LFE Medieninformatik • Wolfgang Reithmeier
Diploma Thesis – intermediate report

Complex Gestures for Mobile Interaction with Dynamic NFC-Displays

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Motivation

• Dynamic NFC displays
  – Grid of ordered NFC tags
  – Projected dynamic display

• Touch & Interact: Applied to a Tourist Guide Prototype [Hardy et al., 2008] => winner at NFC Forum Global Competition

• Work on dynamic NFC-display in the context of the MULTITAG-project (DOCOMO, Lancaster University)
Task Description

• Further development of the project thesis (NFC Display Framework)

• Partial integration with the MULTITAG-framework
  – For example Communication / RPC Module

• Focus on interaction modalities, gestures
  – Taking existing interaction modalities as reference
  – Selection and adaption for dynamic NFC displays
  – Chosen reference Scenario: Pinboard
Overview

- Related Work
- Analysis & Requirements
- Design of Gestures
- Status and Outlook
Selected Related Work

Public Display Interaction
• TouchLight [Wilson, 2004]

Gesture Techniques
• Presense [Rekimoto. 2003]
• HoverWidgets [Grossmann, Baudisch. 2006]

Physical Mobile Interaction
• Hovering [Välkkynen. 2006]
• Marked-up Maps [Reilly. 2004 / 05]
Analysis & Requirements 1/2

Desktop Interaction Modalities (comp. WIMP)

• Simple input gestures
  – (Double-) Click, Right-Click / Context Menu

• Advance input gestures
  – Multi Select / Clear, Resize, Drag & Drop, Scroll (-wheel)
    Mouse Gestures (ála Mozilla Firefox)

Touch & Pen based Interaction

• Some special enhancements / adaptations
  – Drag & Drop alternatives (e.g. Pick-and-Drop [Rekimoto, 97],…)
  – Tap & Hold (e.g. used in Windows Mobile)
  – Pen Gesture (characters, strokes, …)
  – Mode switching techniques [Li et al., 2005]

(© Wikipedia, 2009)

(http://optimoz.mozdev.org/gestures/, 2009)

(Rekimoto, 97)
Analysis & Requirements 2/2

NFC touch based interaction

- **Simple input modalities**
  - Touch Select / Hovering
  - Click-Select

- **Combined input modalities**
  - Path-Select, Pick&Drop
  - Multi-Select / Multi-Selection, Remote Clear
  - Lasso-Select / Polygon-Select
  - Bounding-Box-Select
Design of Gestures 1/6

The Pinboard Scenario

• Provides a rich environment for different modalities

• Scenario Already made positive experiences due lecture exercises

• Expected functionalities:
  – Create / Read / Edit / Delete Notes
  – Place / move / transfer Message
  – Scroll / Browse through the notes
  – ...

Design of Gestures 2/6

• **Research Questions**
  – Which interaction modality fits best in which program functionality?
  – Which design / implementation is mostly accepted by the user?
  – Are “mouse” gestures useful and where can they be applied?

• **Attempt to formalize basic actions**
  – touch_action ::= ((touch duration* release) interval*)
  – key_action ::= (key_down duration* key_up) interval*
  – other_action ::= (tilt/rotation/”bumb”... duration*) interval*
  – basic_action ::= touch_action | key_action | other_action
  – action ::= basic_action+
Design of Gestures 3/6
Interaction Modalities

Click / Double Click

- Double Click more explicit single click

- For example
  - View Message (Click)
  - Transfer Message (Double Click)

- Sample Implementations:
  (Double-) Touch/Click-Select, Press&Hold
Design of Gestures 4/6
Interaction Modalities

Single- / Multiple Selection

- Preliminary grouping action for:
  - Transfer / remove (multiple) massage(s)
  - Moving note(s) around

- Sample Implementations:

  Via Multi-Select / Path-Select / Polygon-Select, …
Design of Gestures 5/6

Interaction Modalities

Drag & Drop

- Moving / Placing notes

- Sample Implementations:
  
  Pick&Drop, Path-Select, Multi-Touch-Select, ..
Design of Gestures 6/6
Interaction Modalities

Right-Click / Context Menu
- For example open Popup-Menu
- Sample Implementations: Press&Hold, Double-Click, alt. Click-Select

Cancel
- Depends on actual gesture
- Mostly via special mobile key
Status and Outlook

Done
• Analysis of existing interaction modalities
• Integration of the frameworks
• Design and implementation of the gesture rule set

In Progress
• Implementation of the pinboard application
• Planning a user study to evaluate different designs for interaction modalities and gestures based on the pinboard application

Todo
• Completion of the pinboard application
• Conducting the user study
• Evaluation of results, writing the thesis
Thanks For Listening!

Questions ?!