



Ambient Assisted Living **- Accessibility -**

AW 2
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- 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



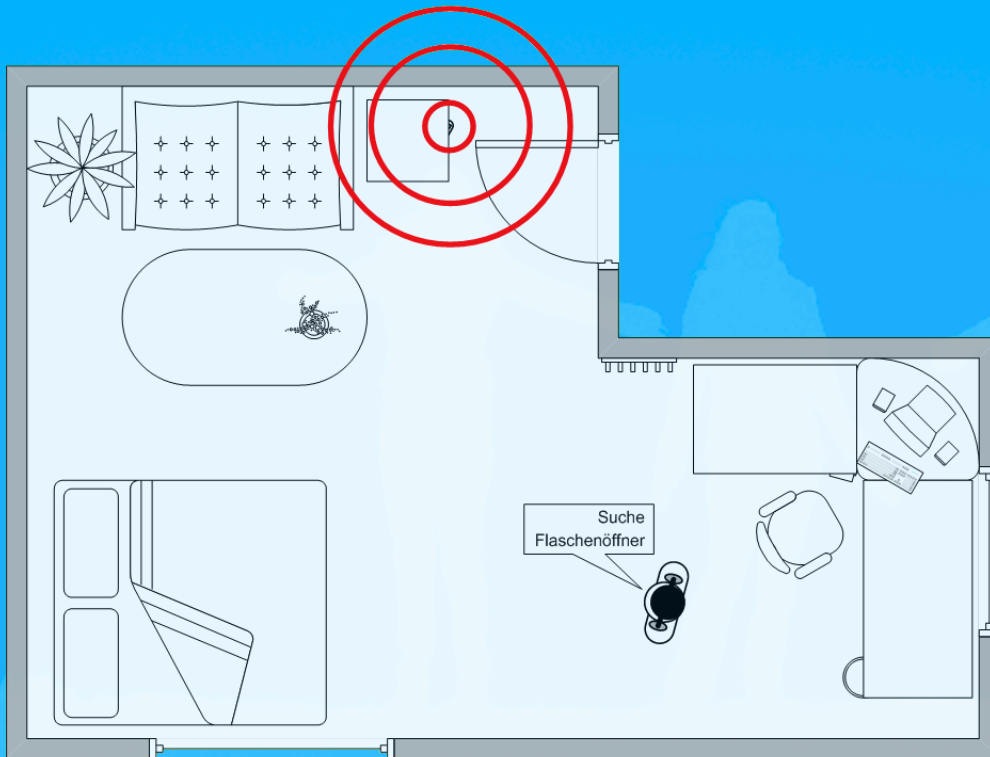
Fraunhofer - Gesellschaft - InHaus1



[www.inhaus-zentrum.de]



“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



[www.bsvh.org]



Object localization vs. Object recognition

Localization

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

General subject
for AAL systems

Recognition

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



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

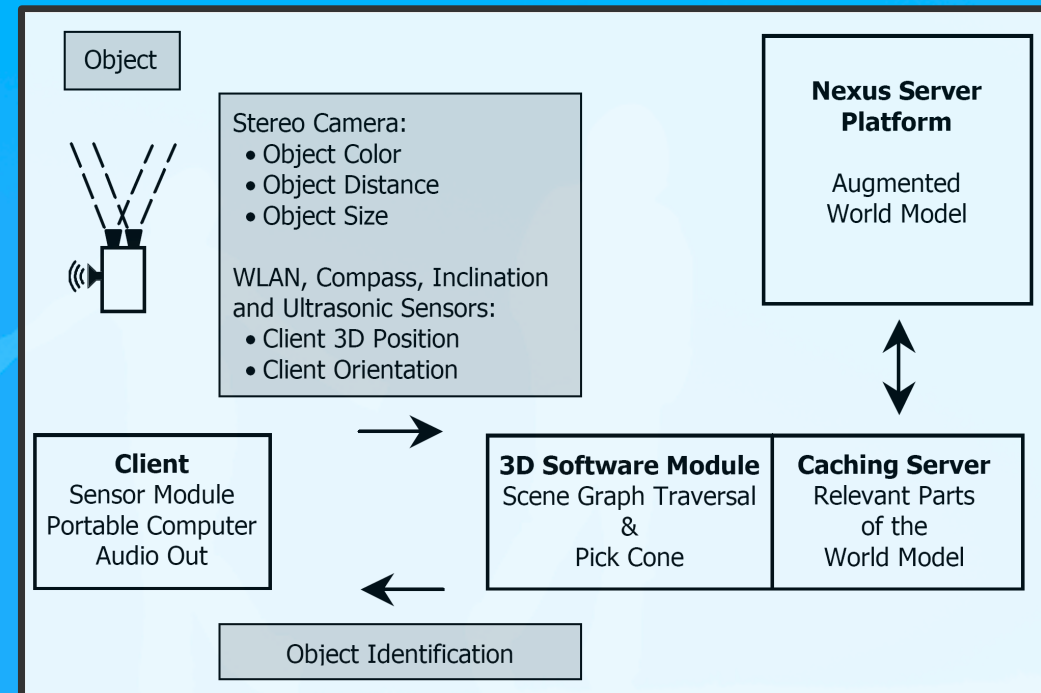
- Interactive localization and recognition of objects using
 - stereo images
 - orientation (inertial sensors)
 - 3D model information
- Initial room localization using conventional W-LAN
- Precise “self-localization”
 - distance measurement
 - appropriate adjustment of the building model



