Dangerous Idea: box
Safe Idea: cylinder
or
Wand = User Interface

Harry Potter's digital wand

Larry Rudolph

Good use for Boxes

- A box is a good shape for storage
  - people
  - shoes
  - circuit boards

Poor use for boxes

- hard to hold a box
- fingers like to curl

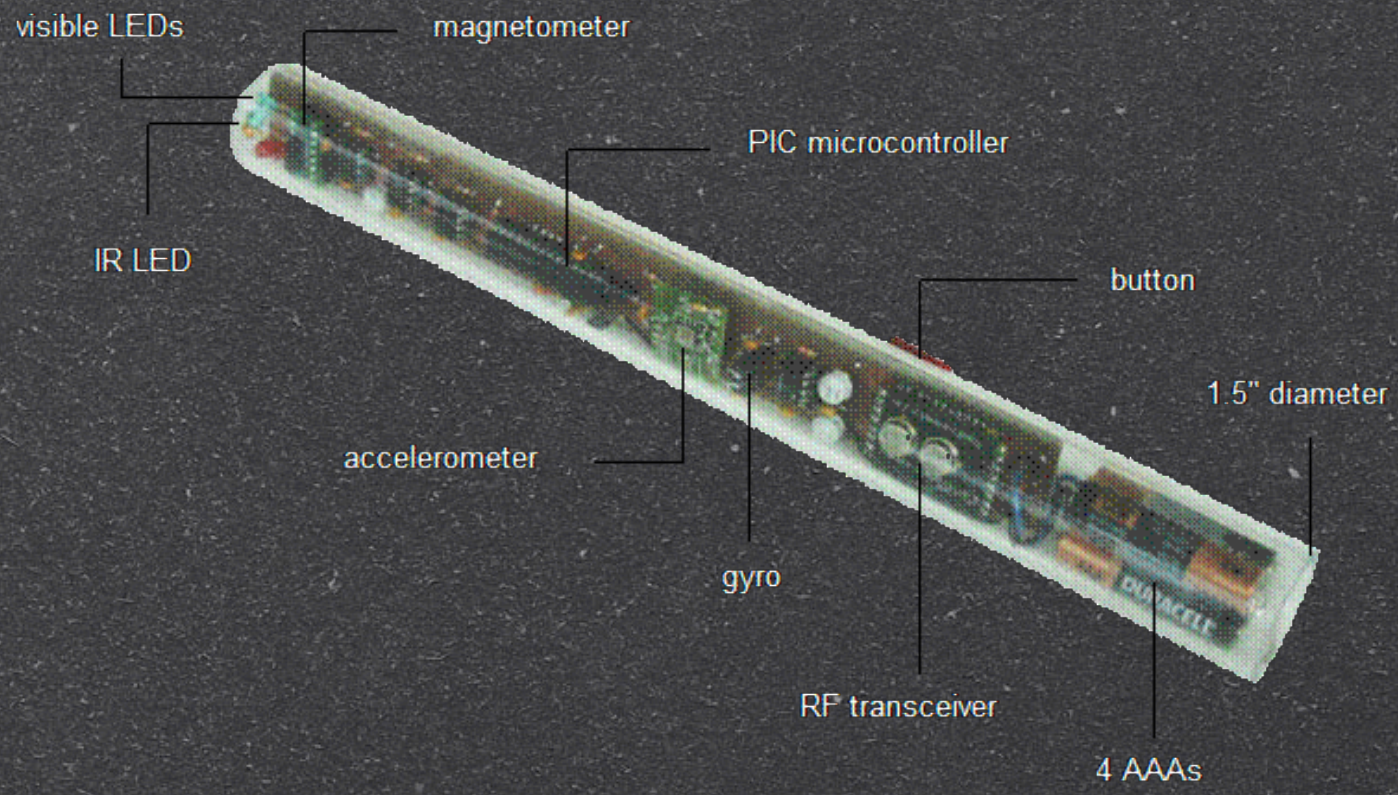
Mobile Device Form

- Wand, stick, staff, cylinder
  - Gandalf’s Staff
  - Harry Potter’s Wand
  - James Bond’s Pen

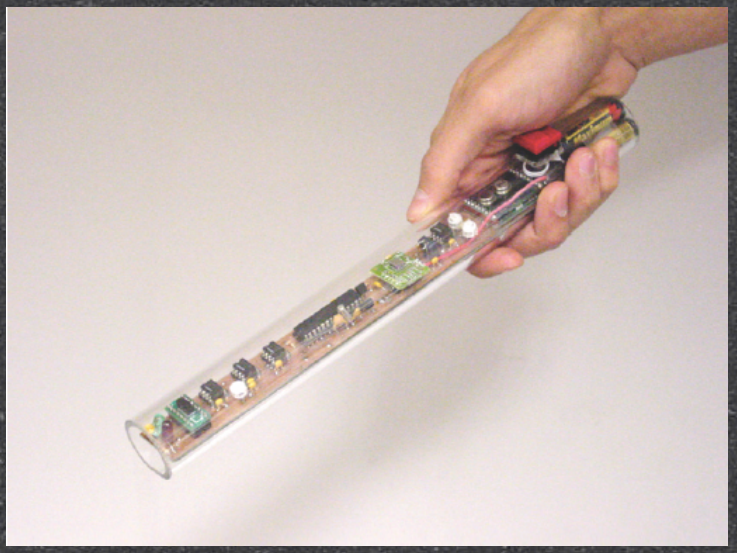
The computer science of Harry's wand

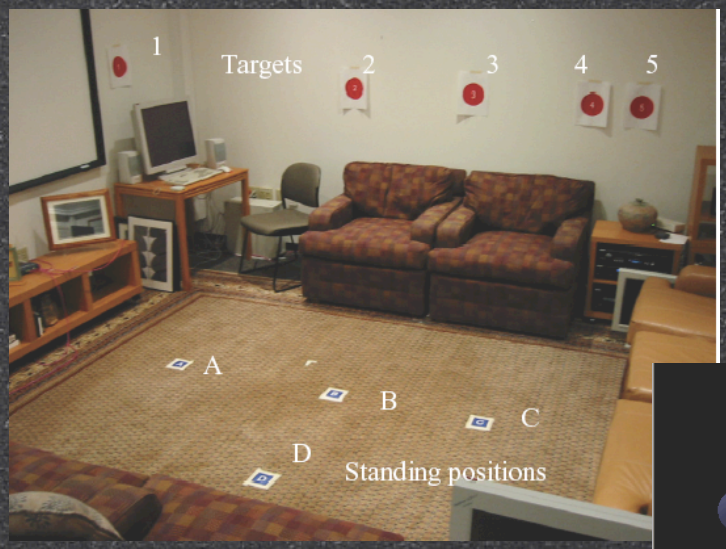
- Point it at something, then shout some Latin-like command
  - Location, Object, Speech recognition
    - camera, microphone, ghost sensors
- Torch, Zapping, Images
  - lasers and electricity

