
Augmented Reality in Surgical Training

— Jon Reuvers —

Outline

- Augmented Reality
 - Augmented Reality versus Virtual Reality
- Surgical Training
 - Virtual Interactive Presence and Augmented Reality (VIPAR)
 - Navigating Three Dimensional Spaces
 - Robotic Surgery Training
- Limitations

Defining Augmented Reality

Real world and virtual elements are combined

Can be registered in three dimensions

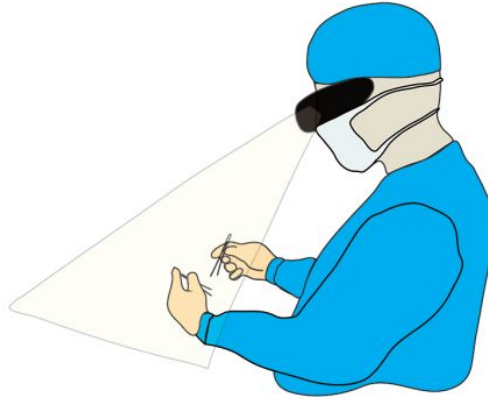
It can be interacted with in real time

Devices

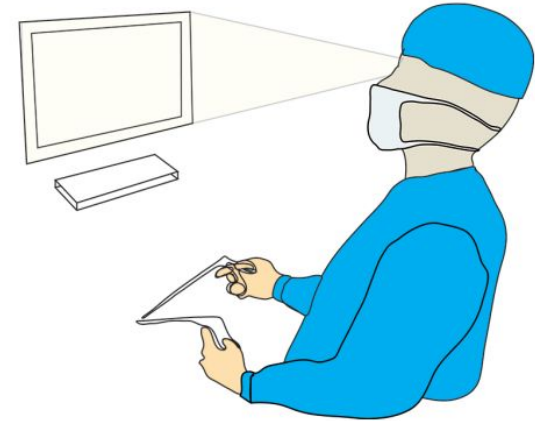
Smartphones

Google Glass

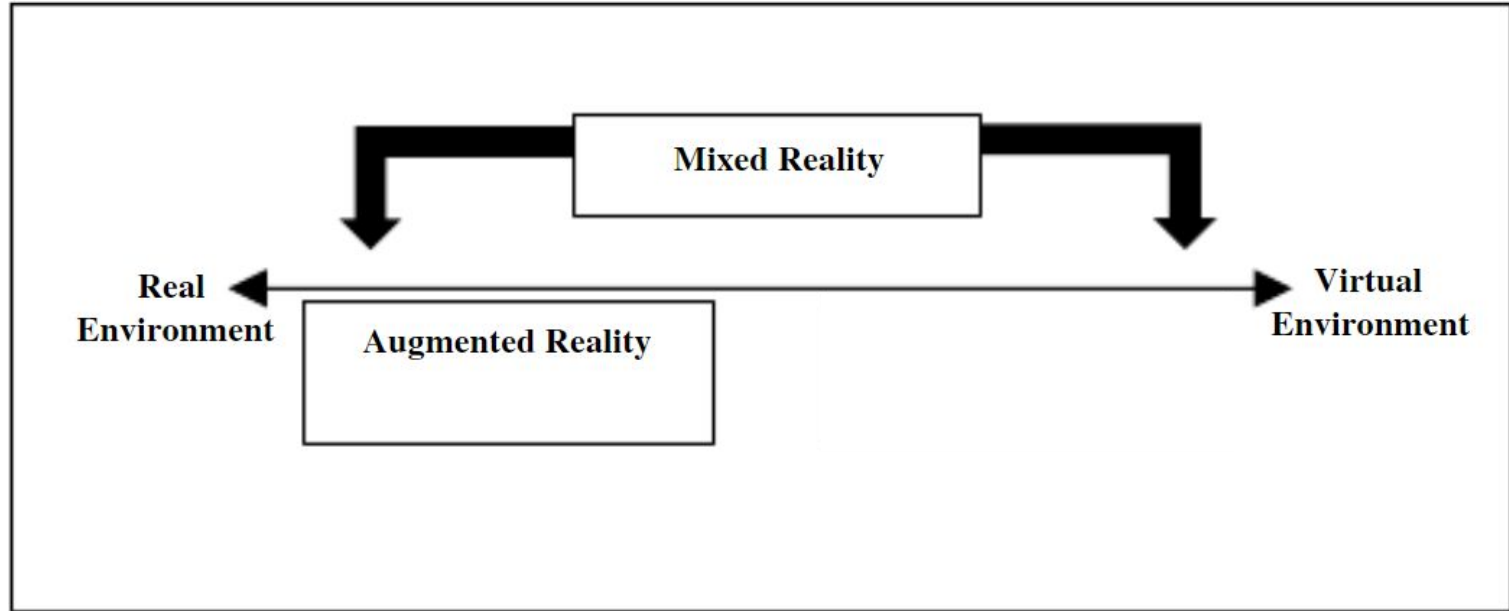
“See through” display



“Head's up” display



AR vs. VR



Uses in Surgical Training