[Hub et al.:2006]

Orientation aid for blind people

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

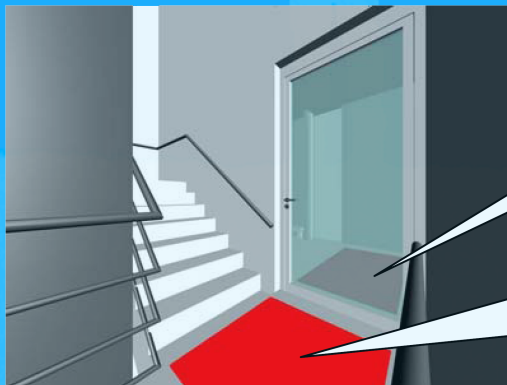
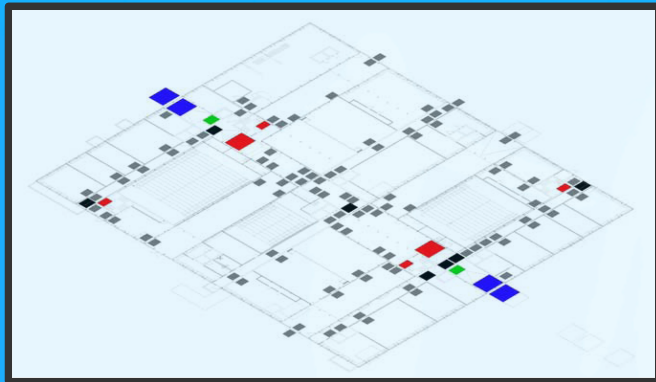


[Hub et al.:2004]



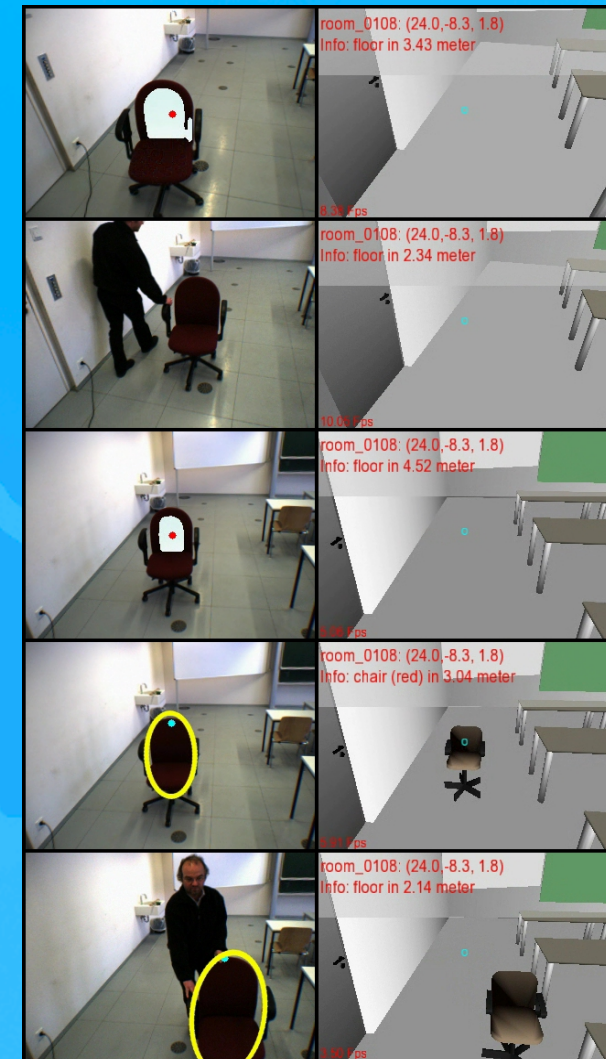
Further features

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



“Door to staircase.”