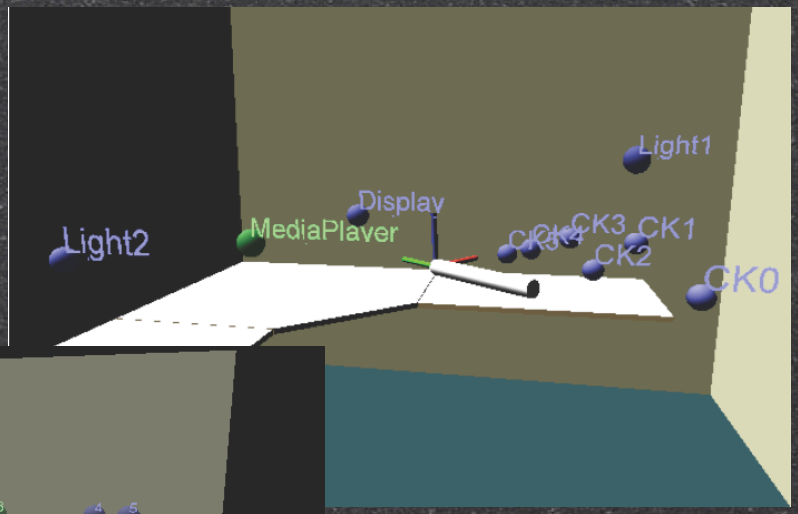
XWand

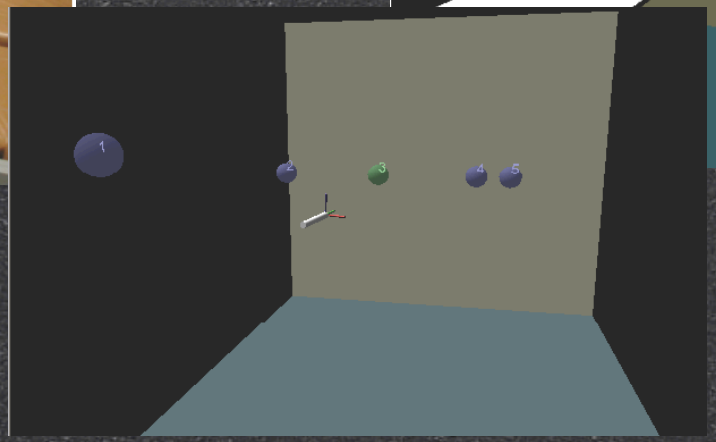


- Andrew Wilson (Microsoft Research)
- UI for Intelligent Spaces




1
Targets
2
3
4
5
A
B
C
D
Standing positions


Light1
Display
Light2
MediaPlayer
CK3
CK1
CK2
CK0



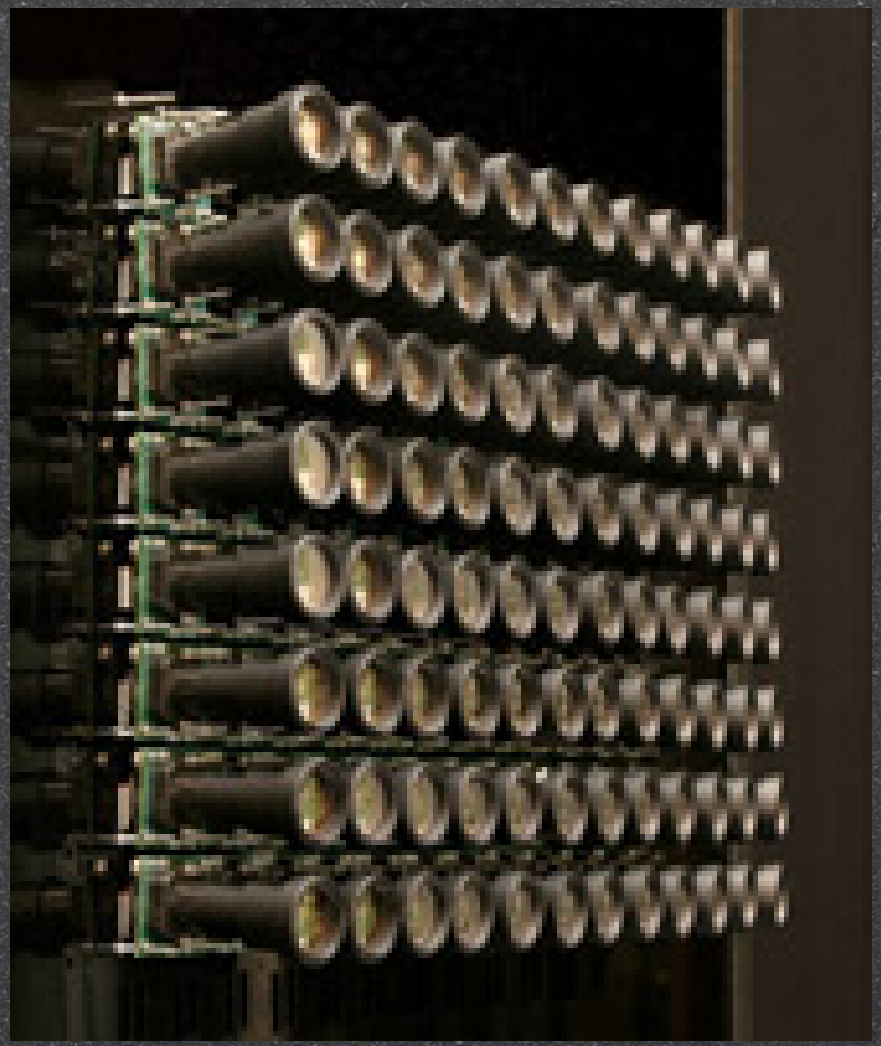
Critique of XWand

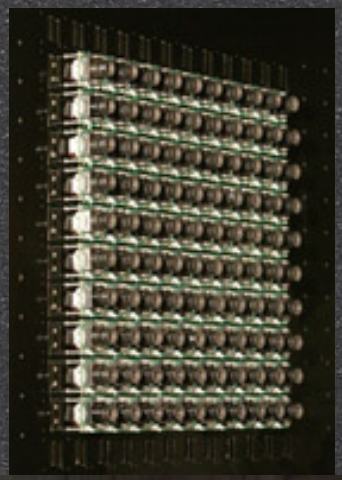
- Need to be in an immersive, instrumented space
- Does not work everywhere, e.g. on trains such as the “hogwarts express”
- Why not simply use a hand with better camera tracking algorithms?

Bring your own environment

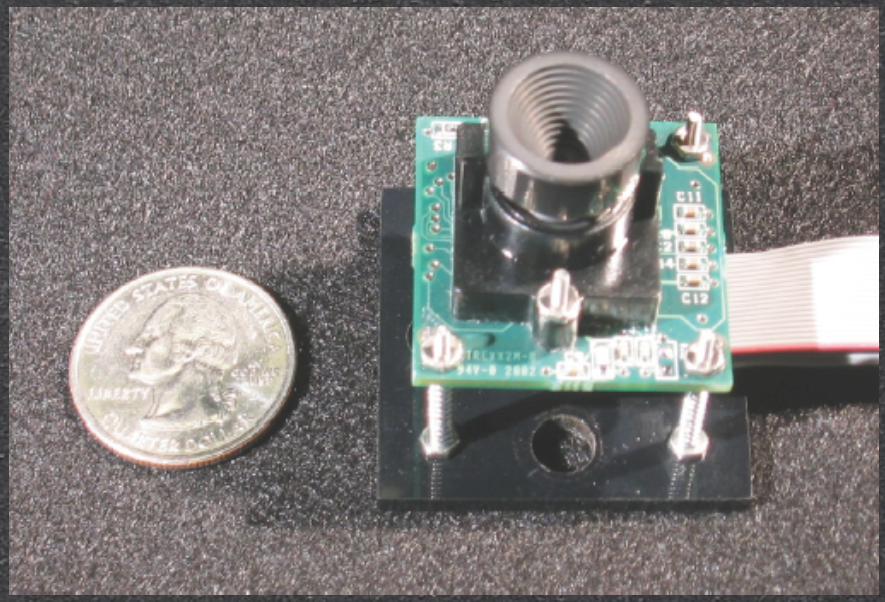
- Environment should have lots of
  - input sensors
  - output actuators
- Cylinders are nice form factors for arrays of sensors & actuators

