# Dynallax: Solid State Dynamic Parallax Barrier Autostereoscopic VR Display

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# Authors

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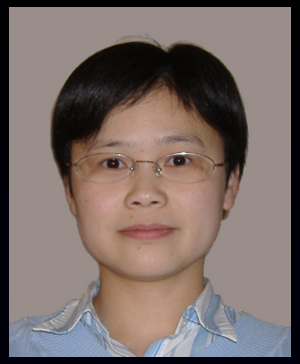

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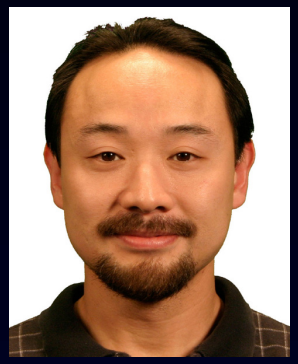

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Tom DeFanti

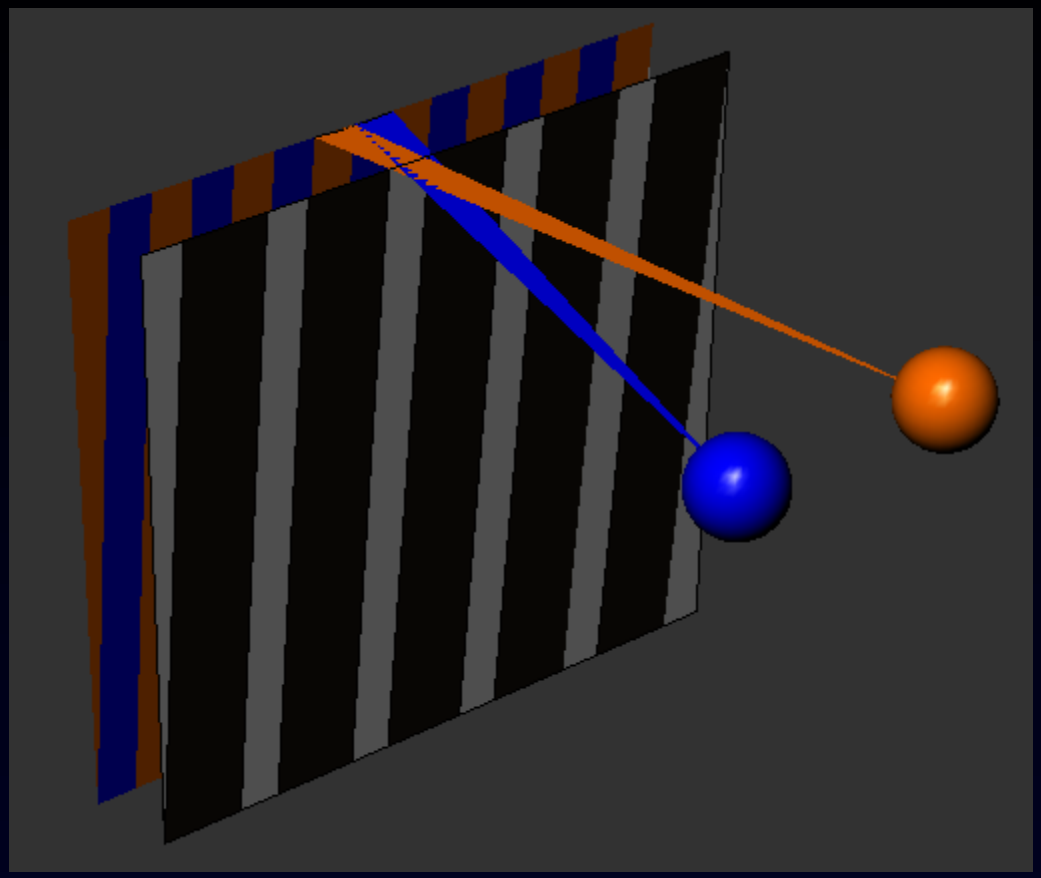
# Static parallax barrier autostereo VR

Good

- simple
- tiled hi-res
- VR quality

Bad

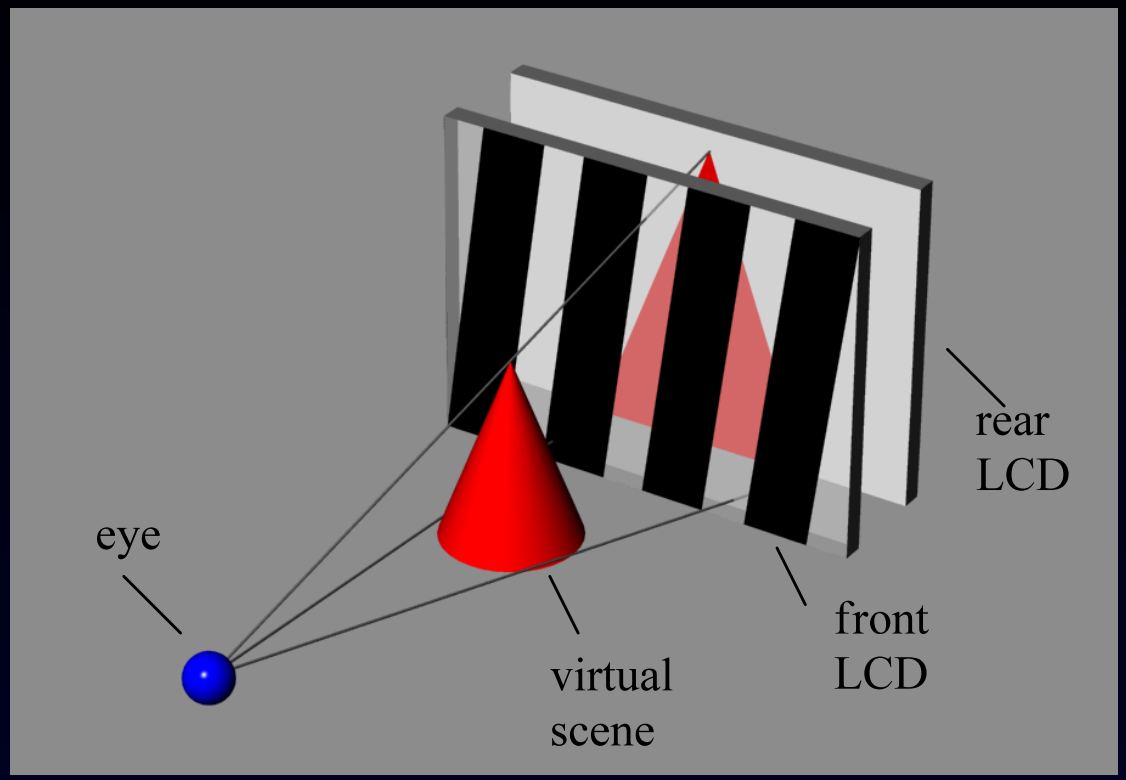
- 3D only
- limited range
- latency critical
- Single viewer