Virtual Interactive Presence and Augmented Reality (VIPAR)

- Distanced teaching/direction

Navigating Three Dimensional Space

- Assistance in depth perception

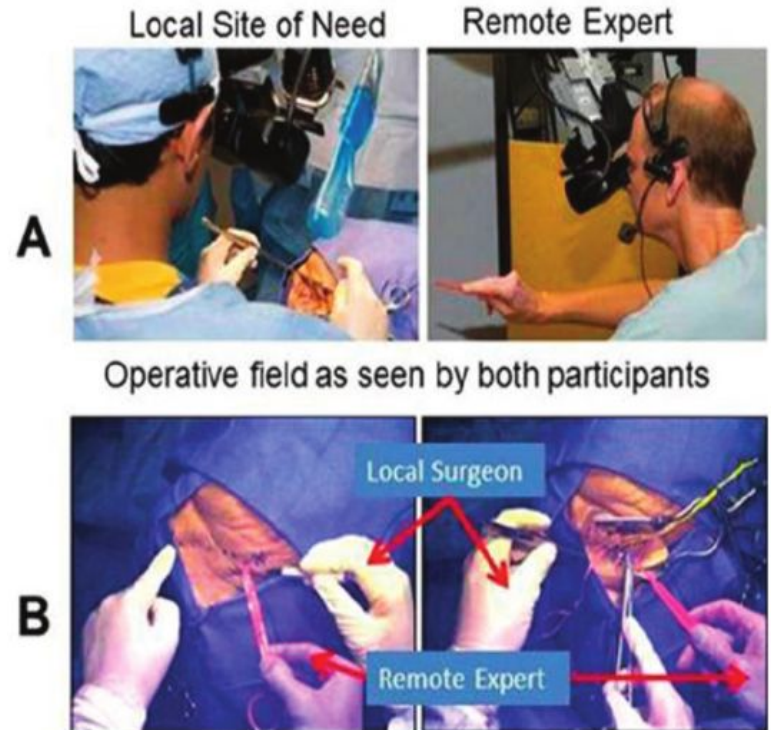
Robotic Surgery Training

- Increased instructional capabilities

Virtual Interactive Presence and Augmented Reality

Connects two locations to one space

Users hands are displayed to both parties



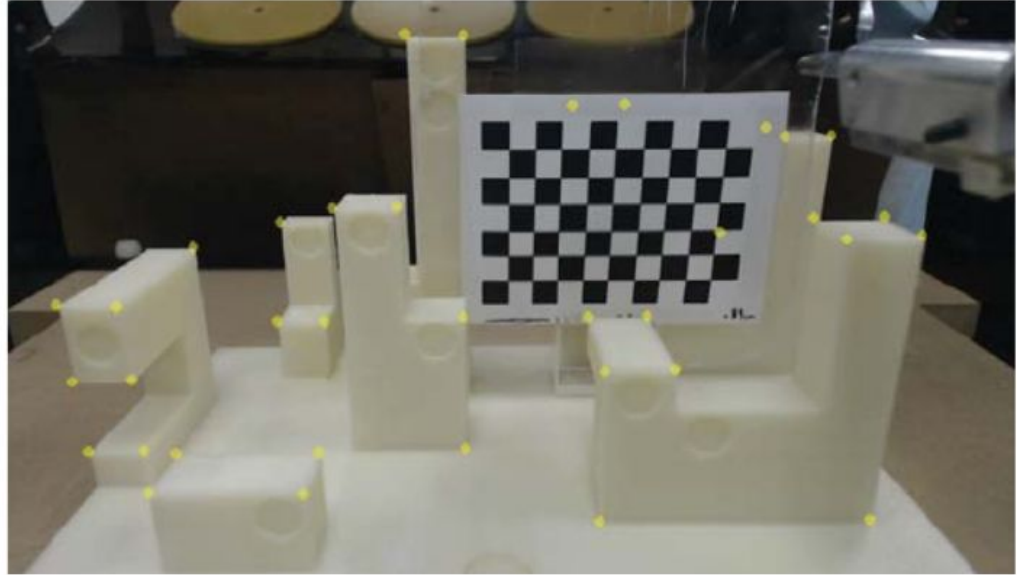
How its done

- Two cameras at separate locations intake video
- Video feeds are decompressed
- A buffer of the most recent frames is accessed
- Images are merged by overlaying a semitransparent version of the remote image onto the local image.
- Stored in a local buffer

