Abstract Media Spaces

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Outline

- What is Abstraction?
- Simple Media Spaces
- Abstract Media Spaces (AMS)
  - Benefits and Drawbacks
  - Methods for Abstracting Media
  - Designing an AMS
- Summary

What is Abstraction?

“Guernica” by Pablo Picasso
Reaction to the bombing of Guernica in World War II.

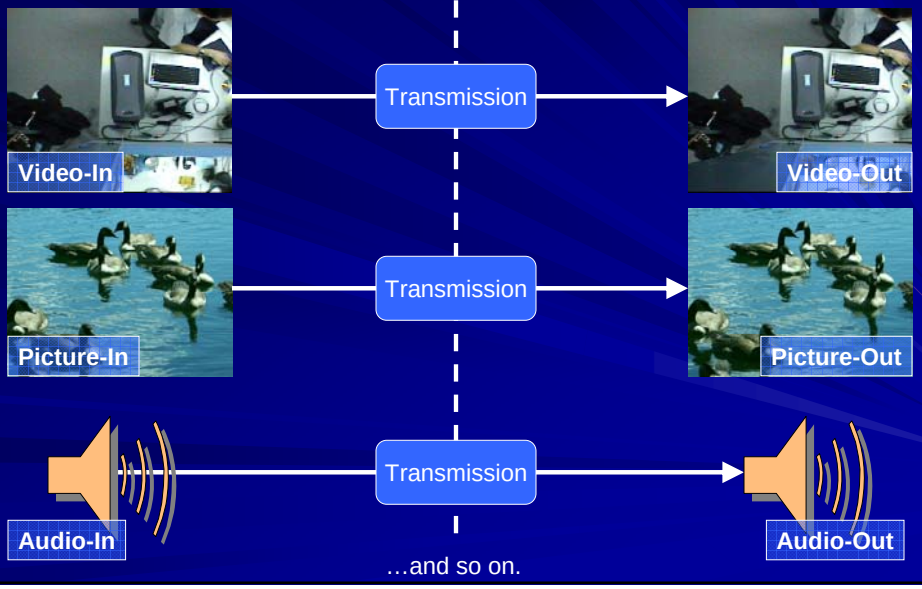
What is Abstraction? (2)

- Throwing away information [1]

Realistic → **Abstract**

	Photo	Cartoon	Art Piece
Fact	 -Female -Blond Hair -Yelling -Emotion?	 -Female -Brown Hair -Yelling / Angry	 -Female -Yelling / Distressed -In a barn/cellar
Abstraction	-Image cropped -Unclear context	-Part not drawn -No context -Lips, eyebrows, fingers, mouth, hair…	-Eyes on same side of head -Eyes in wrong place -Distorted body shape -Hair on back of head -Blue-gray color

Simple Media Spaces

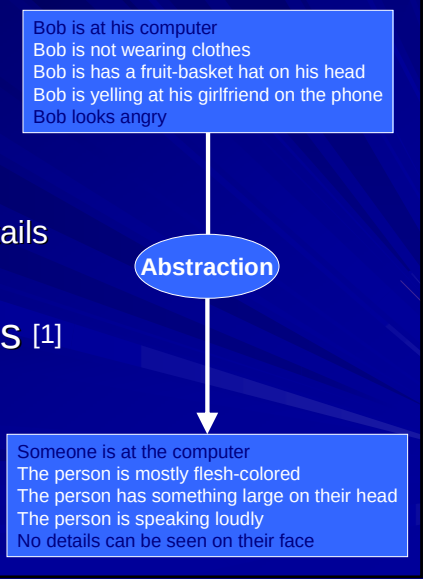


Simple Media Spaces (2)

- Literal Transmission
  - Input = Output
  - Low degree of abstraction
  - Some loss from original (reality)
    - Capture limitations
    - Compression – bandwidth limitations
  - Still perceptually equivalent

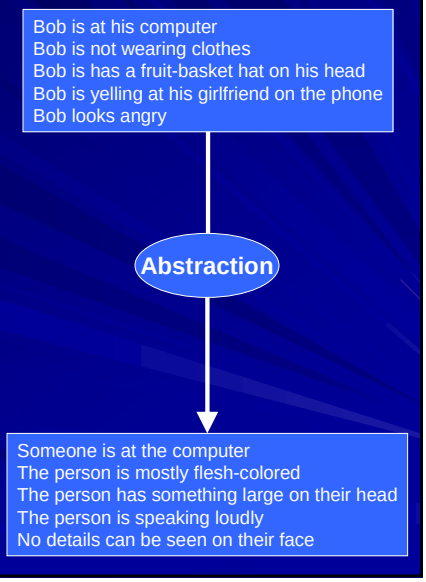
Why use Abstraction in a MS?