Camera Arrays

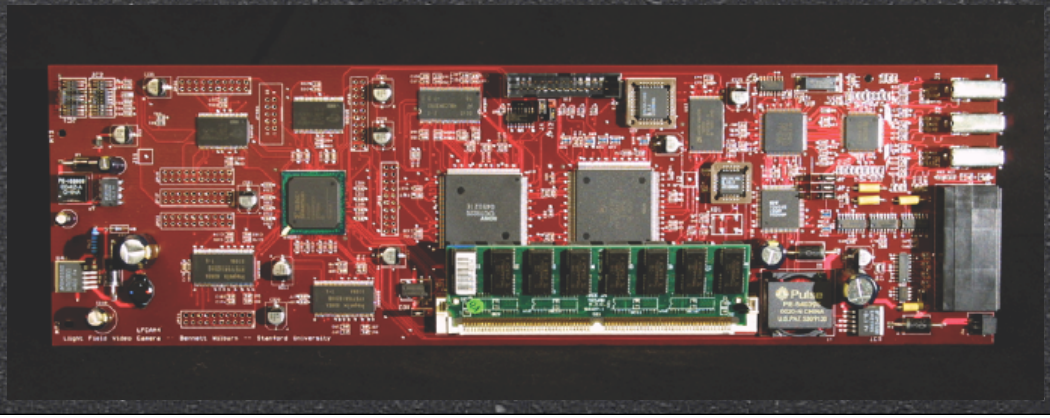




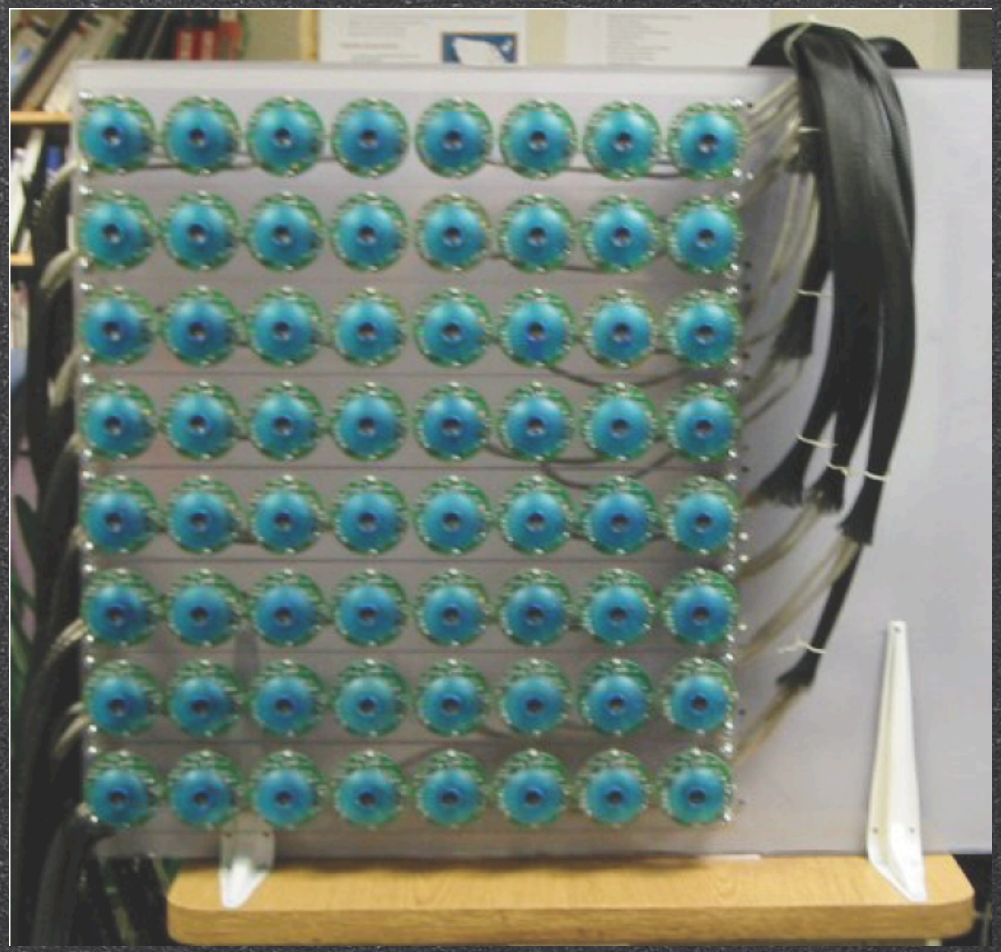
Camera Array



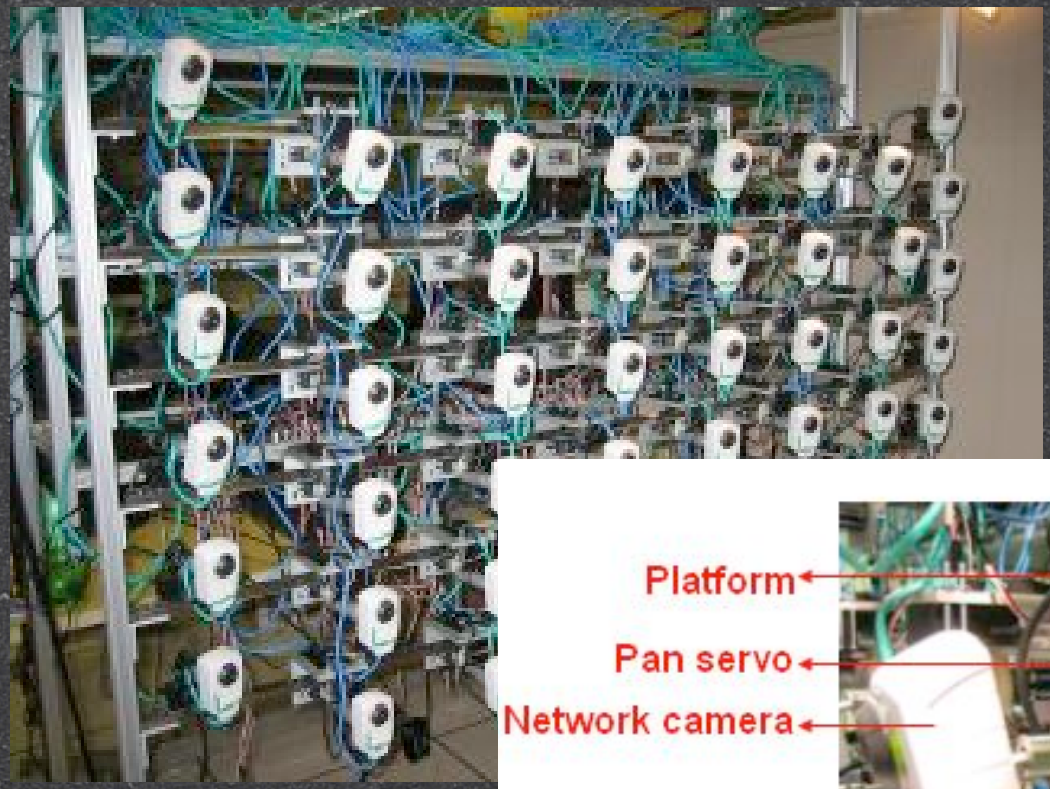
- Camera's are small, say 1 square inch
  - a dozen per foot
- Processing: if we wait .. will be ok

