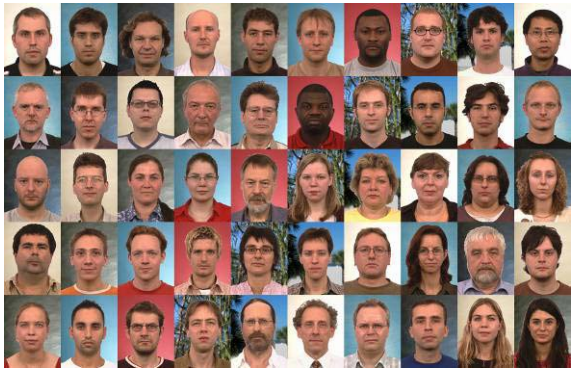
Proposals for R&D Topics

- Security / Dynamic Face Recognition
- Computational Photography
- Intelligent 3D Environments
- Intelligent Home Environments
- Shared Cross-Media Home-Entertainment
- Interactive Immersive Event Video
- Interactive Free Viewpoint Video
- Virtual Communities & Shared Virtual Environments
- Media Conversion in Video Communication
- Next Generation Video Coding (H.265)

Security / Dynamic Face Recognition

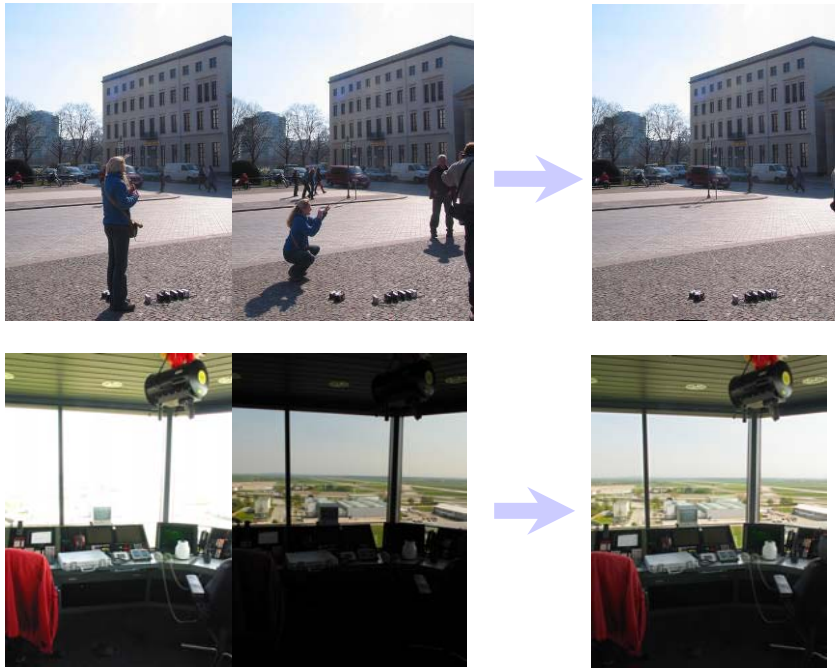
- Creation of biometric data for security applications, passports, admission control, surveillance,…
- Face recognition usually applied to single images



- Facial motion highly individual
  - Exploiting individual expressions in recognition process
  - Higher recognition ratio
  - Less sensible to manipulation
- Other applications: medical treatment, diagnosis, human-machine interfaces, affective computing,…

Computational Photography

- Digital cameras large market and widely used
- New field: computation of new images from multiple pictures
  - High dynamic range imaging
  - Image compositing
  - Object removal
  - Superresolution
  - Lightfield photography
  - ….