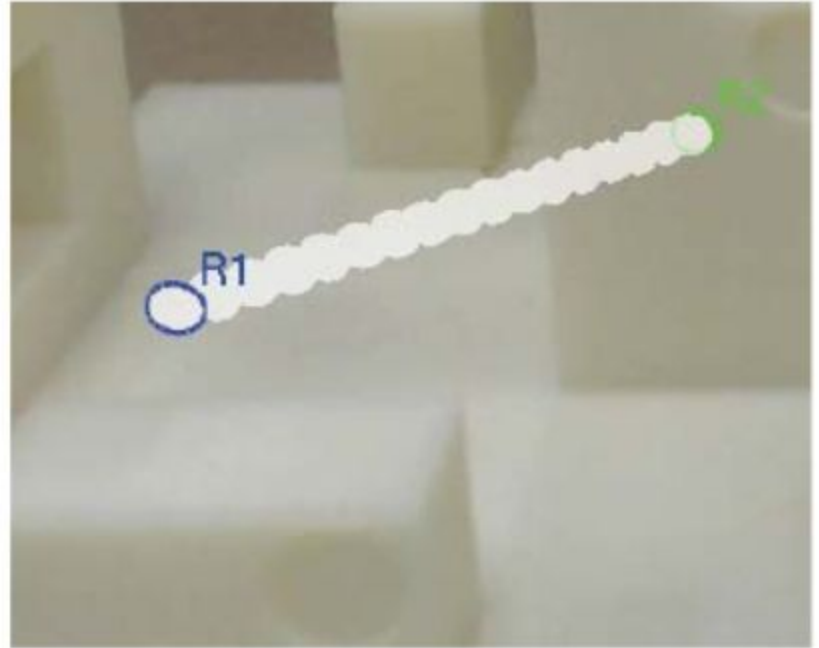
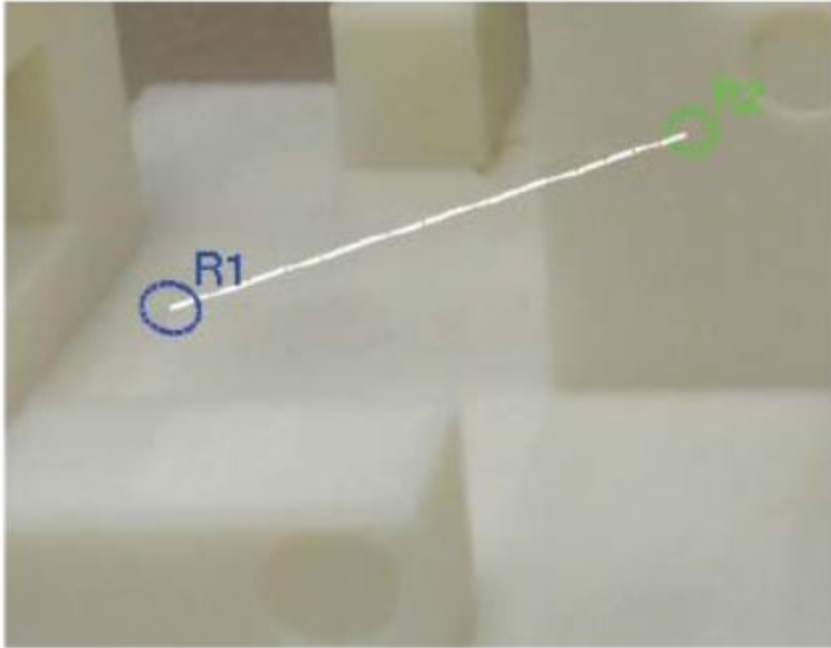
Potential problems

- Requires an anchoring point for calibration
- Some latency in the feed
- Different hardware can cause issues due to possible different codecs