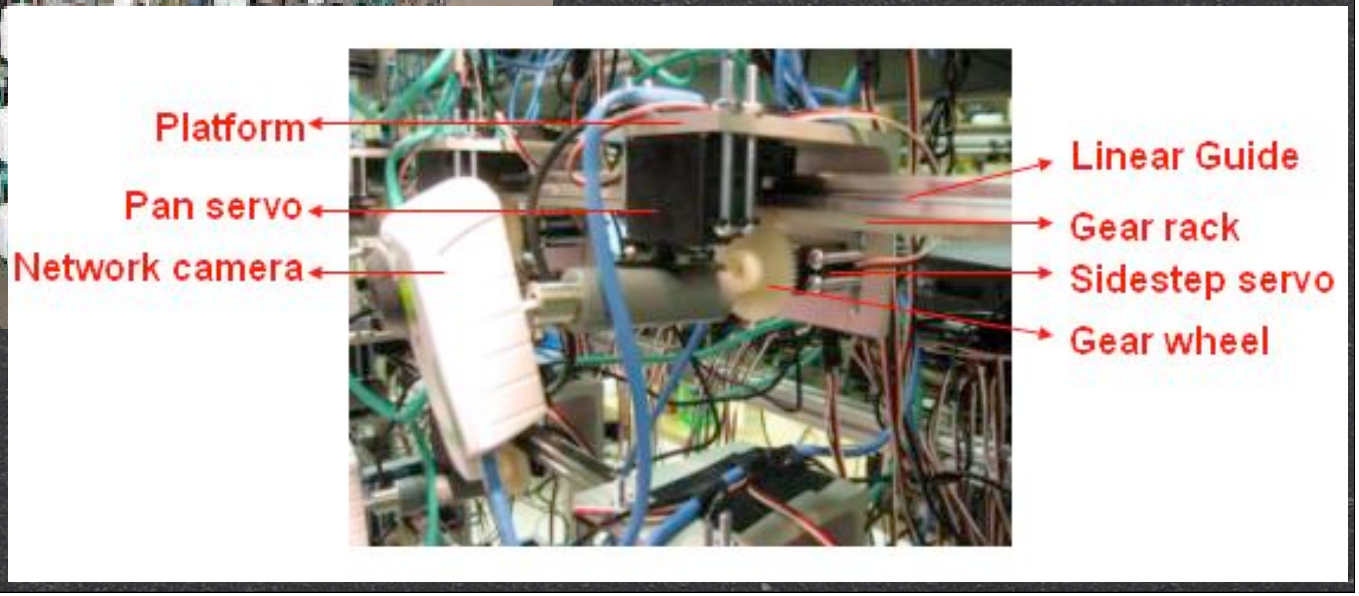


We have (had) one too



Self-reconfigurable Camera Array



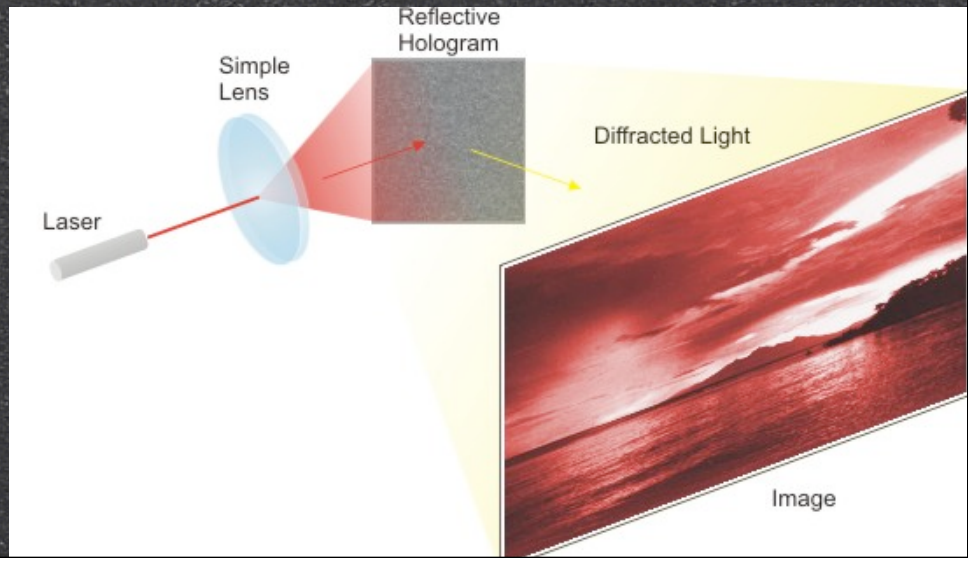


Array of projectors

- Need small ones
- Need ones with low power
- Lasers!

