ShelfTorchlight: Augmenting a Shelf using a Camera Projector Unit

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Motivation
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Problems & Research Questions

- Support the **search** for a particular object (product / book) in a shelf using a camera-projector-unit
  - to tackle the problem of the “last mile”

- **Highlight** the object adapted to the users needs
  - allow personalization
  - provide additional information
Related Work

Butz et al. (2004)
Pervasive

Spassova et al. (2005)
ISMAR

Crasto et al. (2005)
IEEE Workshops on Application of Computer Vision
Micro - / Macro - Navigation

• Macro - Navigation:
  – „the navigational goal is beyond the user’s perception of the current environment“
  • e.g. „Offsetting Displays on Mobile Projector Phones“ by Cauchard et al. (Scenario 3)

• Micro - Navigation:
  – „the task to focus the user’s attention to a spot within the perimetry of their perception“
Semantic Zoom

• “A semantic zoom changes the type and meaning of information displayed by the object“
  ⇒ combine physical and semantic zoom

• Project „general“ information when the user is farther away
  – No concrete data like text
  – Abstract information e.g. colored dots

• Project more personal information in a „private“ environment

Modjeska (1997)
Scenarios
Interaction Techniques - Library Scenario

• Looking for a particular book?
  – Swipe the projector phone over the shelf
  – The desired book gets an highlight matching its spine
  – Semantic Zoom: Why/when the book got added to the search-list

• Browsing
  – The rating for the actual highlighted book is projected (stars)
  – Semantic Zoom: Stars changes to a textual review
Interaction Techniques - Retail Scenario

• Colored circles (traffic light - metaphor) are projected onto the products

• Comparing personal profile to ingredients of the product
  – Allergies
  – Preferences
  – Shopping-list / Price
  – ...

• Semantic Zoom: Detailed explanation for the colored circle
Demo Video Retail Scenario

A mobile camera projector unit is used ...
Implementation - Hardware

• Nokia N95 8GB
  – 5 Megapixel (only 640x480 used)
  – Screen Resolution 240x320
  – CPU 332MHz
  – RAM 90MB
  – 128g

• Aiptek T30
  – 15 Lumens
  – 640x480 (only 320x240 used)
Implementation - Software

• First attempt: metaio mobile SDK (marker-less)
  – Symbian S60:
    • Nokia N95 = insufficient RAM for more than 3 markers
  – Windows Mobile:
    • Toshiba TG01 = no TV-Out

• ⇒ Visual Codes by Rohs et al.
  – „Replacement“ for EAN / Library codes

Rohs et al. (2004)
UCS
Conclusion & Future Work

- ShelfTorchlight utilizes a mobile camera projector unit to alleviate the search for a desired object in a shelf
- Allowing information filtering (personalization, semantic zoom)
- Mobile, Lightweight & scalable (all informations stored in the markers / retrieved from the web)

- Different output modalities
- User Test:
  - Preferred visualization technique
  - Performance
  - Search strategies projected interfaces vs. magic lens
Thank you for your attention!