Augmented video image: CamBall virtual table tennis

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BACKGROUND

- MVQ (Motion Vector Quantization)
 - Video coding technology developed at VTT, 1991 -
  - Excellent performance on low data transmission speeds
  - Very light implementation on receiving device (Java)

- VTT Information Technology / Multimedia group
  - MVQ development continued
  - Various applications in mobile multimedia & video streaming
  - Recent research area: Augmented Reality (AR)

  - See http://www.vtt.fi/multimedia

AUGMENTED REALITY (AR)

- Principle
  - Mixes virtual objects with view of real world
  - Location is registered by marker detection from video image
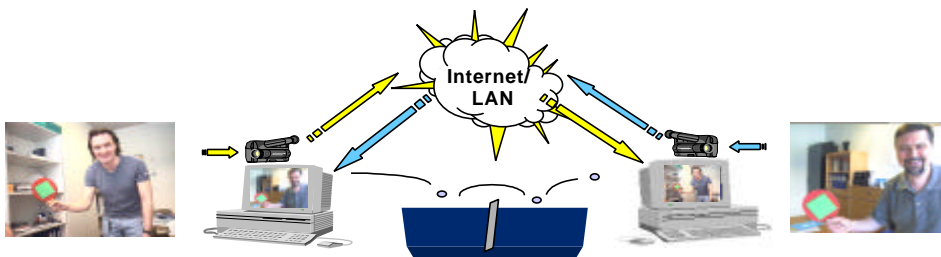 - Virtual object is displayed at marker location (position & angle)

- Interaction
  - between marker / virtual objects
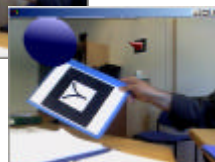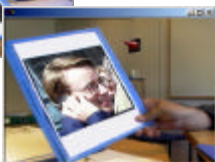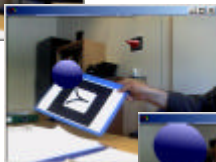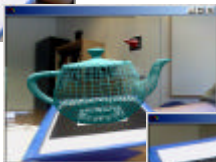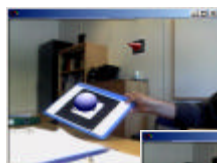
- Research Software
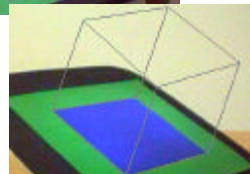 - ARToolKit, by HITLab, Univ. of Washington
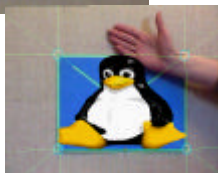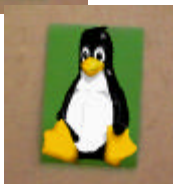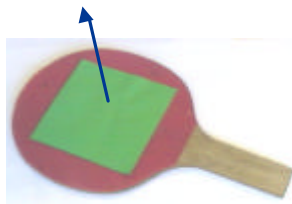

CAMBALL - VIRTUAL TABLE TENNIS

- Virtual table tennis over the Internet
- Opponent shown in video image (MVQ)
- Played with real rackets (marker attached)
- Virtual ball, table and net

MARKER DETECTION

- Colored square glued to racket
- Pose detected from video image
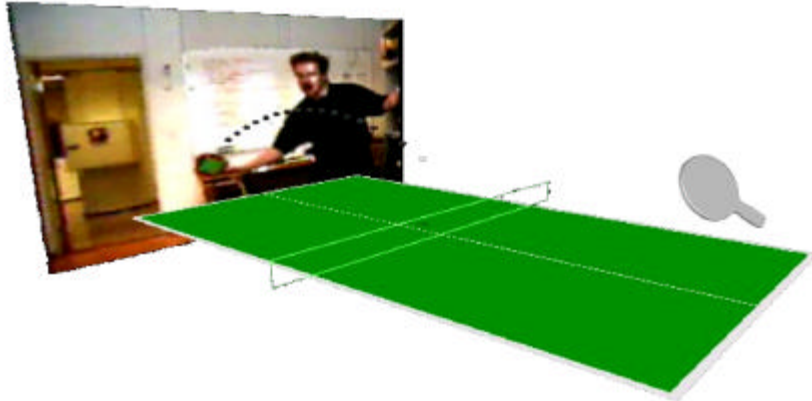- Marker can be partially obscured

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IMPLEMENTATION

- Game Modes
  - solo against a wall
  - solo against "oneself" (2 balls)
  - Dual over Internet / LAN

- Simplifications (optional)
  - Racket size can be adjusted
  - Ball directed towards table
  - Slow motion balls

FEATURES

- Game viewing by Internet audience
- Recording of game

SUMMARY

- Benefits & applications
  - Socially and physically activating
  - Natural human-computer user interaction
  - Fits in small interiors, at home or office
  - Suits also for kids and elderly people
  - No special hardware required

- Limitations
  - Full realism may not be possible to achieve
  - Simplified/modified game can be even better than real

- Next steps
  - Free Internet download of current game version (fall 2002)
  - Further development with commercial partners (being sought for)

FUTURE WORK

- Game features
  - Enhanced realism: friction, air resistance, etc.
  - HMD video glasses / stereo virtual objects
  - Serve by gesture detection
  - Avatar players
  - Audio streaming
  - Foursome game
  - Other game concepts

- Generalizations, new applications
  - 3D CAD collaboration
  - augmented video conferencing
  - marker detection based AR

FURTHER INFORMATION

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