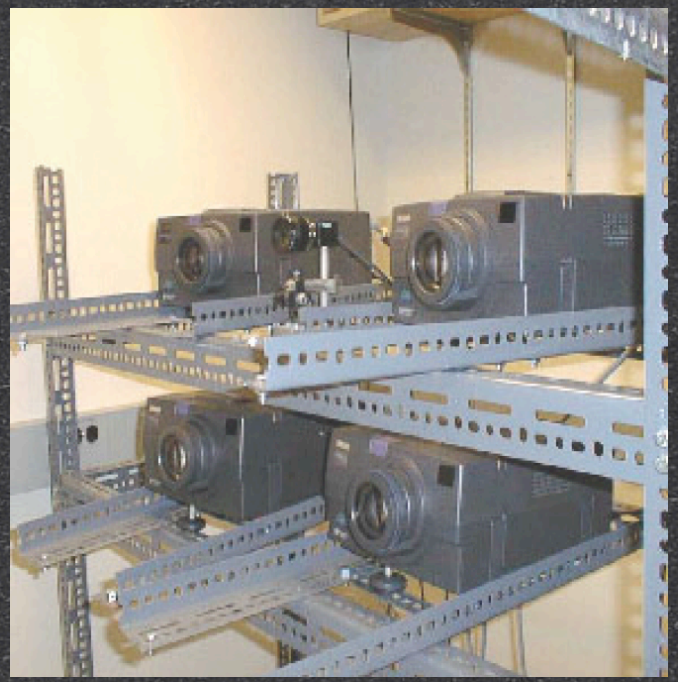
Display Holograms

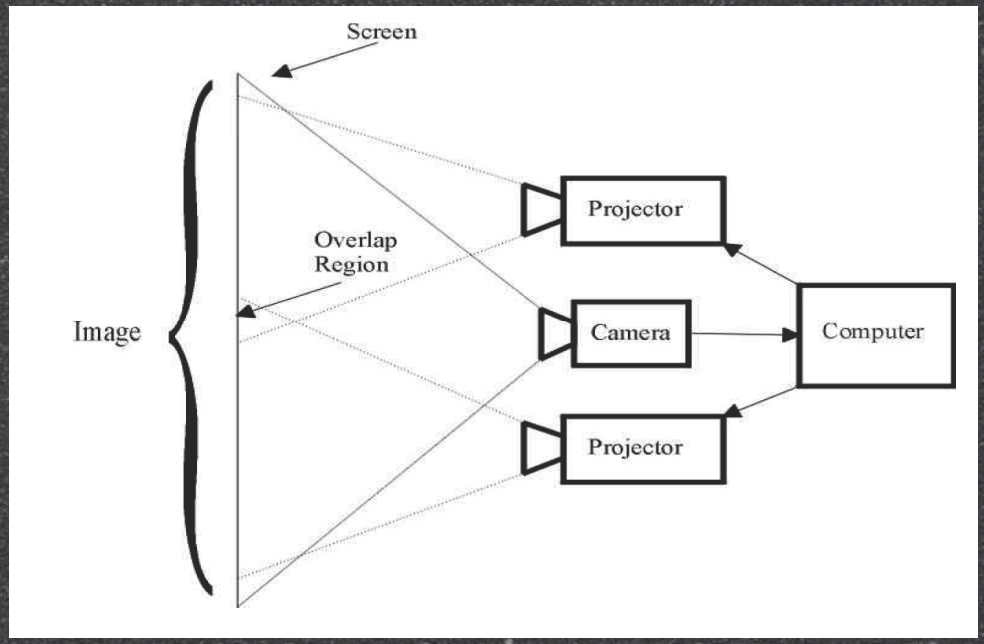
- Blue-Optics (start up)
- laser, lens, hologram on chip
- key insight, reduce noise variation, not noise
- array output?