- To control information
  - Preserve Privacy
    - Shield sensitive details
  - Reduce Distraction
    - Eliminate unnecessary details
    - Re-map awareness cues
- Reduce bandwidth needs [1]



Drawbacks of Abstraction

- Loss of information
  - Useful: *Identity, Actions, Availability, etc.*
  - Incidental: *Details, Emotional state, etc.*
- Loss of understanding
  - Unclear meaning
  - Unclear context

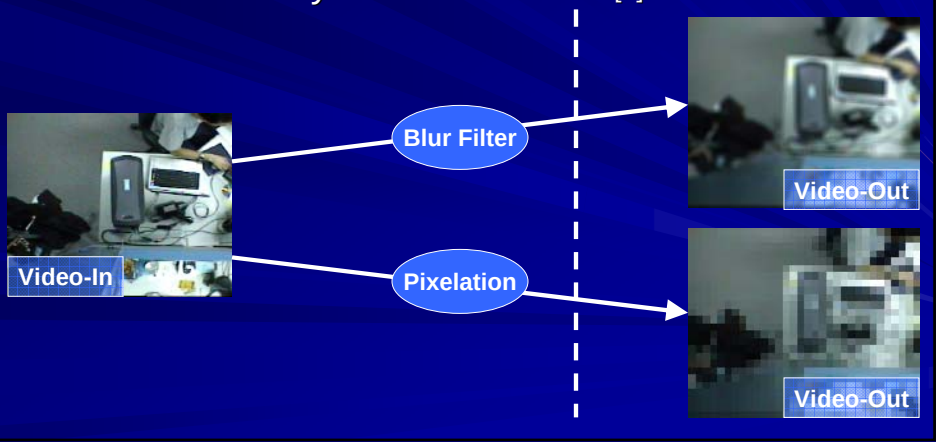


Methods of Abstraction

- Simple Degradation
- Feature Extraction (Silhouetting)

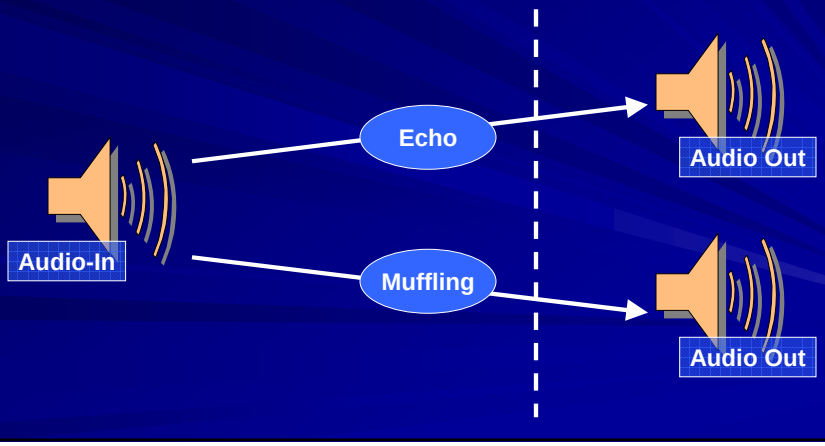
Simple Degradation

- Video
  - Still resembles original
  - Ex. Mike Boyle's Video Filters [4]



Simple Degradation (2)

- Audio
  - Still resembles original

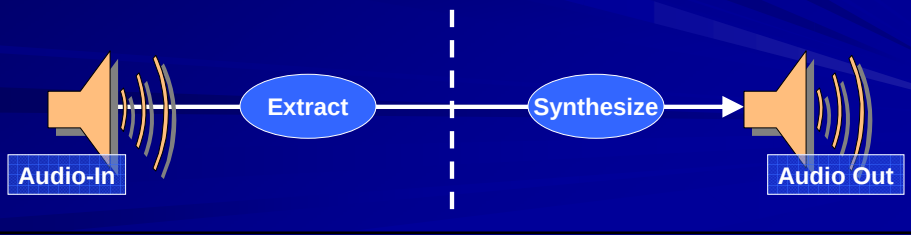


Feature Extraction

- Video
  - Vision Techniques
    - Motion detection
    - Presence detection
    - Eye tracking
    - Face tracking
    - …

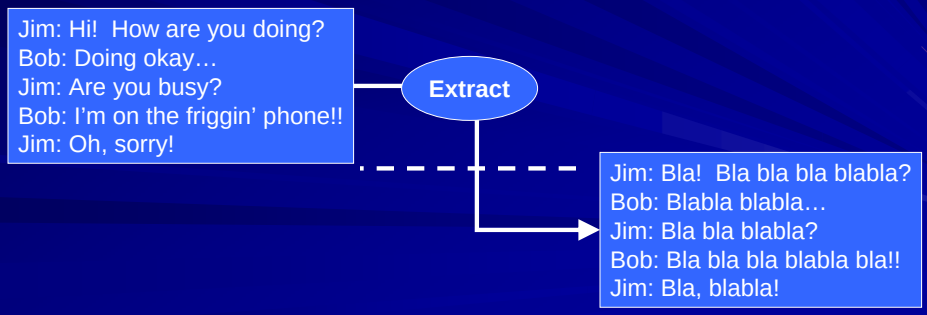
Feature Extraction (2)

- Audio
  - Ex. Smith et al's Low Disturbance Audio [3]
    - Speech → Non-Speech
    - Can still recognize voice
    - Cannot understand words
    - Similar to Blur Filter but for Audio!