„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]



“Child falls and cries”



Issues

- Event recognition
- Locating sound source
- Sound visualization
- Floor plan



IC2Hear

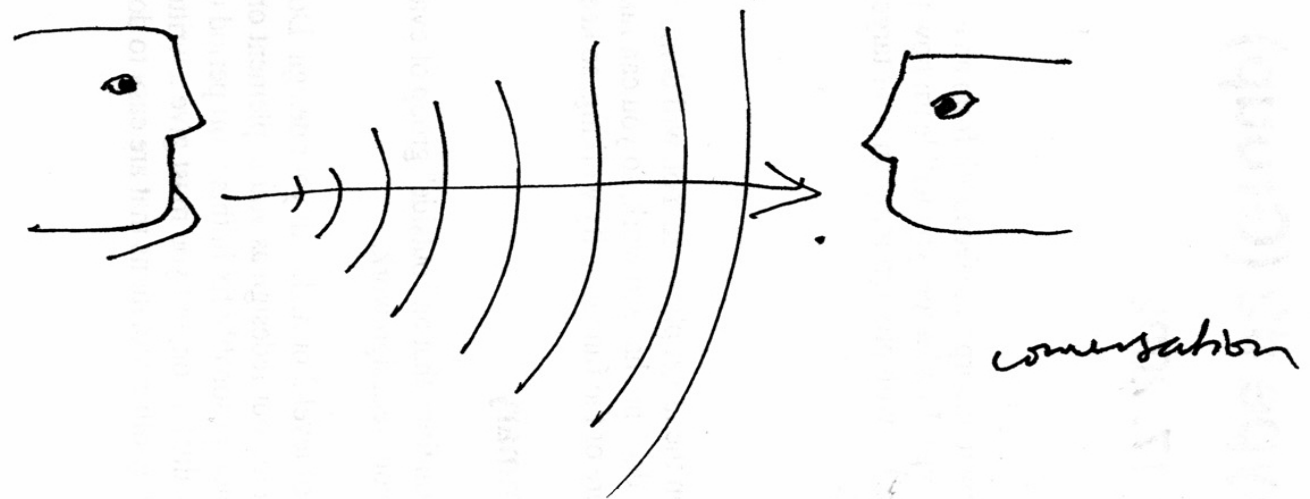
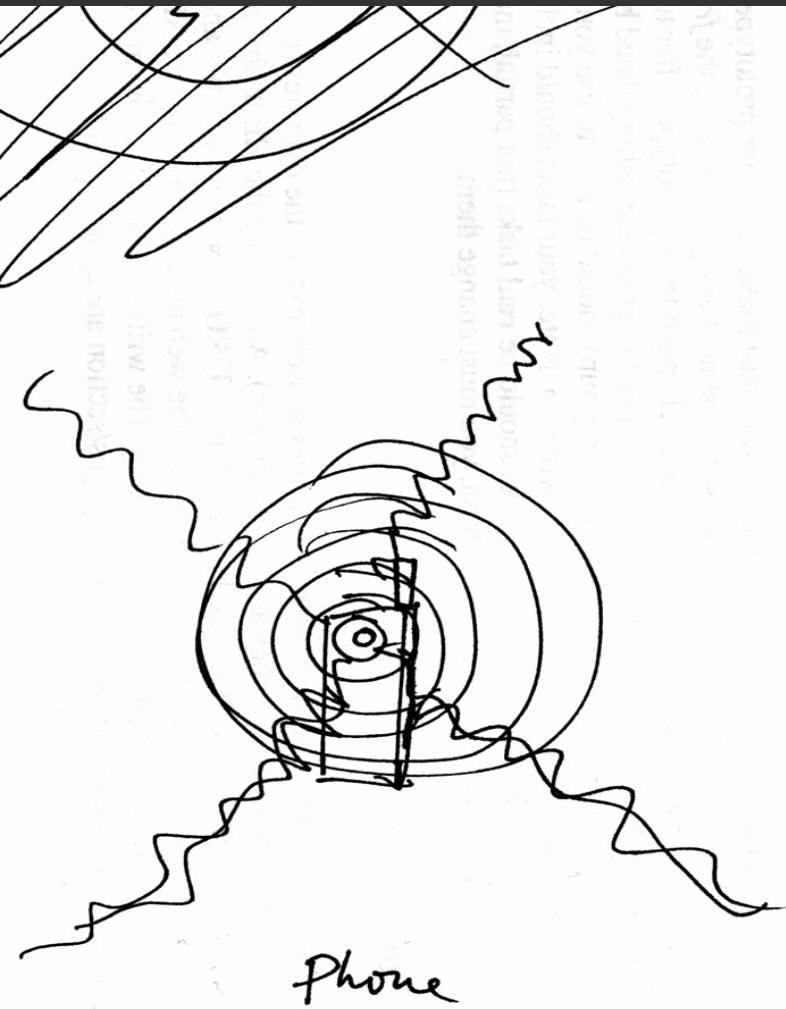
Group for User Interface Research (University of California at Berkeley)