Tracked single viewer

# Dynallax: dynamic parallax barrier

Barrier on front LCD

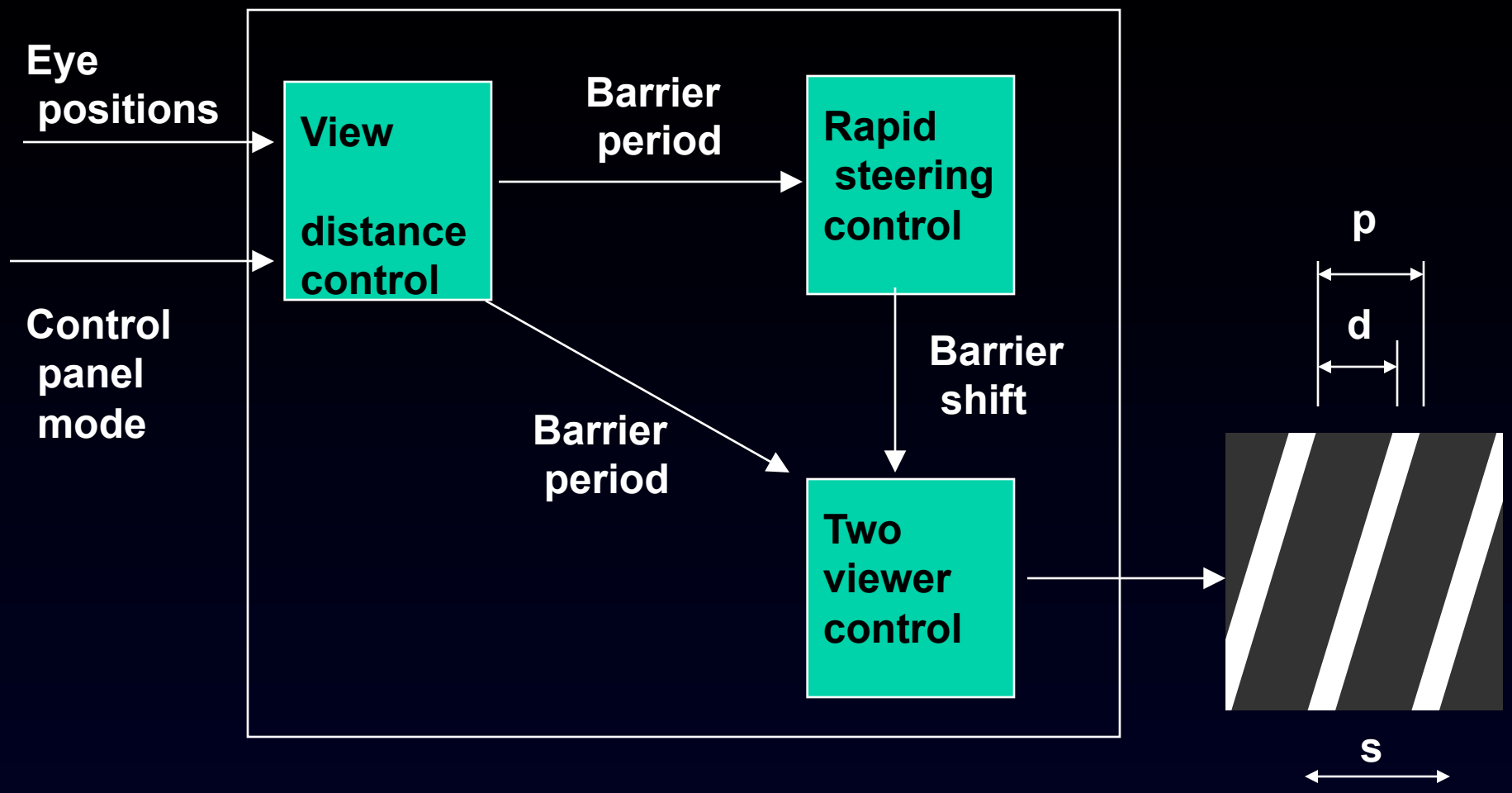



Scene channels on rear LCD

# Prototype working VR system

- IS-900 tracking
- Tracked wand
- 17-inch display
- 1280x1024