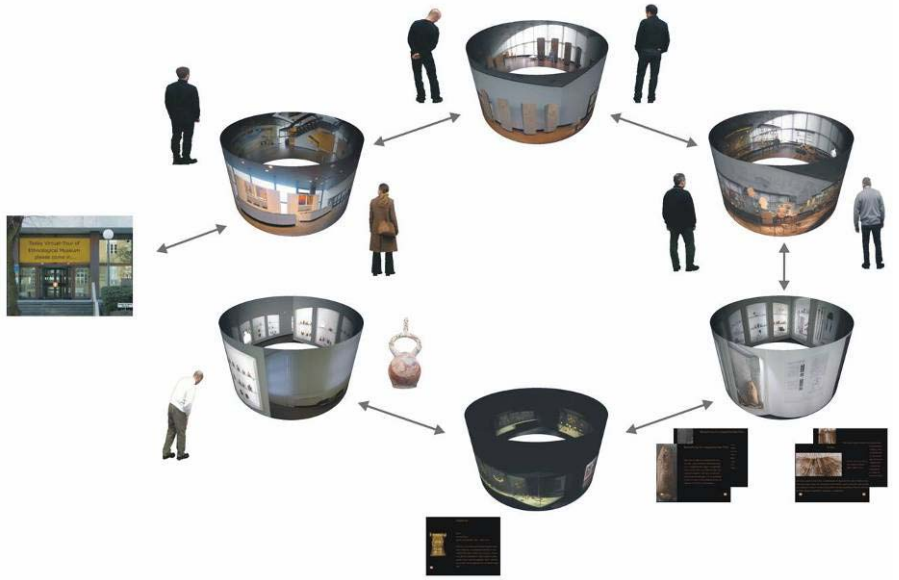


- Applications:
  postprocessing, imaging software, TV and cinema, surveillance,…

Intelligent 3D Environments

- Location aware services
- Personalized services
- Ubiquitous services

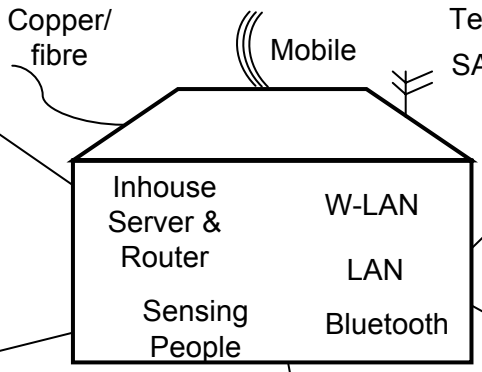
- Examples:
  - Intelligent travel guides (restaurants, shops, sights)
  - Car infotainment
  - Driver assistance
  - Human machine interfaces



