Ambient Assisted Living
- Accessibility -

AW 2
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Outline

- Retrospective
- Scenario revision – Object localization
- Digging deeper
- Object localization vs. Object recognition
  - NeXus
  - Orientation aid for blind people
- Scenario revision – Sound awareness
  - IC2Hear
- Summary
Main targets

- Minimize dependencies
- Transparent and omnipresent assistance
- Improve user interfaces
- Make accessibility happen
Scenario revision – Object localization

“Lost bottle opener”

Issues

● Indoor positioning via RFID
● User interface
  – speech recognition
  – guidance by using (virtual) surround sound
● No map or 3D model available
Insights gained from interviews with visual impaired persons

- Dealing with
  - unknown areas
  - obstacles
  - noise (e.g. construction site)

- Uncertainty when
  - changes occur
  - meeting unfamiliar people
Object localization vs. Object recognition

Localization
- instant search result
- useful for sighted people as well
- searching “the machine's way”

Recognition
- object discovery
- orientation aid
- awareness improvement
  - information for recognized objects
- searching “the human's way”

General subject for AAL systems
NeXus
Visualization and Interactive Systems Group (University of Stuttgart)

- Spatial world models for mobile context-aware applications
- Global infrastructure for location independent applications
- Subproject “Orientation aid for blind people”

[www.nexus.uni-stuttgart.de]
Orientation aid for blind people

- Interactive localization and recognition of objects using
  - stereo images
  - orientation (inertial sensors)
  - 3D model information
- Initial room localization using conventional W-LAN
- Precise “self-localization”
  - distance measurement
  - appropriate adjustment of the building model

[Hub et al.:2006]
Orientation aid for blind people

- Object identification
- Matching of known and recognized objects
- Transmission of corresponding information

[Hub et al.:2004]
Further features

- Training, recognition and tracking of movable objects
- Virtual navigation areas

“Stair with seven steps upstairs. Banisters to the left and right side. Turn left after the landing.”

[Hub et al.:2005], [Hub et al.:2006]
Scenario revision – Sound awareness

“Child falls and cries”

Issues
- Event recognition
- Locating sound source
- Sound visualization
- Floor plan
IC2Hear – Sound awareness

IC2Hear
Group for User Interface Research (University of California at Berkeley)

- Acoustic event classification system
  - CHIL Project Database
    - 25 noise classes (manually transcribed)
    - 2800 noise instances collected
  - SVM / GMM / HMM classifier

- Prototype
  - Trained with common office sounds
  - Background noises filtered out
  - High quality microphone mounted above desk

[Malkin et al.:2005], [Matthews et al.:2005]
Sound visualization

Phone

Footsteps

Conversation
IC2Hear – Sound awareness

Sound visualization

- Symbols / Icons
- Spectrograph

[Ho-Ching et al.:2003]
IC2Hear – Sound awareness

When? Where?

- History

- Map prototype

[Matthews et al.:2006]
Summary

- Awareness improvement
  - Sound
  - Vision
- Several approaches
- Integration required
- For disabled and non-disabled
References


Make accessibility happen

On the Internet, no one knows you're not a dog!
Nor even if you're still the same dog!

[T.V. Raman]
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