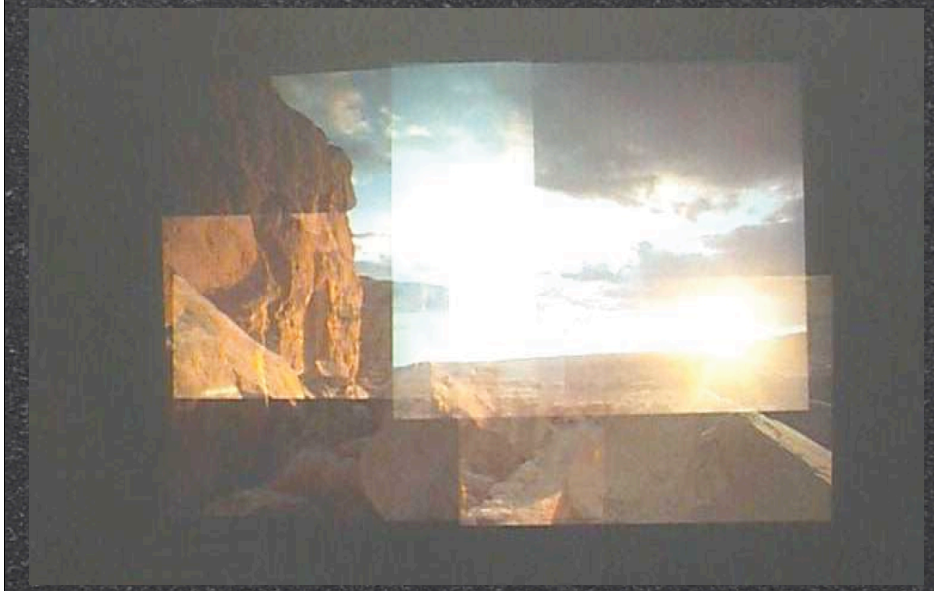


Scalable self-calibrating display technology for seamless large-scale displays

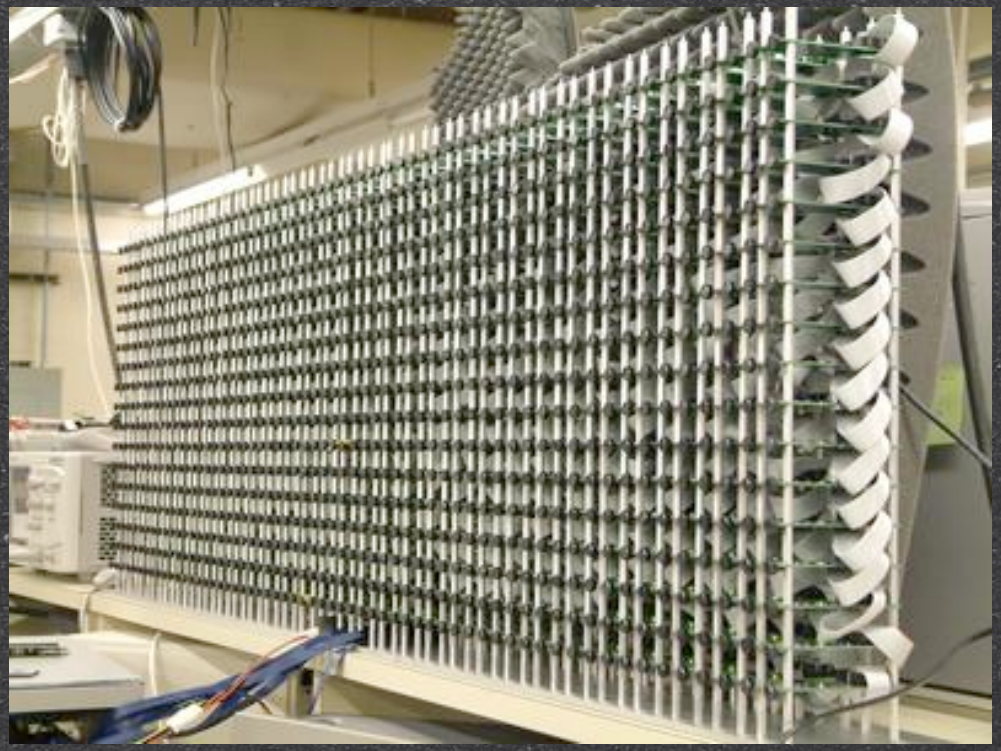
- MIT thesis by Rajeev Surati (under TK)
- Projector array
- Self-calibration via camera




Screen
Image
Overlap
Region
Projector
Camera
Projector
Computer



Microphone Array



- < camera
- CSAIL & others
- Need fixed, large spacing
- Virtual microphone(s) placed anywhere

Speaker Array

- Virtual sound placed anywhere
- Many for personal use
  - home theater
- Yamaha (CES'05)
  - 42 speakers

Laser Array

- LIDAR (laser array accurately detect objects in front of autonomous car)
- Laser's within all pointing forward. Mirror defects then outward -- hologram Lens have them all forward focused
- Parallel communication
  - My favorite: two ships passing at sea