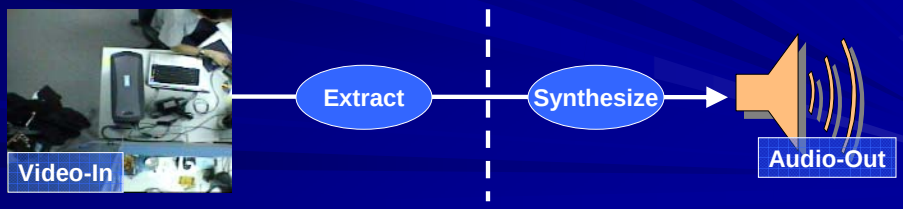
Feature Extraction (3)

- Text
  - Ex. Syllable replacement



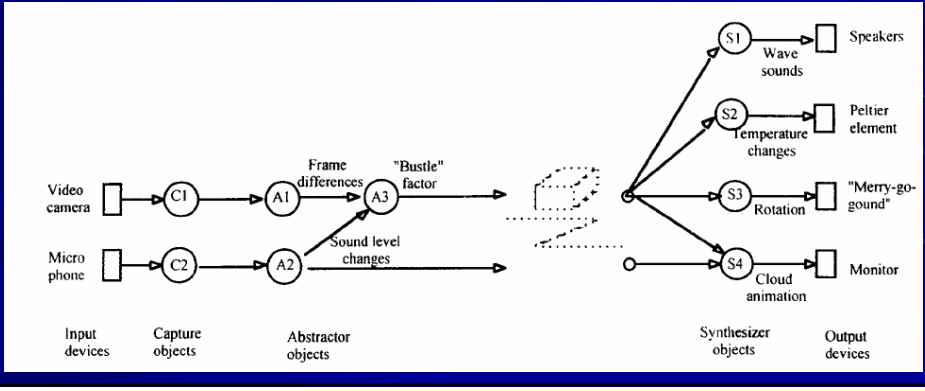
Media Translation

- Convert one media form to another
- No direct translation
  - Feature Extraction
  - Synthesizer – Visualization, Sonification, etc.



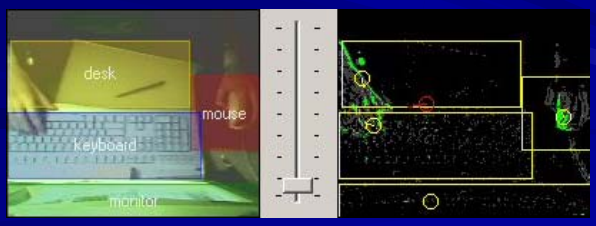
Media Translation (2)

- Ex. AROMA [1]
  - Peripheral awareness



Media Translation (3)

- Ex. Cambience (my thesis project)
  - Inputs
    - Web Cam (video)
  - Feature extraction
    - Motion detection, partitioning, thresholding, etc.
  - Outputs
    - Audio – volume, pan, etc.



Translation Pitfalls

- Extreme abstraction
  - No longer understandable
  - Usable only as art piece
- Learning Curve
  - Arbitrary mappings
  - Users may need to see literal data [1]

Designing an AMS

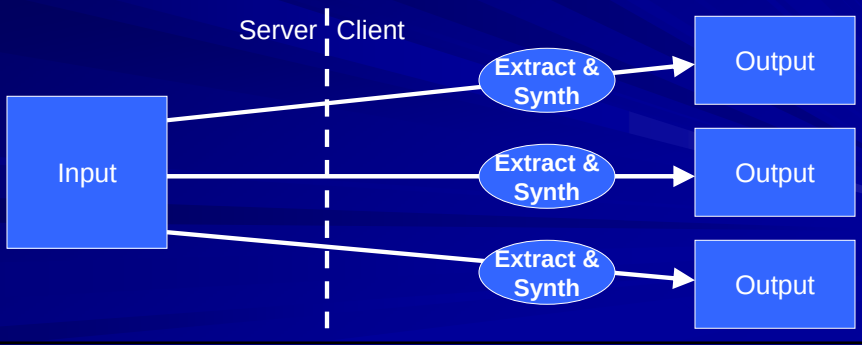
- Processing
  - Must be done in REAL TIME
  - Can lower sampling rate to compensate
- Peripheral vs. Foreground
- Draw Inspiration
  - Ambient Displays
  - Visualizations

