LFE Medieninformatik • Wolfgang Reithmeier

Diploma Thesis – intermediate report

Complex Gestures for Mobile Interaction with Dynamic NFC-Displays

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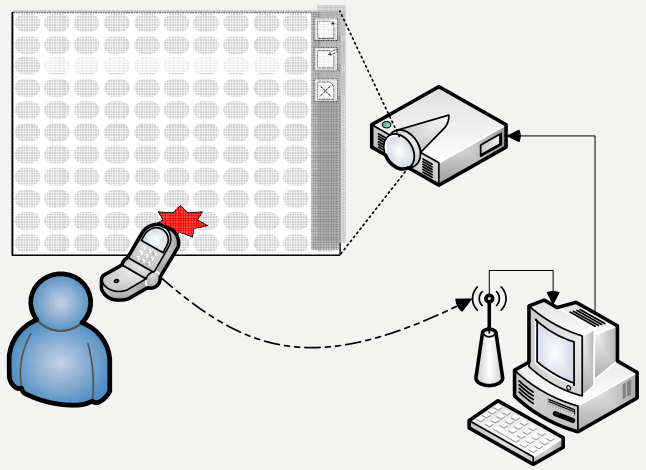
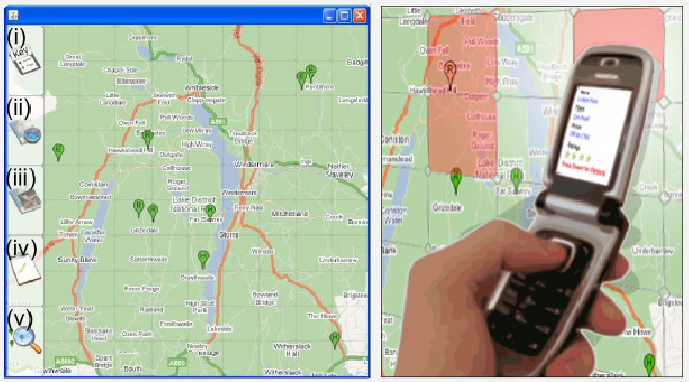
Motivation

- 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

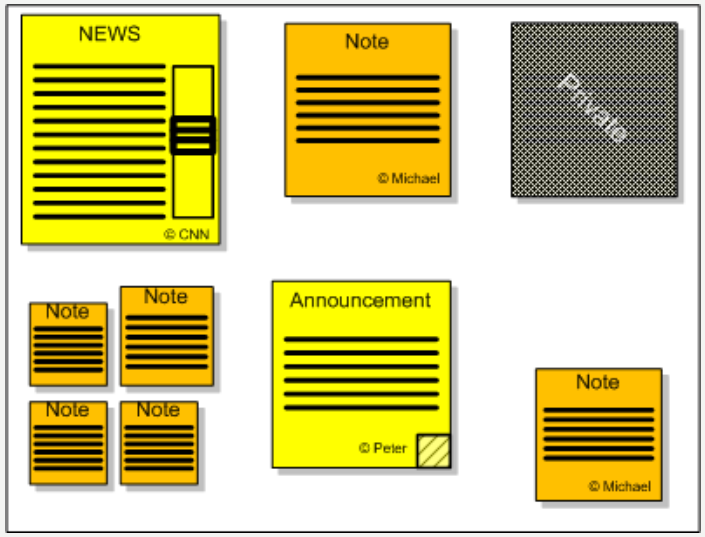
- Work on dynamic NFC-display in the context of the MULTITAG-project (DOCOMO, Lancaster University)



(Hardy et al., 2008)

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



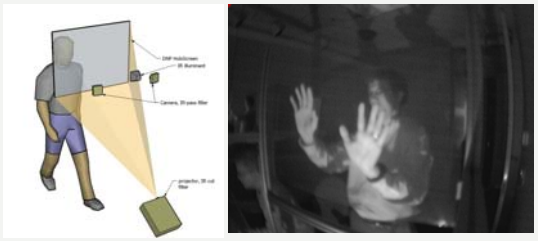
Overview

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

Selected Related Work

Public Display Interaction

- TouchLight [Wilson, 2004]



(Wilson, 2004)

Gesture Techniques

- Presense [Rekimoto. 2003]
- HoverWidgets [Grossmann, Baudisch. 2006]

(Rekimoto. 2003)