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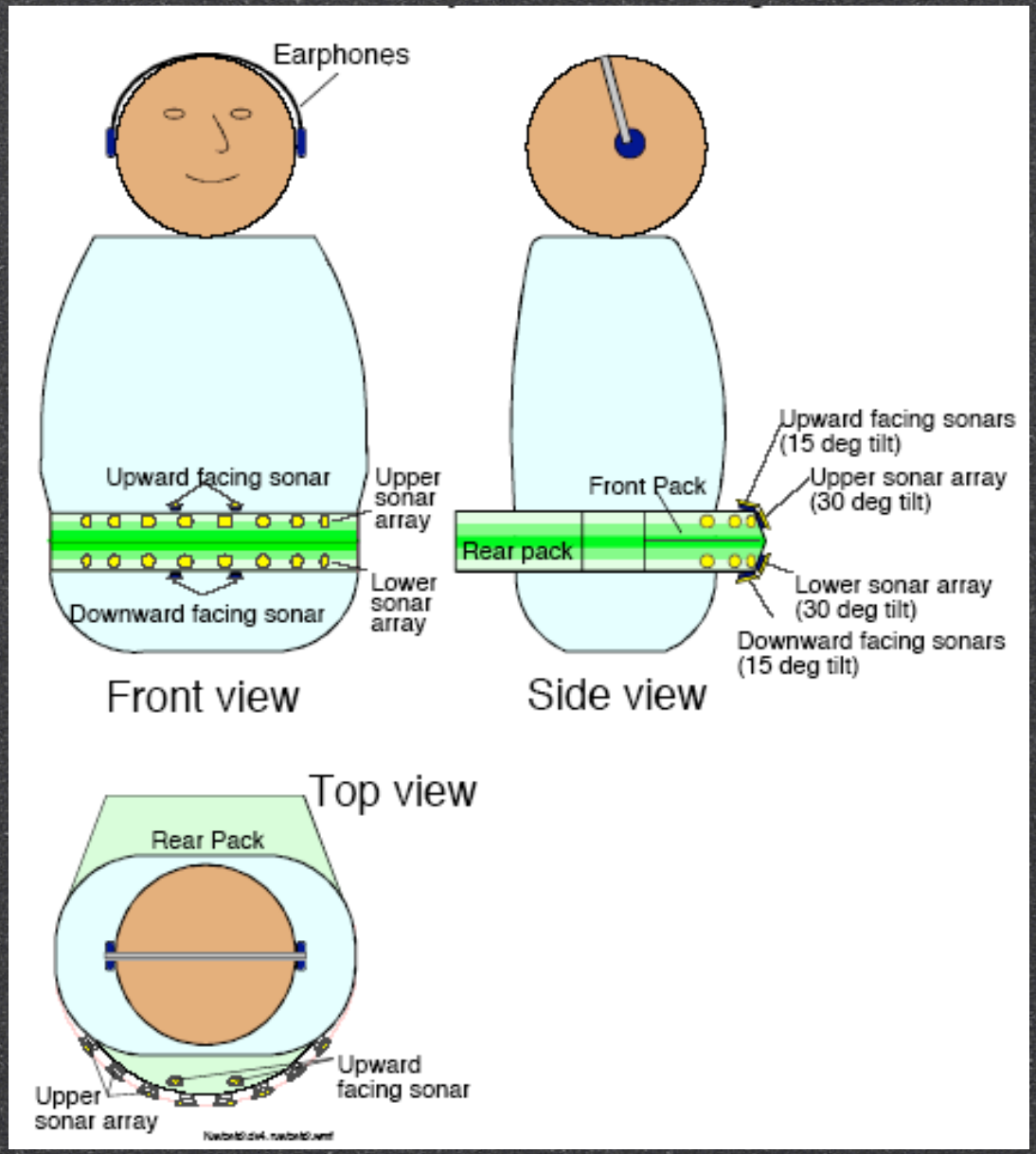
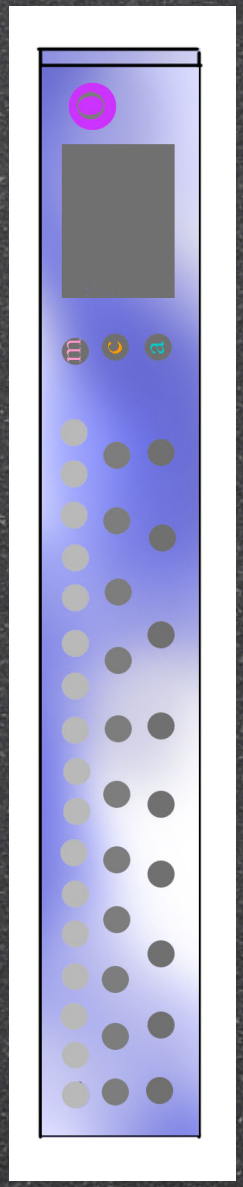
Sonar Array

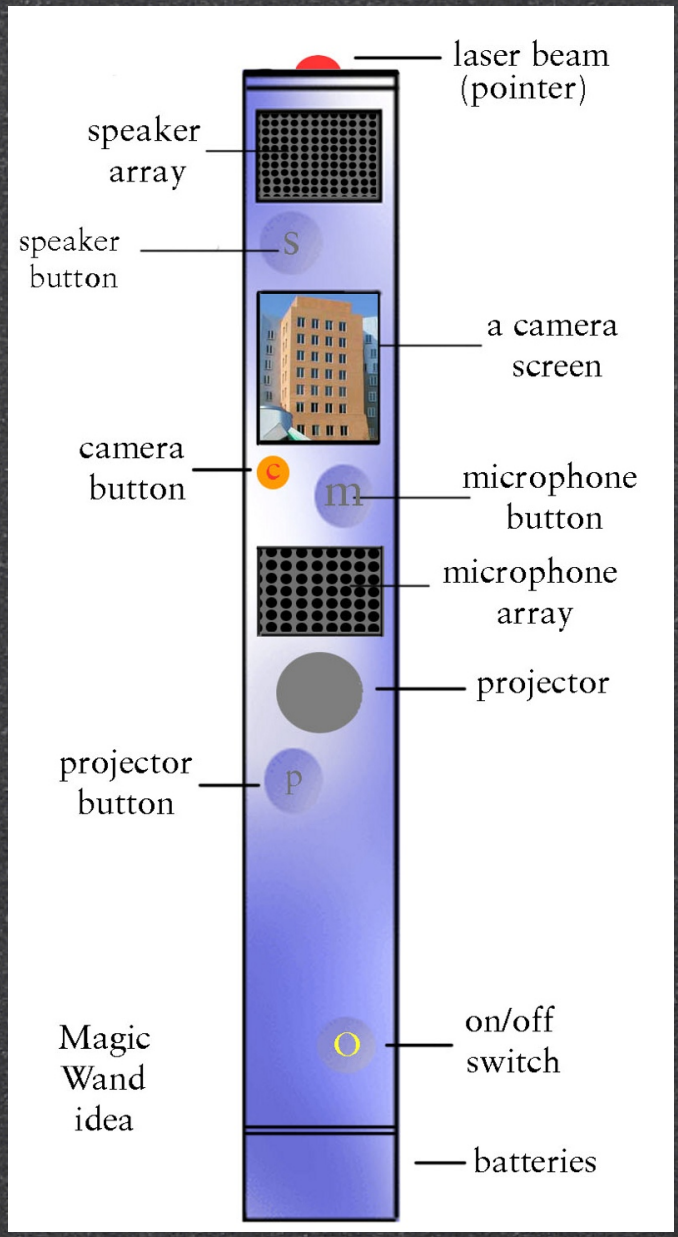
- Multi-sensor travel aid for the blind (Borenstein)