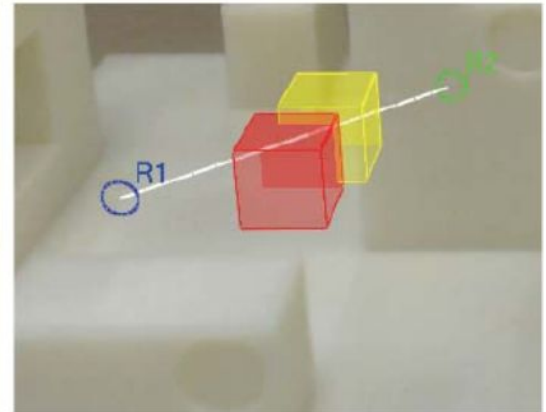
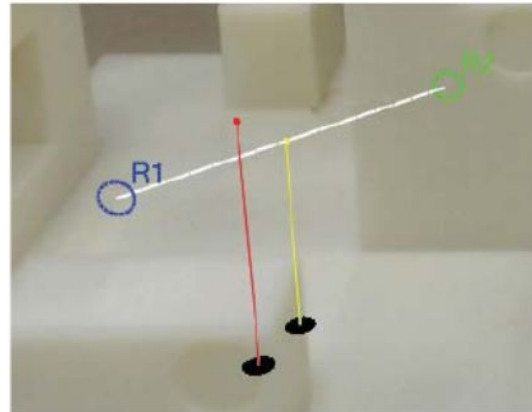
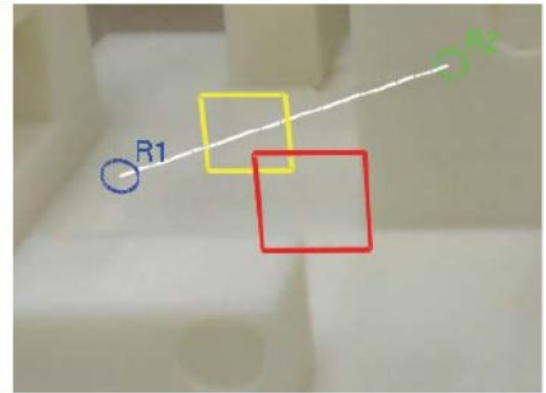
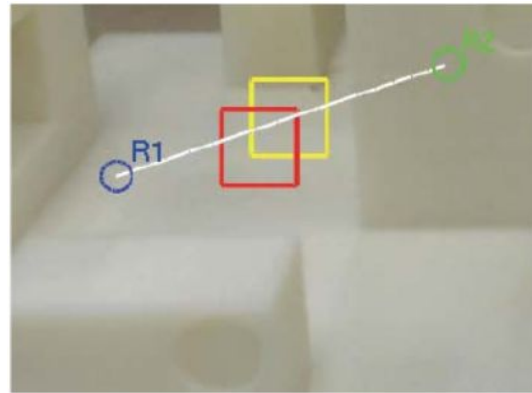
Navigating Three Dimensional Spaces