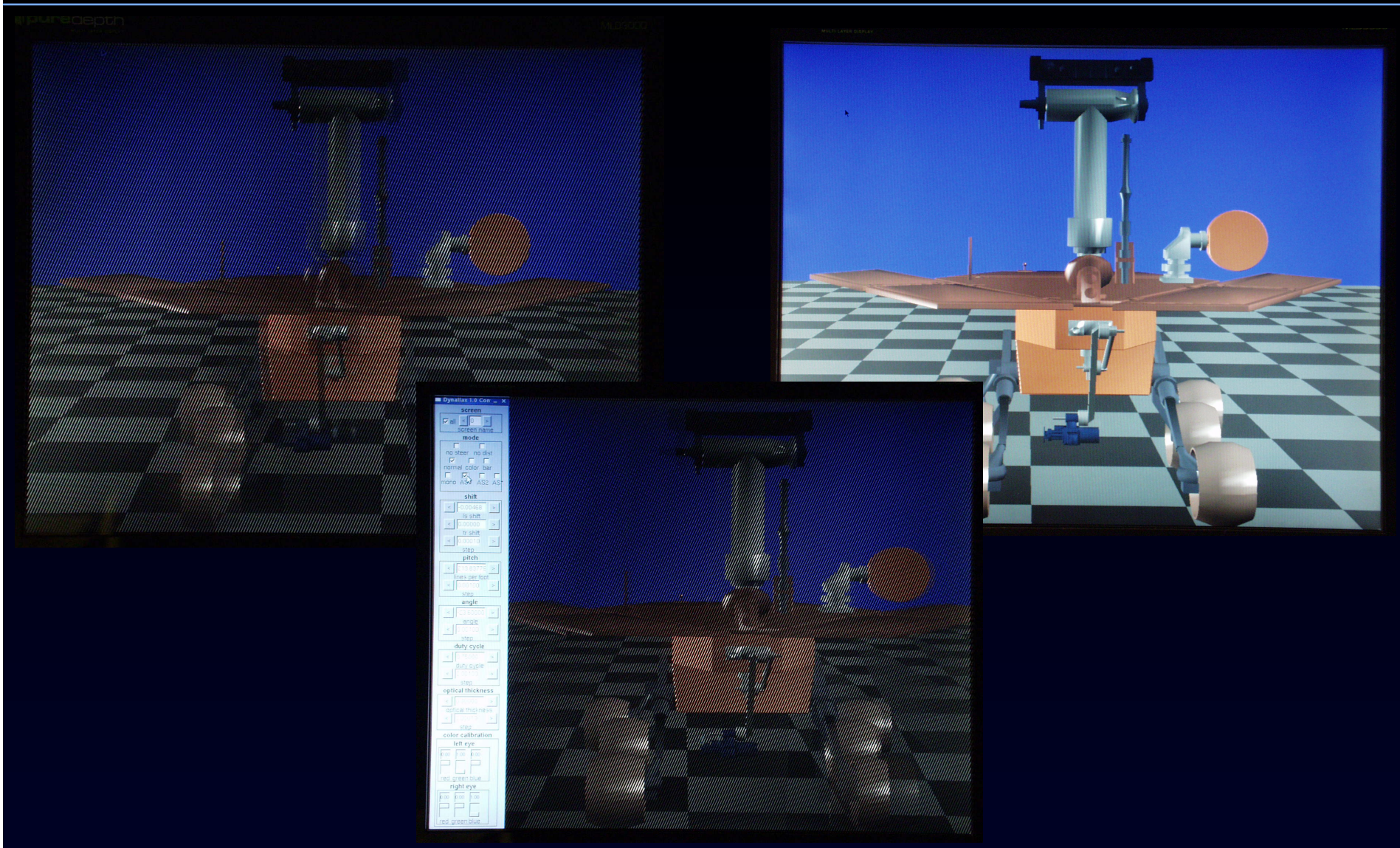
# Real time controller



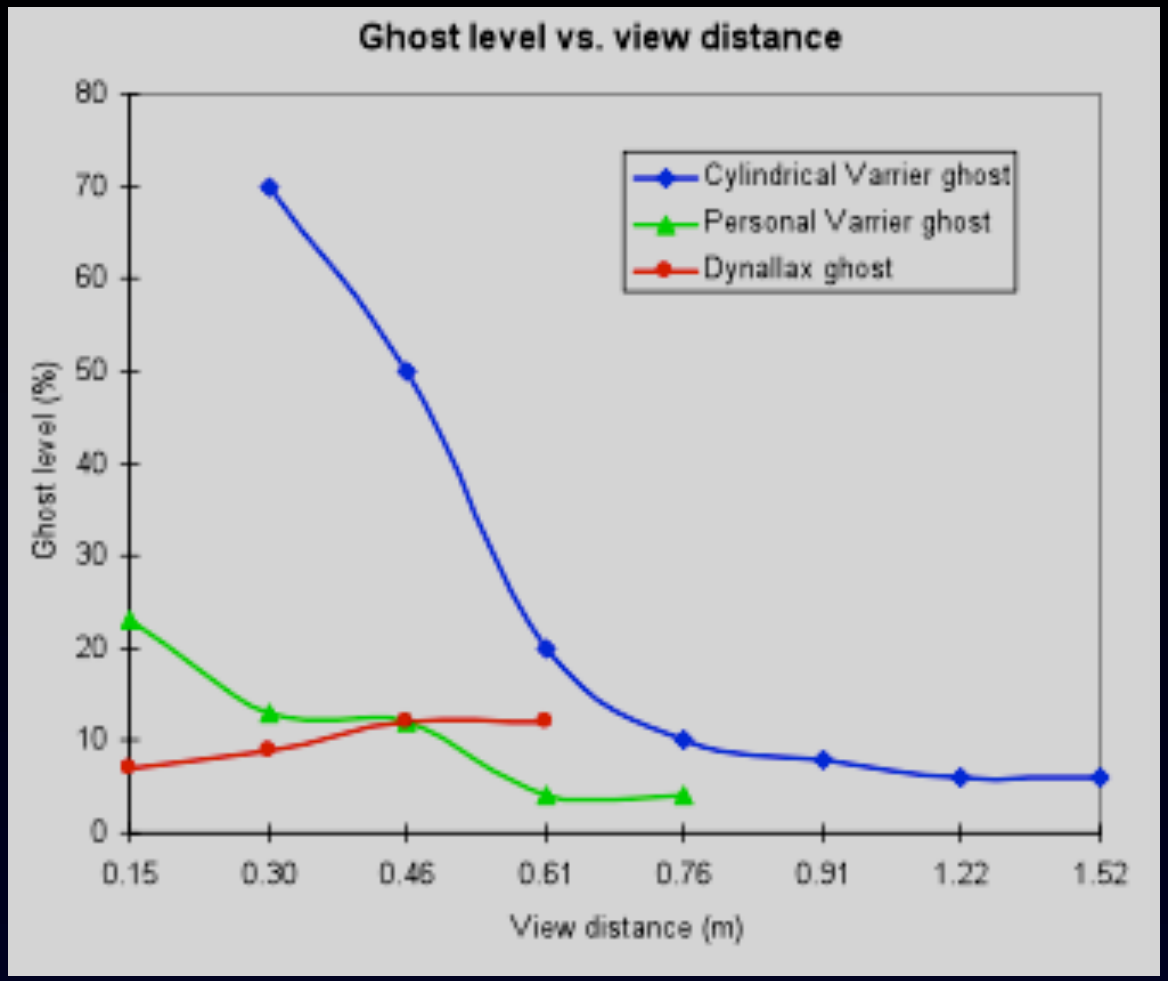
# Results

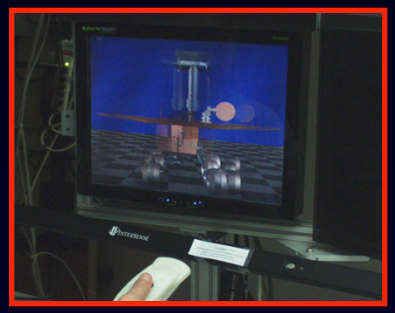
- 2D – 3D switchable
- Extended optimal view distance range
- Latency sensitivity reduced
- 2 independent tracked viewers

