Order a specific table

- **Observations**
  - do critical actions on the mobile device
  - delete and save often unclear
  - meaning of symbols not clear
  - shift of attention is confusing
  - further selection after attention shift not clear
Conclusions

• **Symbols of Awareness**
  - Combination of text and symbol
  - simple and not too abstract

• **Symbols of Approach**
  - no abstract symbols
  - important elements

• **Overall design / Interaction**
  - general information should be displayed on the interface
  - implicit guidance preferred
  - accentuation of critical actions
Further Work

  http://www.onlineforschung.org/visualdesign

- Draw design consequences

- Refine puzzle metaphor and develop further ideas

- Pick up interesting aspects and realize them in a high fidelity prototype

- Test the high fidelity prototype in another user study
Questions?
Thank You!