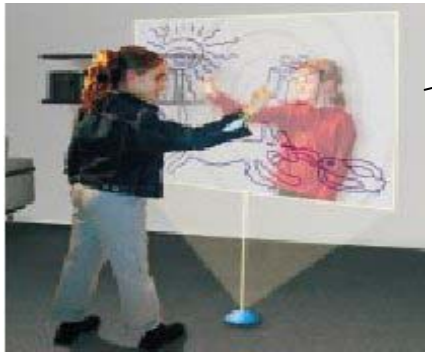
Intelligent Home Environments

collaborate with a business friend through your immersive portal

Ubiquitous, Seamless, and Intuitive Services at Home



interact intuitively with multimedia services

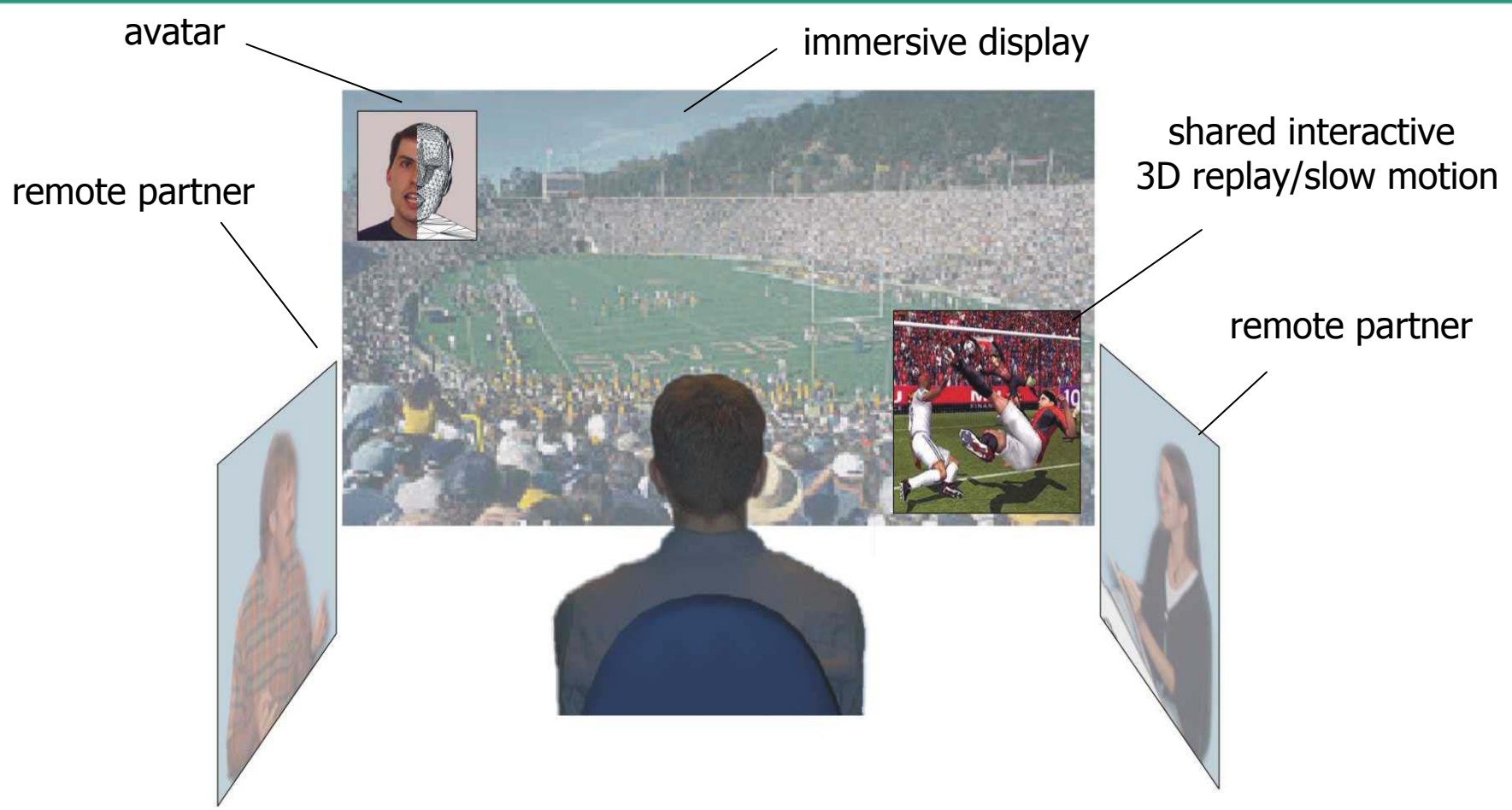


play with a remote friend

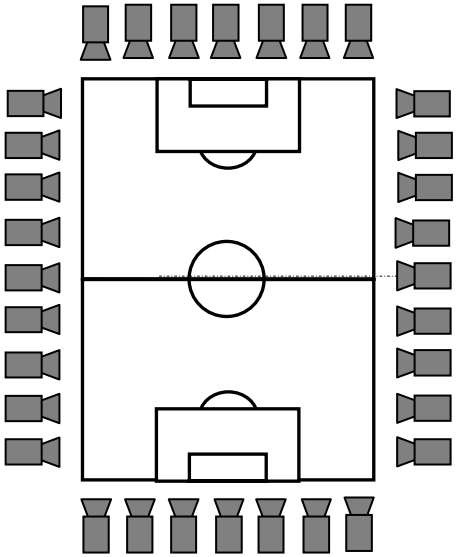
be advised by remote fitness trainer

enjoy augmented TV at your video wall

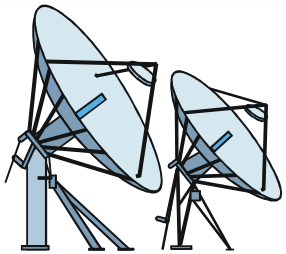
Shared Cross-Media Home-Entertainment



Interactive Immersive Event Video

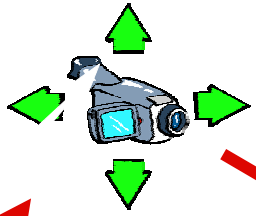


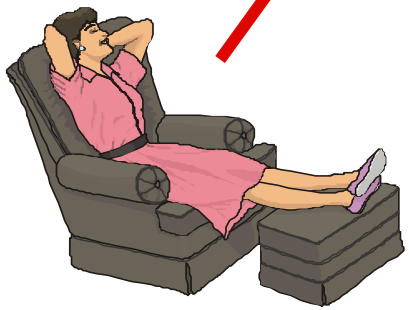
Multi-View Capture of Live Event



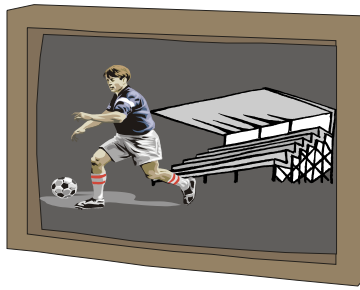
Multi-View Coding & Transmission

Interactive Rendering Using Virtual Camera





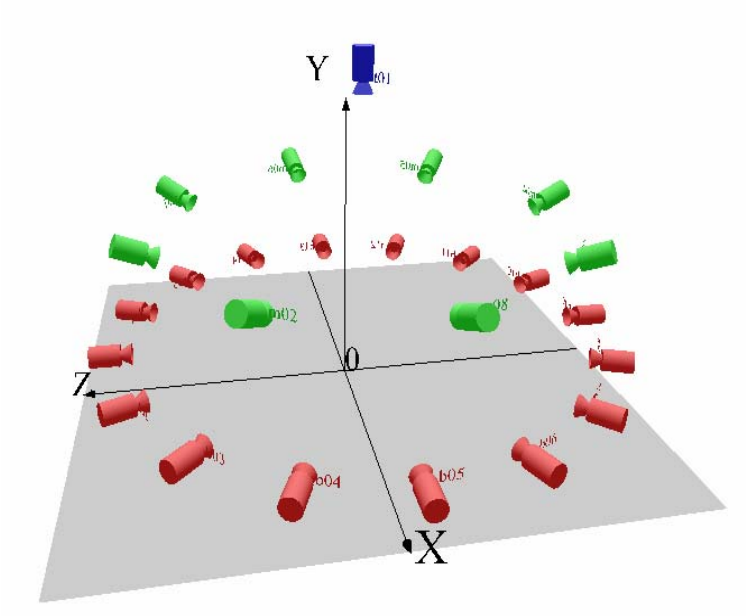
User Interaction



Free Viewpoint Video

Interactive Free Viewpoint Video: The Next Step in Entertaiment

- Capturing a real dynamic scene with **N cameras**
- Transformation into a suitable **data representation**
- Interpolation of arbitrary **intermediate views**
- Allows **free navigation** within the scene (in limits)

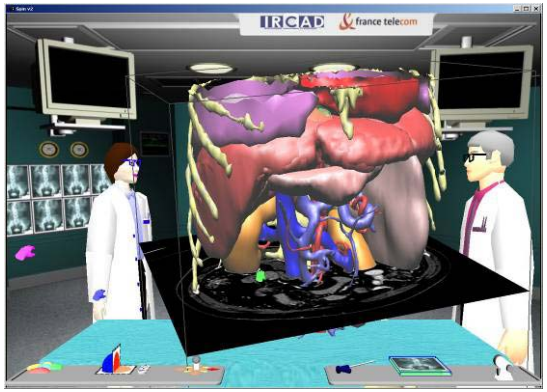


Streaming (UMTS, DVB-H, W-LAN) of interactive FFV clips to mobiles (e.g. go scenes during football matches)

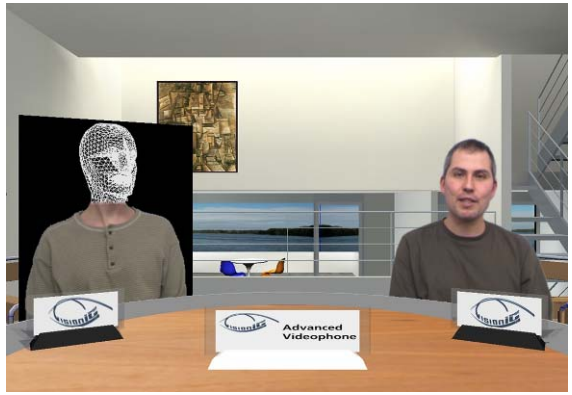
Virtual Communities & Shared Virtual Environments

Virtual Operator

Virtual Chatrooms



Virtual Team Collaboration



Virtual Conference

Media Conversion in Video Communication