Physical Mobile Interaction

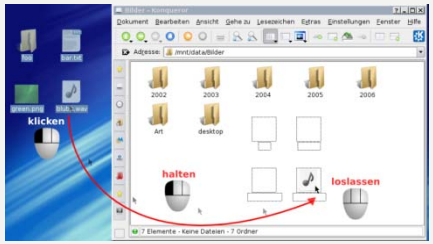
- Hovering [Välkkynen. 2006]
- Marked-up Maps [Reilly. 2004 / 05]

(Välkkynen. 2006)

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)

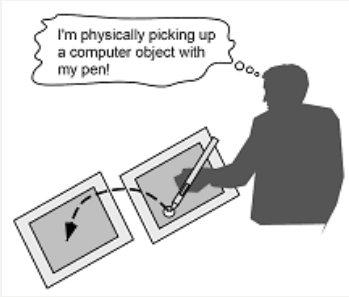


(© Wikipedia, 2009)

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

Touch & Pen based Interaction

- **Some special enhancements / adaptions**
  - 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]



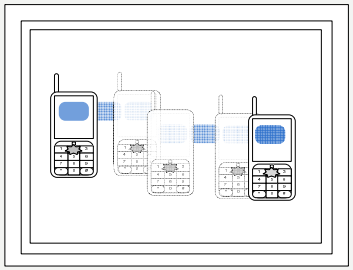
(Rekimoto, 97)

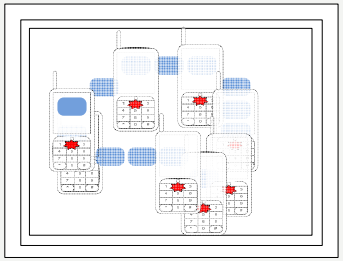
Analysis & Requirements 2/2

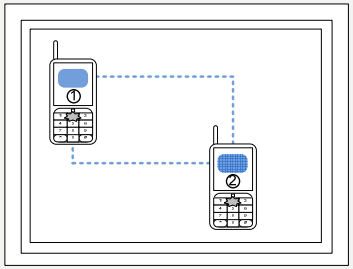
NFC touch based interaction

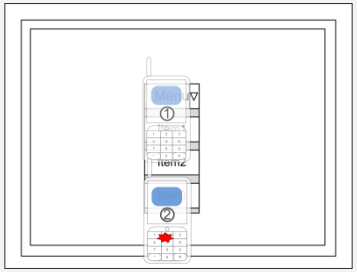
[Reilly 2005, Vetter 2006, Hardy, Rukzio 2008/09]