- **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]



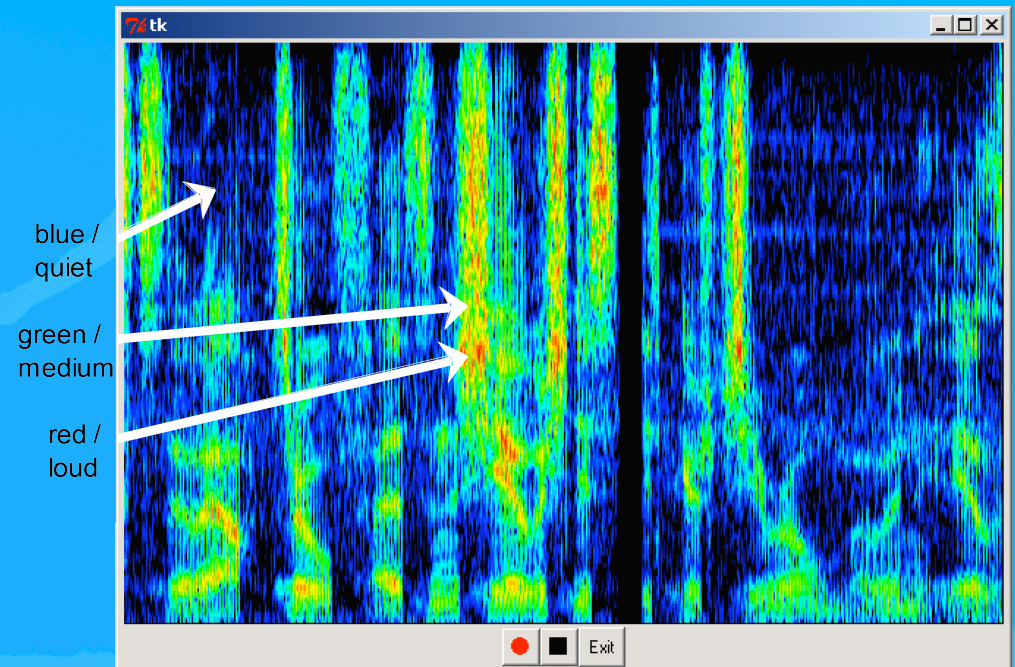
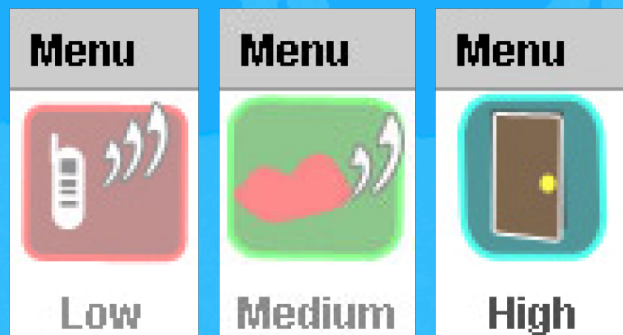
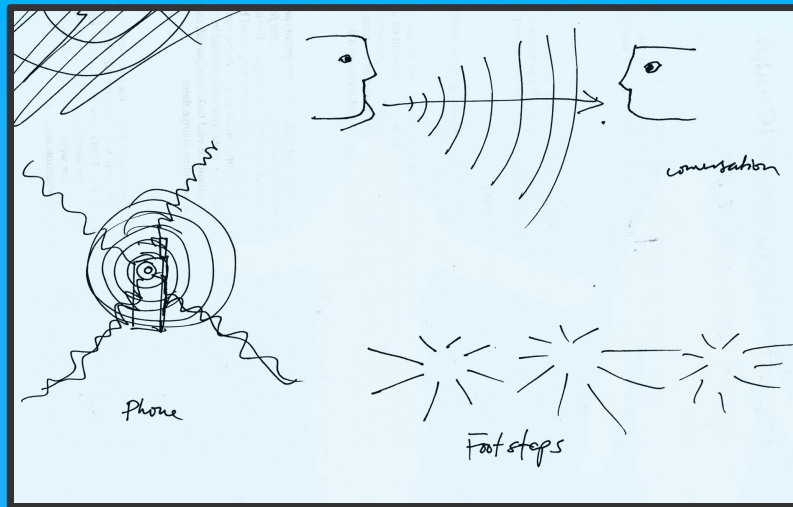
Sound visualization