Designing an AMS (2)

- 3 Architectures
  1) Client-side processing
  2) Server-side processing
  3) Distributed processing

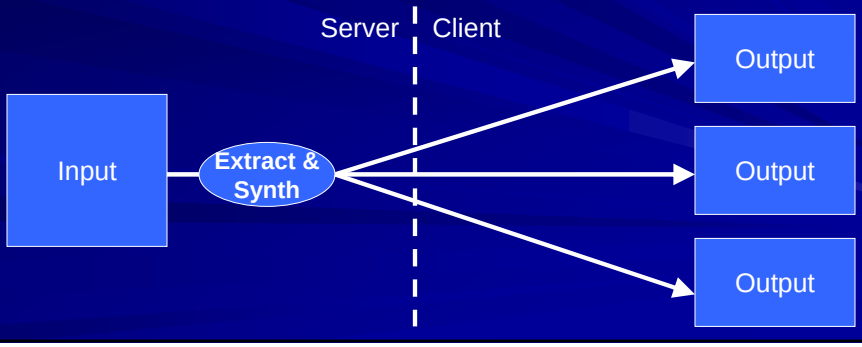
AMS Architectures (1)

- Client-Side Processing
  - Transmit raw data – privacy risk!
  - High Bandwidth usage
  - Low CPU for Server, high for Clients



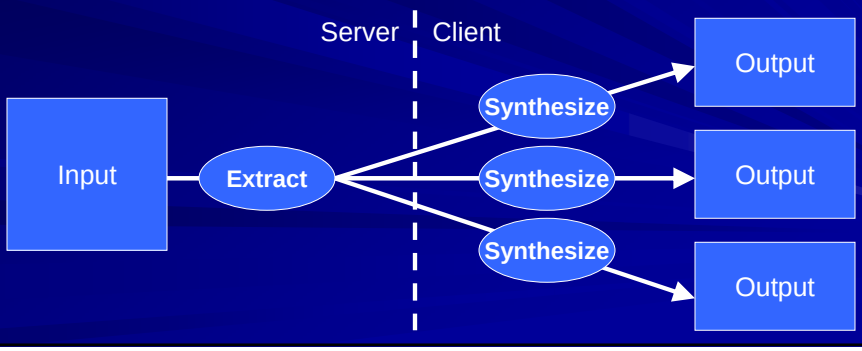
AMS Architectures (2)

- Server-Side Processing
  - Transmit synthesized media
  - High Bandwidth usage
  - High CPU for Server, low for Clients



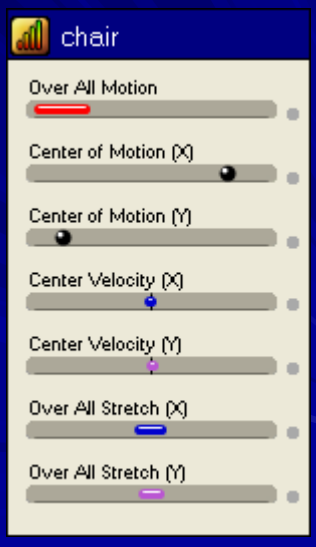
AMS Architectures (3)

- Distributed Processing
  - Transmit extracted features
  - Lower Bandwidth usage
  - Lower CPU for Clients and Server



Designing an AMS (3)

- Ex. Cambience
  - Video Input
    - Feature extraction on Server
  - Transmission
    - Scalar values
  - Audio Output
    - Sound synthesis on Client



Summary

- Abstract Media Spaces
  - Throw away information
    - Simple Degradation
    - Feature Extraction
  - Can provide a privacy shield
  - Can provide better peripheral awareness
  - Allow media re-mapping
  - Can lower bandwidth usage

Questions?

References

1) Pedersen, E. R., Sokoler, T. (1997) AROMA: Abstract Representation of presence supporting Mutual Awareness. Proceedings of CHI'97, 51-58.
2) Wikipedia: The Free Encyclopedia. (n.d.) Retrieved October 2005 from http://en.wikipedia.org/wiki/Abstract_art, http://en.wikipedia.org/wiki/Pablo_Picasso, http://en.wikipedia.org/wiki/Cubism
3) Smith, I., Hudson, S. (1995) Low Disturbance Audio For Awareness and Privacy in Media Space Applications. In proceedings of ACM Multimedia '95, ACM Press, p. 91-97
4) Boyle, M. (2005) Privacy in Media Spaces. PhD Thesis, Department of Computer Science, University of Calgary, Calgary, Alberta CANADA T2N 1N4. April.