# 2D – 3D switchable and mixed-mode

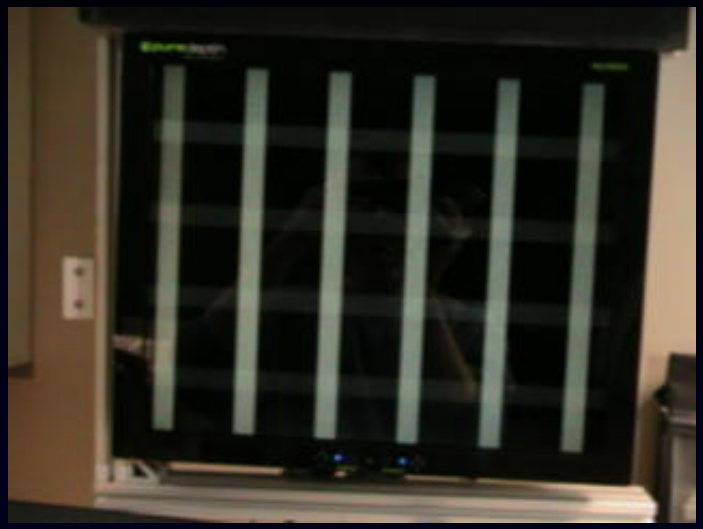


# View distance control

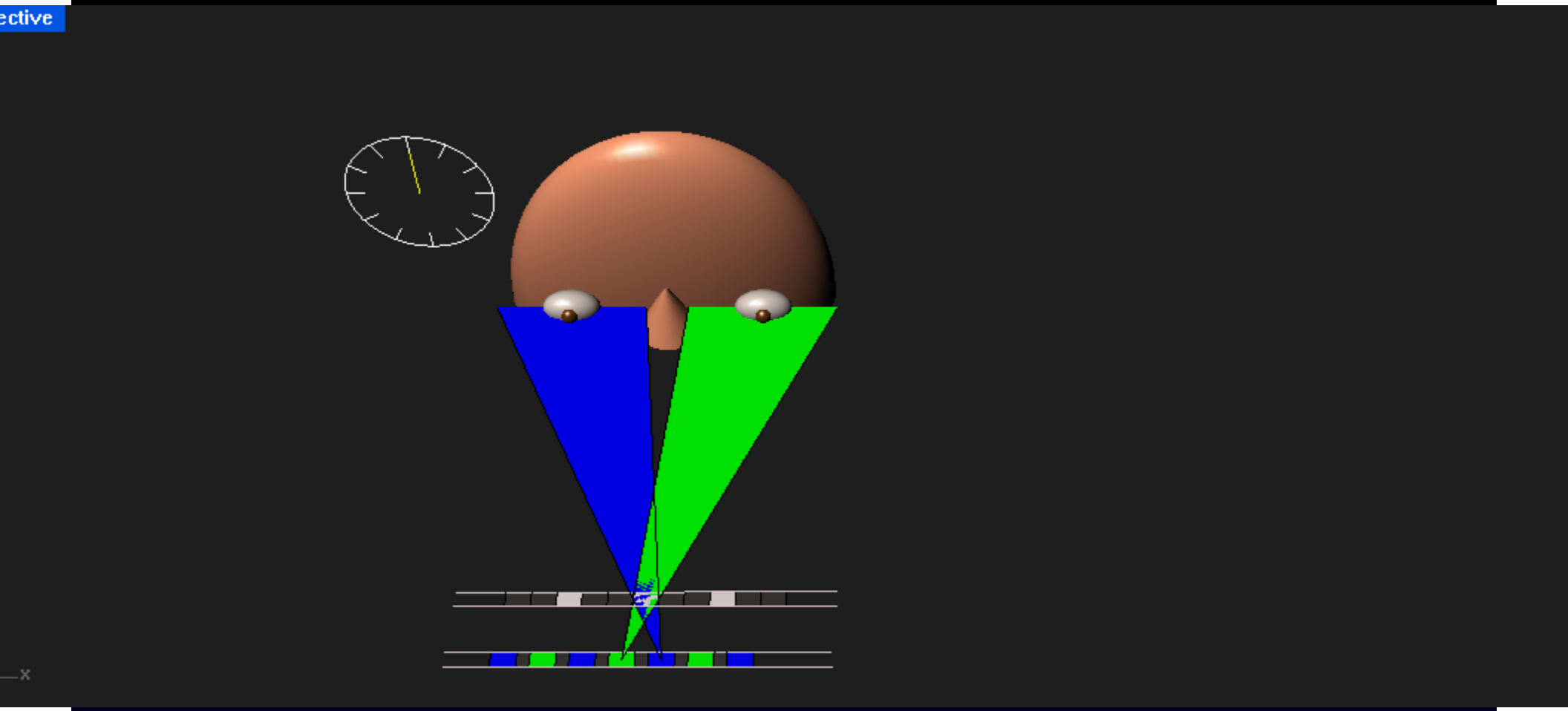




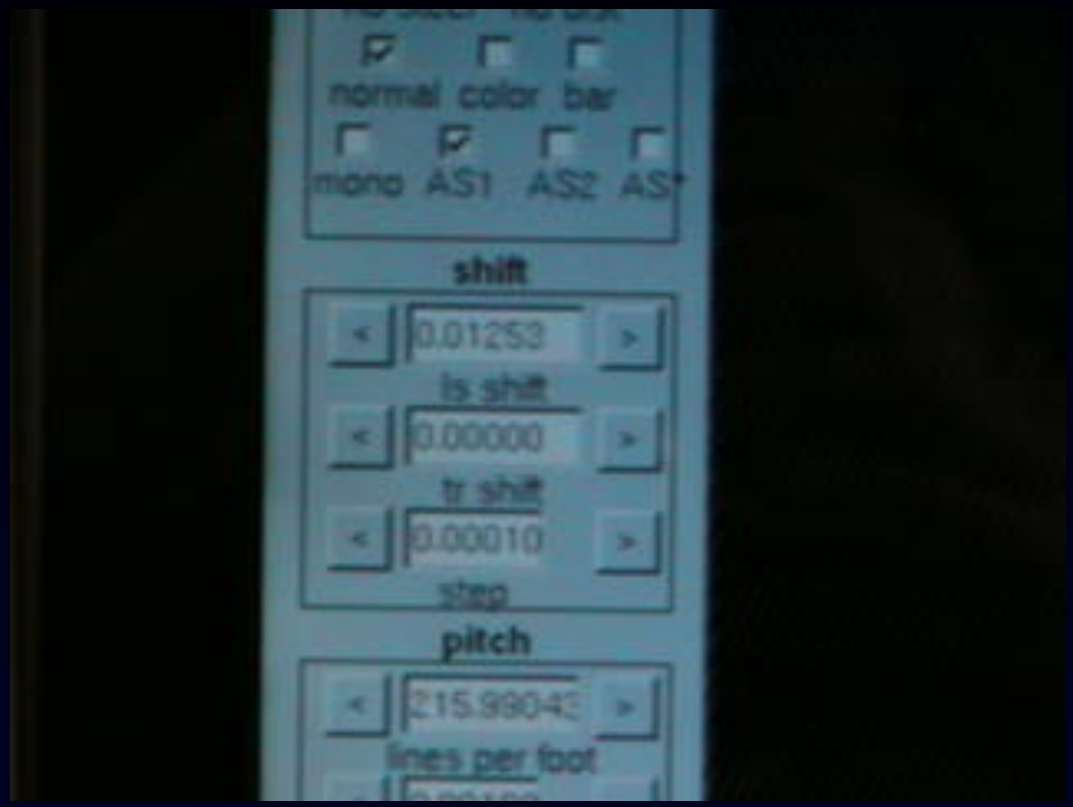
# View distance control continued

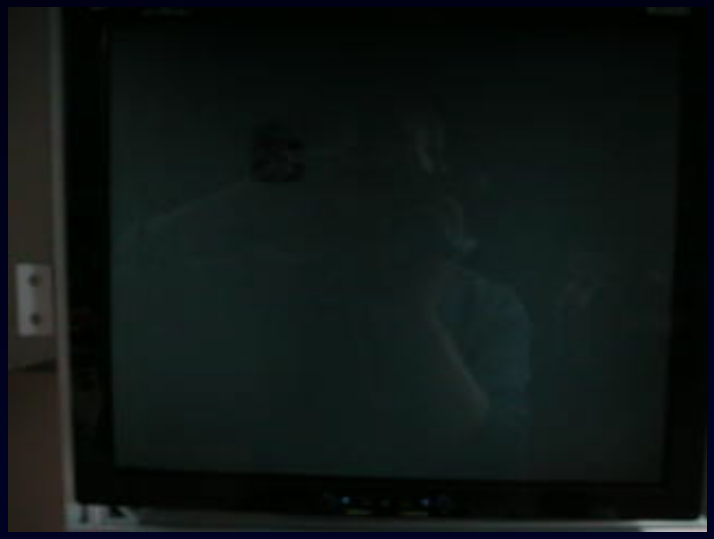


# Rapid steering

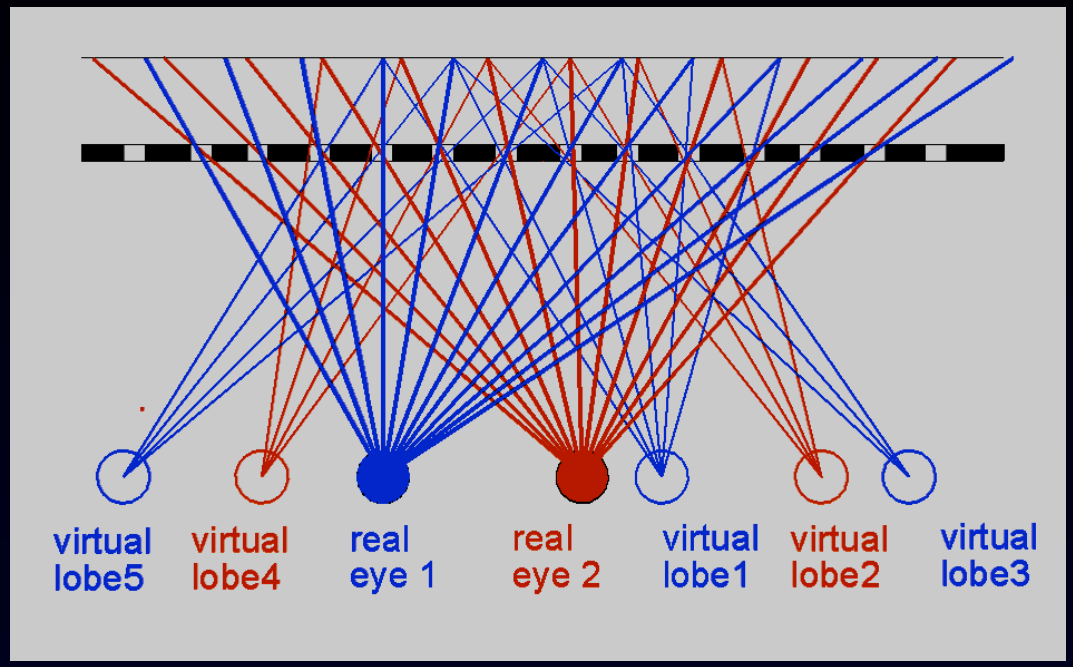