- **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





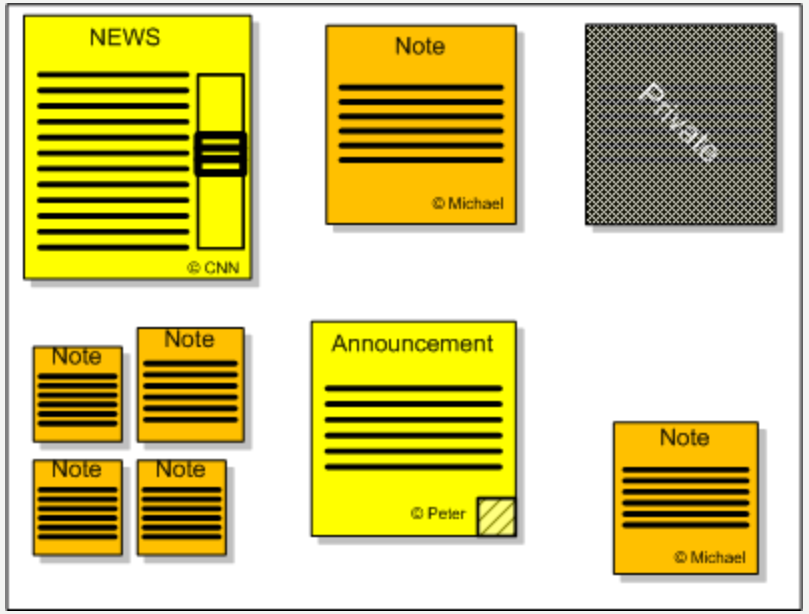




Design of Gestures 1/6

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+

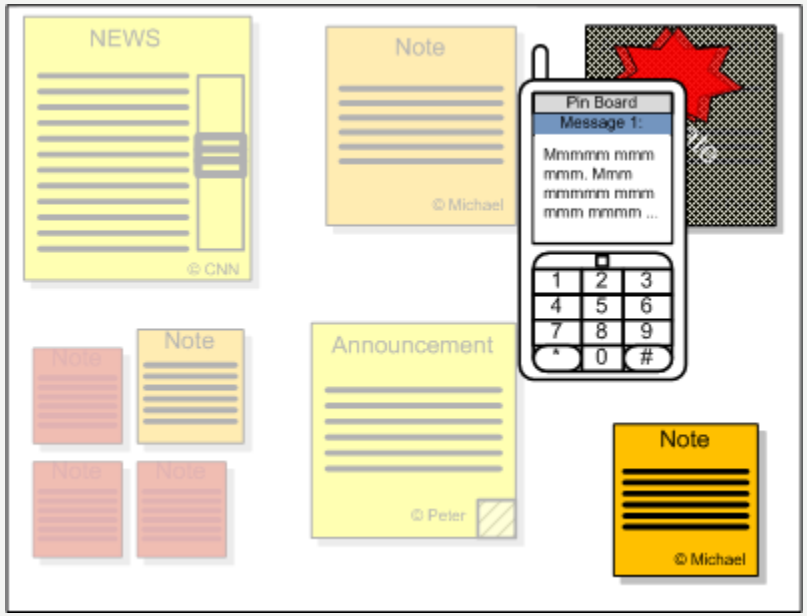
Design of Gestures 3/6

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

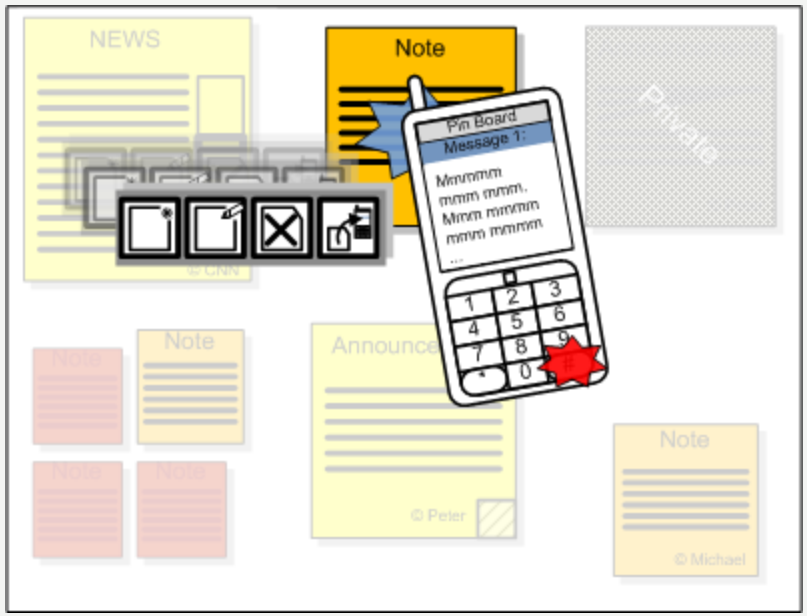
Right-Click / Context Menu

- 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

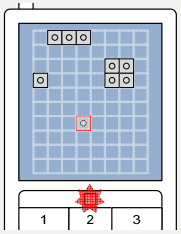
- Analysis of existing interaction modalities
- Integration of the frameworks
- Design and implementation of the gesture rule set

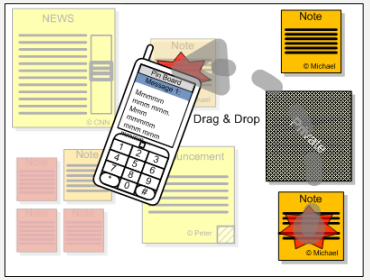
In Progress

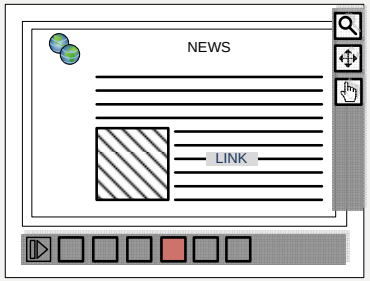
- Implementation of the pinboard application
- Planning a user study to evaluate different designs for interaction modalities and gestures based on the pinboard application

Todo

- Completion of the pinboard application
- Conducting the user study
- Evaluation of results, writing the thesis







Thanks For Listening !

Questions ?!