Sound visualization

- Symbols / Icons
- Spectrograph

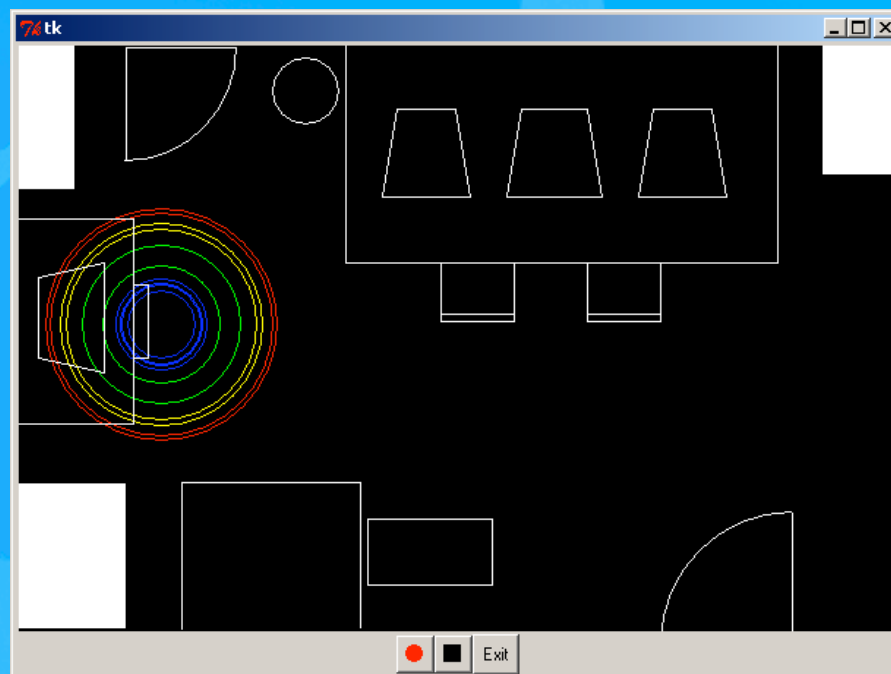
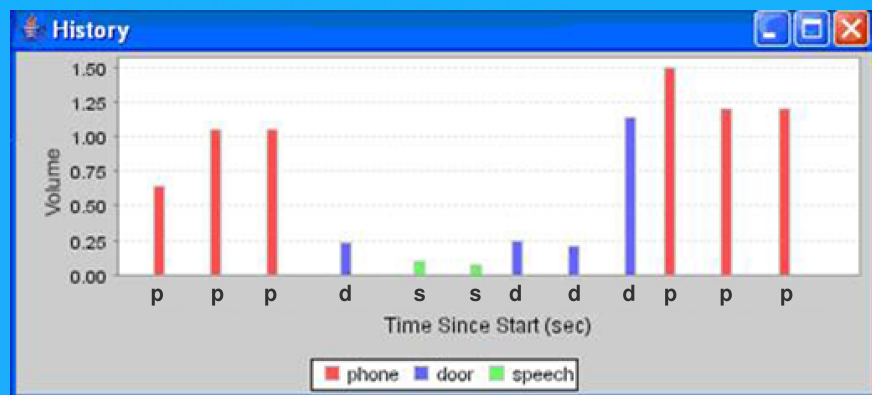


[Ho-Ching et al.:2003]



When? Where?