# Rapid steering continued

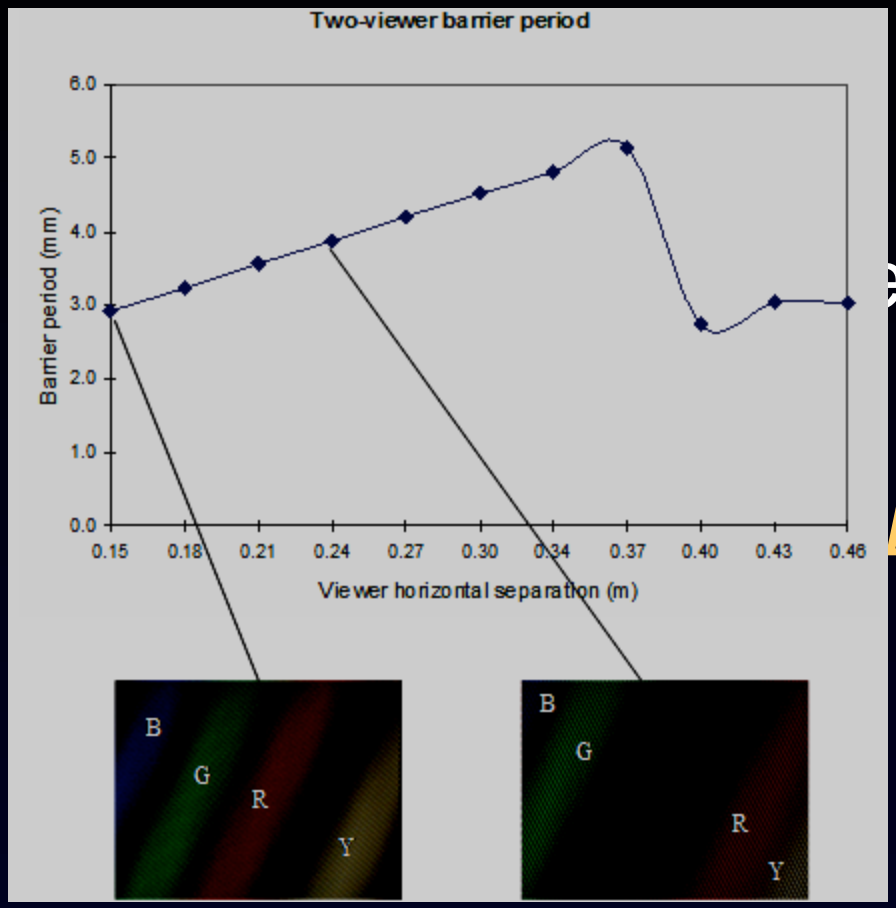




# Repetition of virtual lobes



# N viewers: minimization algorithm




$$E_{i,j} = | e - d_{i,j} | \;;\quad d_{i,j} < e$$
$$0 \;;\quad d_{i,j} >= e$$

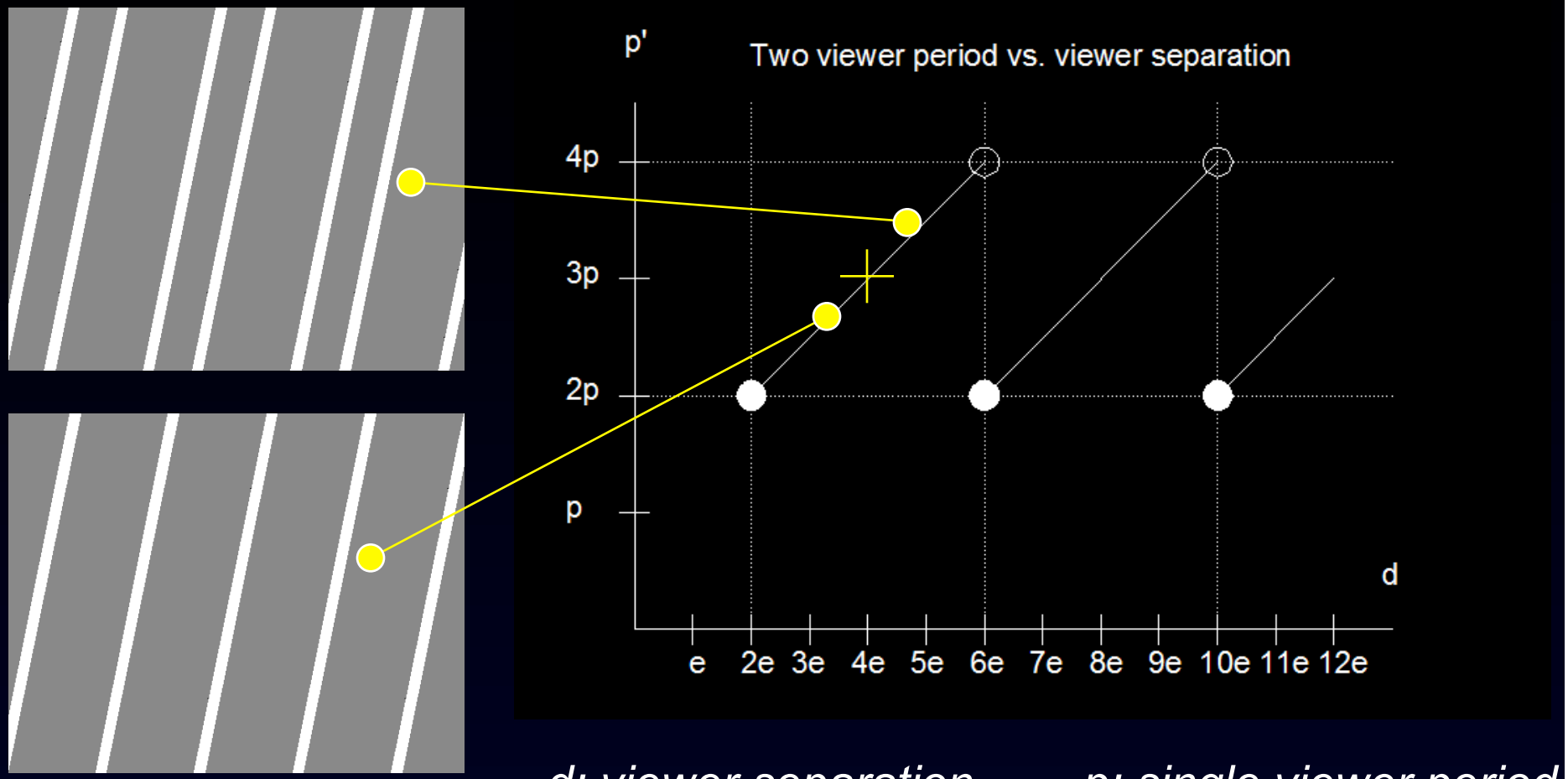