- Communication with different devices
- Wide range of display sizes and bit-rates
- Conversion between data representation formats required

Next Generation Video Coding (H.265)

- **H.264**
  - Dramatic improvement of coding efficiency in comparison to previous standards
  - Key technology for advanced video communication: Broadcast, HD DVD/BD ROM, Internet and mobile services (DVB-H, DMB, PSS, MBMS)
  - Success Story for German R&D institutions and industry: FhG-HHI, TU München, Uni Hannover, RWTH Aachen, Siemens, Bosch, Telekom
- **H.265**
  - ITU-T starts activities for next generation video coding (H.265)
  - Target date for completion: 2010
  - Performance target: Halved data rate in comparison to H.264
  - FhG-HHI and others have to strengthen their leading role in video coding

Approaches for H.265

- Usage of the increased computing power in the receiver: backwards adaptive algorithms (e.g. motion estimation, texture synthesis, etc.)
- Joint coding of of several images by volume coding and adapted encoder control
- Use of generalized model based approaches (model-aided coding)
- Uasge of the transmission characteristics of networks (Internet, dd-hoc networks, mobile networks): robustness towards packet losses, distributed representation of coded data across multiple senders, multi-path transmission
- Improved usage of the characteristics of the human visual systems – continuation of the approaches started in the BMBF project BBI

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Tele-Immersion: Sensation of Being-There