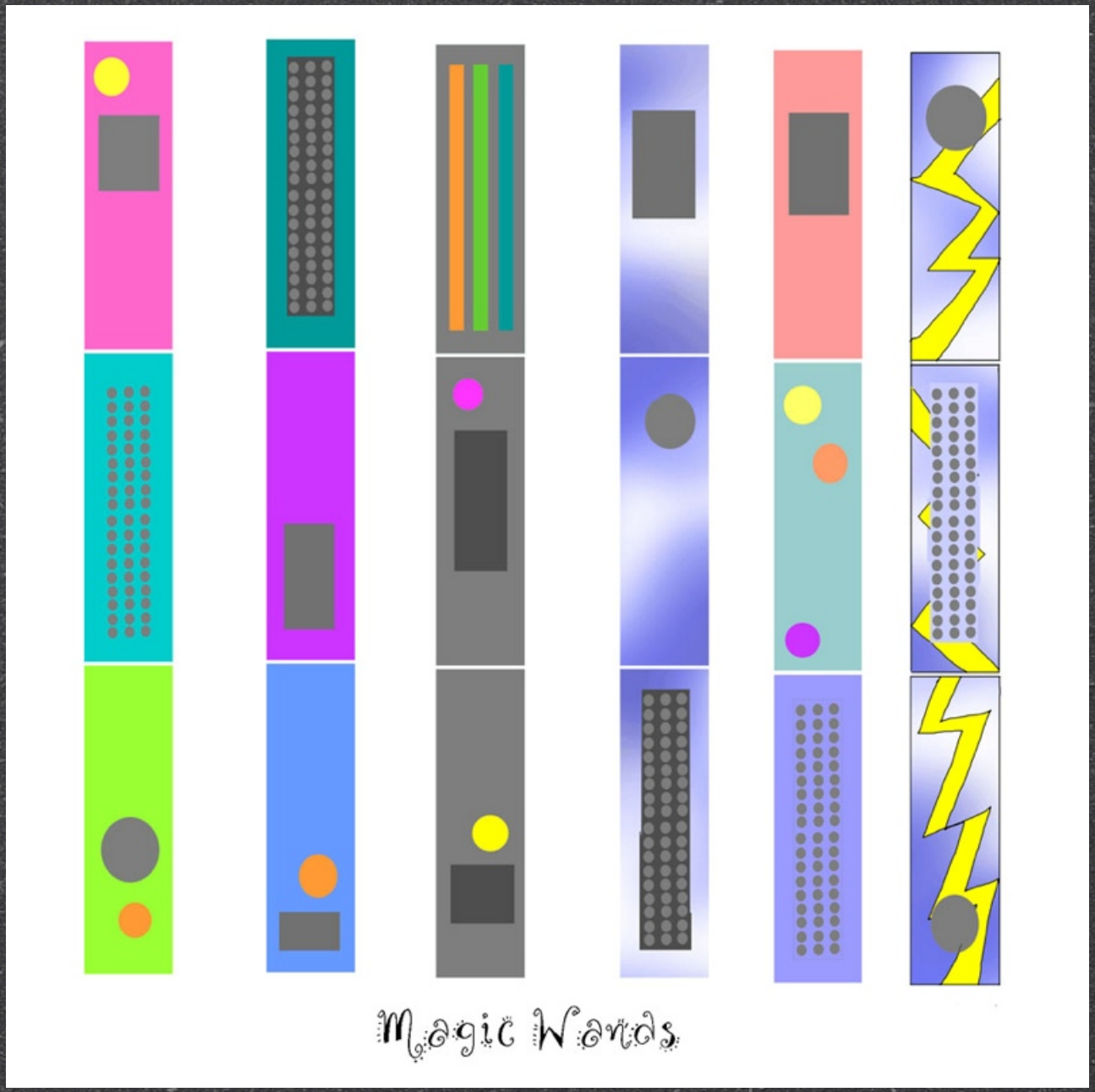


Put it all together



- Sally O'Lee's visualization initial view




Magic Wands

If I had a cylinder, I'd ...

- Talk long distances wirelessly
- Burn through walls with laser's
- Shock my enemies with static elect.
- Wave it around in a field to recharge
- Play DDR by opening it up & lay flat for 2-d array

Dimensions

- Size:
  - Pen (is there enough spread?)
  - Wand (will it get too hot?)
  - Staff (my choice; interleaved spiral arrays)

Discussion

- Please attack my 1/2 baked proposal
- Would like to form study group
  - array sizes (optimal numbers)
  - processing needs
  - heat & power requirements
  - can we build a prototype?
- Maybe transform mouses into mice?

tk's comments

- what about keyboard or buttons
- what about handwriting
- he wants a pen with ink, phone, buttons.