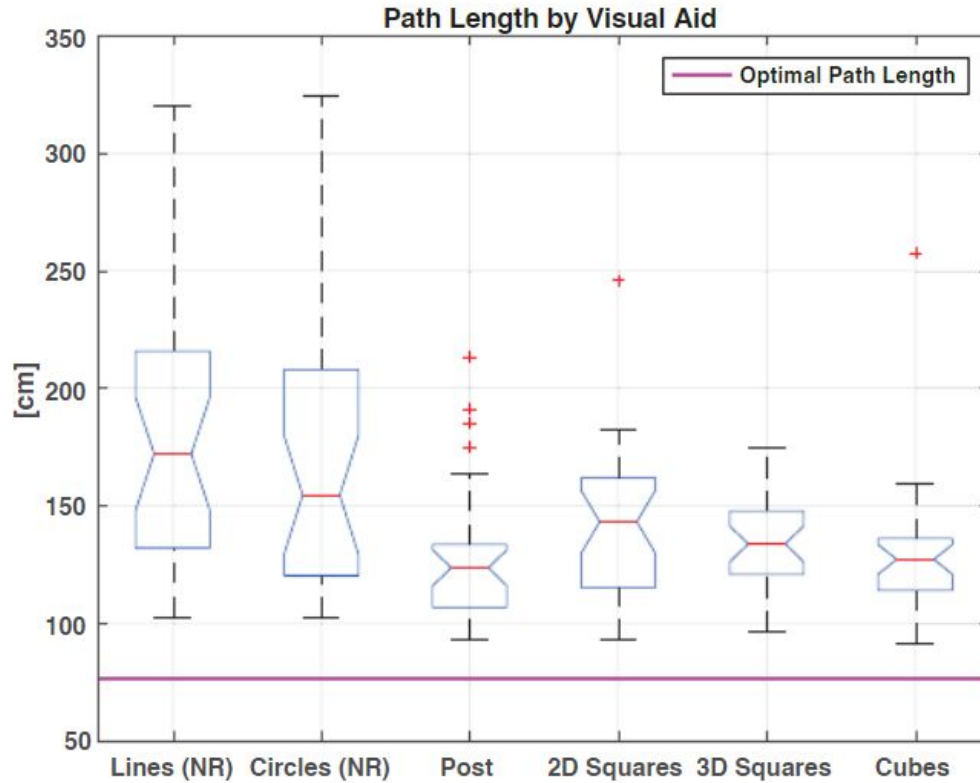
No Reference Indicators



Four Types of Indicators



Results

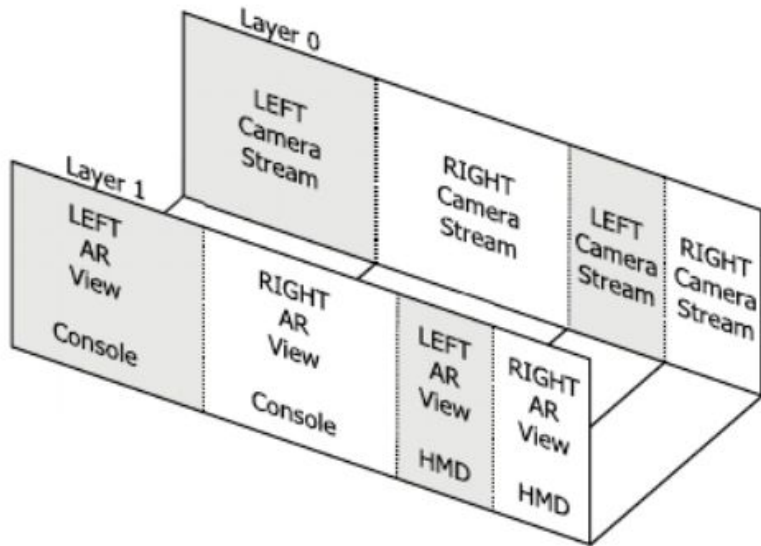


Robotic Surgical Training

- Enhancement of da Vinci System
- Intention is to create a more interactive training experience



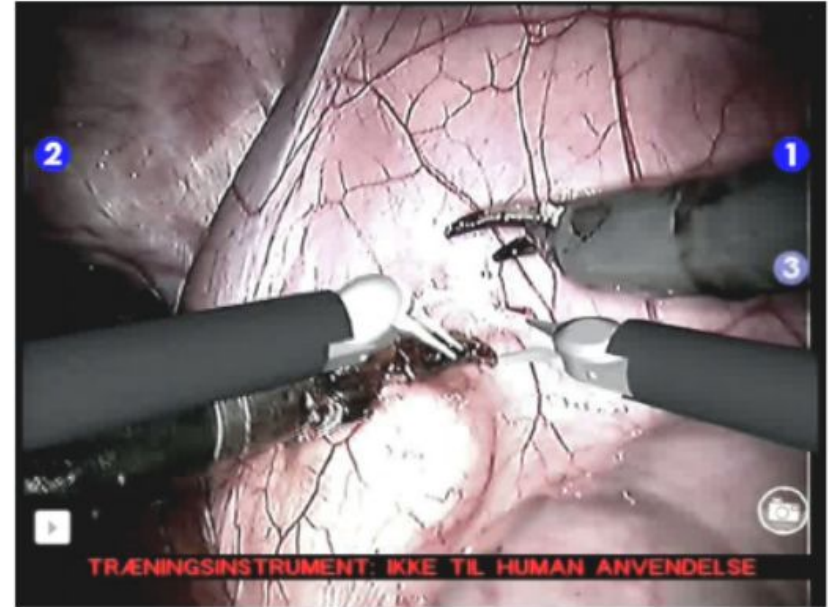
Visual Display



HMD - Head Mounted Display

Concerns

- Successfully used, but cumbersome
- Latency
- Visually not significantly different enough



Limitations

Calibration

Power Consumption

Privacy

Conclusions

- Future research can yield more benefit
- Currently usable, but not necessarily in live operation in its current state
- Most of the studies' participants thought the systems had merit

Questions

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