- History
- Map prototype



[Matthews et al.:2006]



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



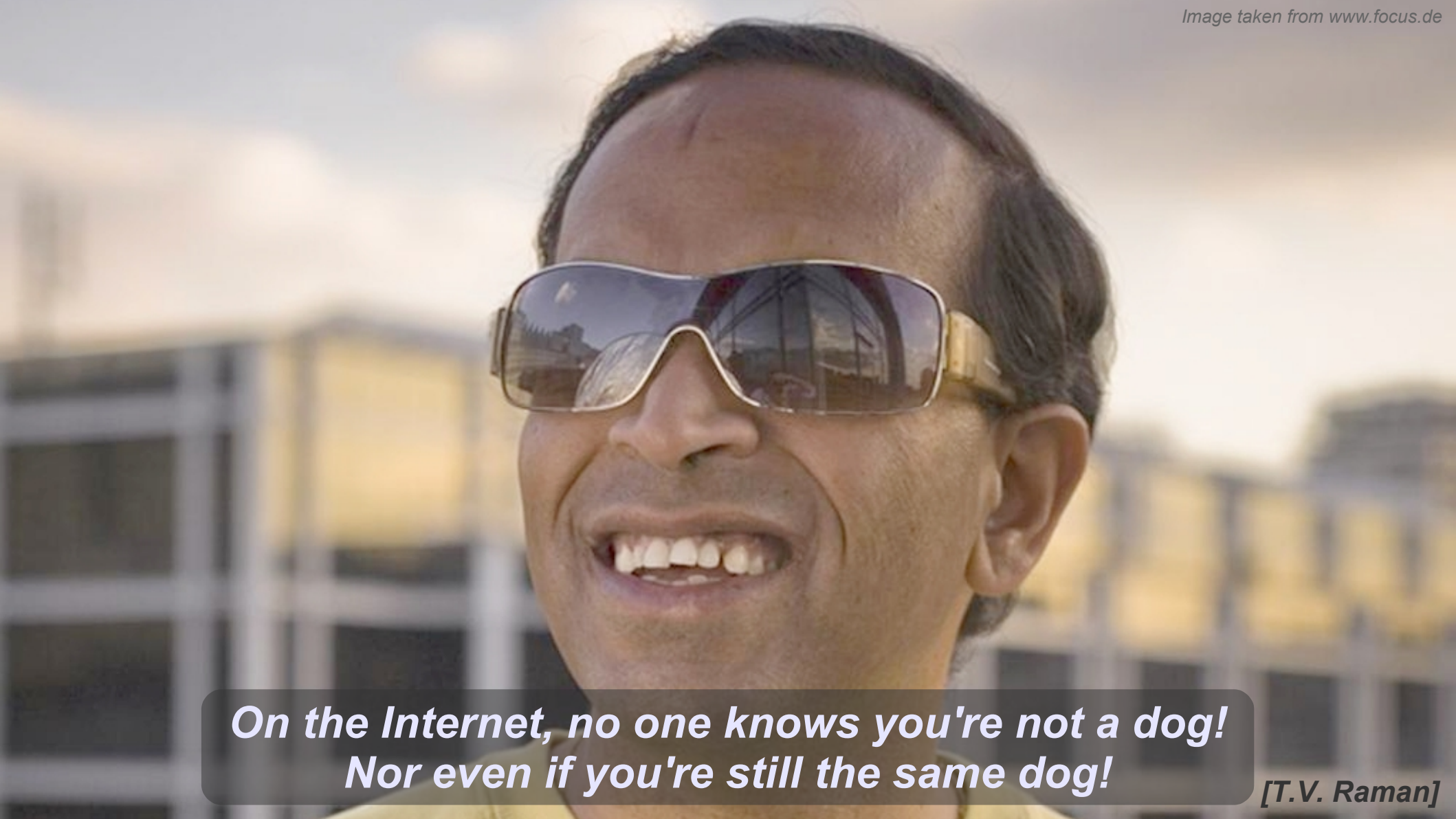
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[www.xkcd.com]




Make accessibility happen

Image taken from www.focus.de



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

[T.V. Raman]



AAL	Ambient Assisted Living
CHIL	Computers in the Human Interaction Loop
GMM	Gaussian Mixture Model
HMM	Hidden Markov Model
RFID	Radio Frequency Identification
SVM	Support Vector Machine