$$E_{total} = \sum_{i,j} \sum E_{i,j}$$

*E: conflict energy*

*e: interocular distance*

*d: viewer separation*

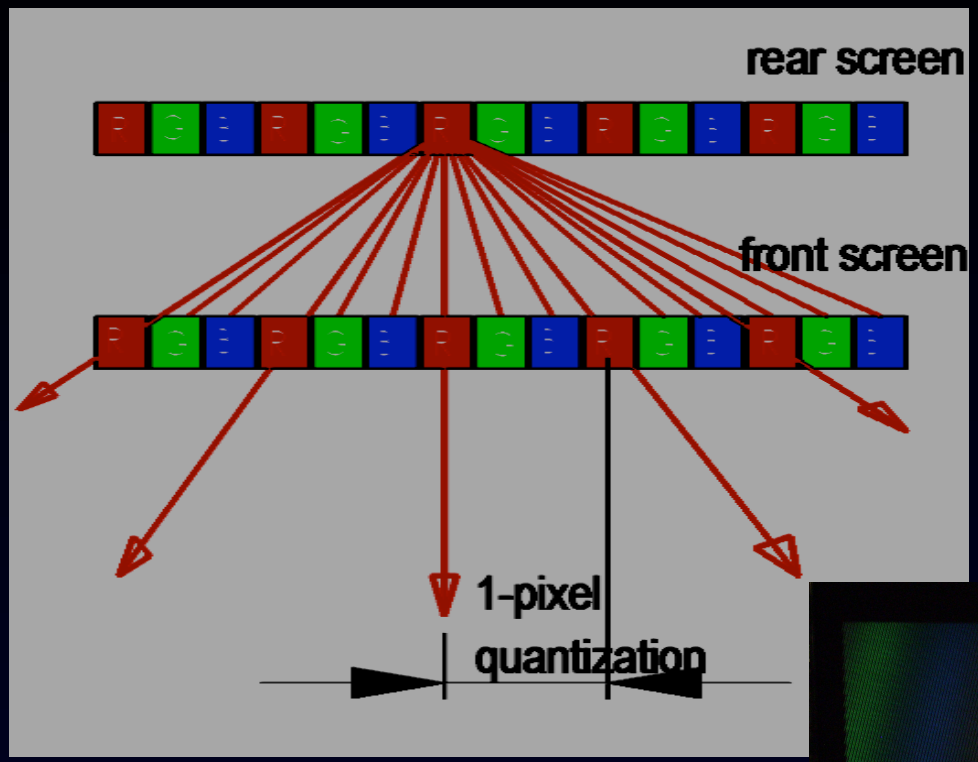
# Two viewers: special case

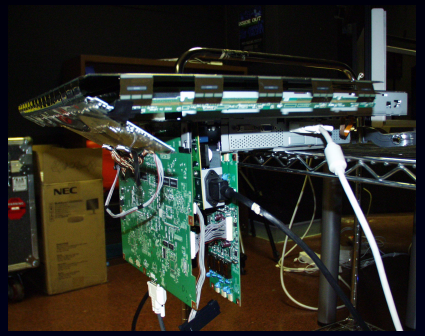


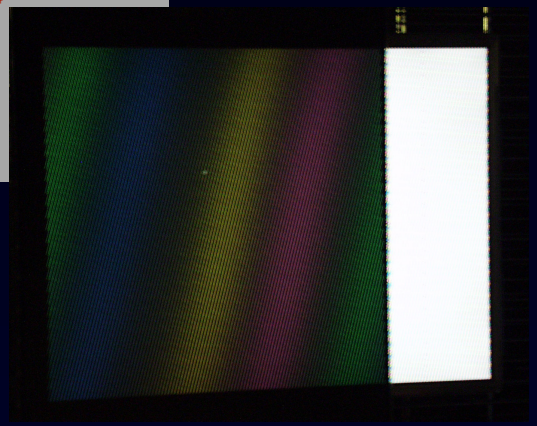

*d: viewer separation* *p: single viewer period*

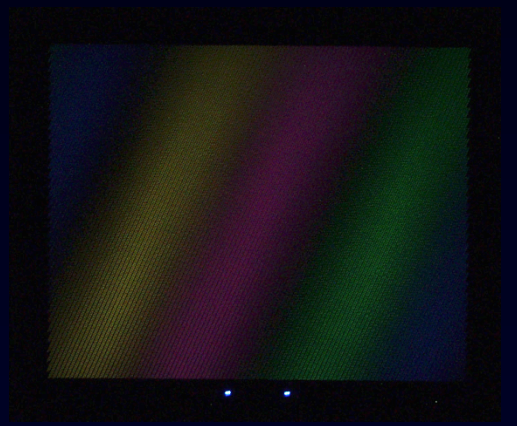
*e: interocular distance* *p': two viewer period*

# Color front barrier: pixel quantization









# Contributions

- 2D – 3D switchability
- Extended optimal view distance range
- Latency sensitivity reduced
- Two independent tracked viewers
- Experiments with custom display architecture

Single-user mode qualifies as VR, while two -user mode has practical limitations

# To do list

- More resolution
- Bigger
- Brighter
- Clear sub-pixel front barrier
- 2 viewer mode refinement
- Tiled engineering

# Acknowledgment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