Light Fields on the Chea

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6.838 Final Project Presentation

Previous Work

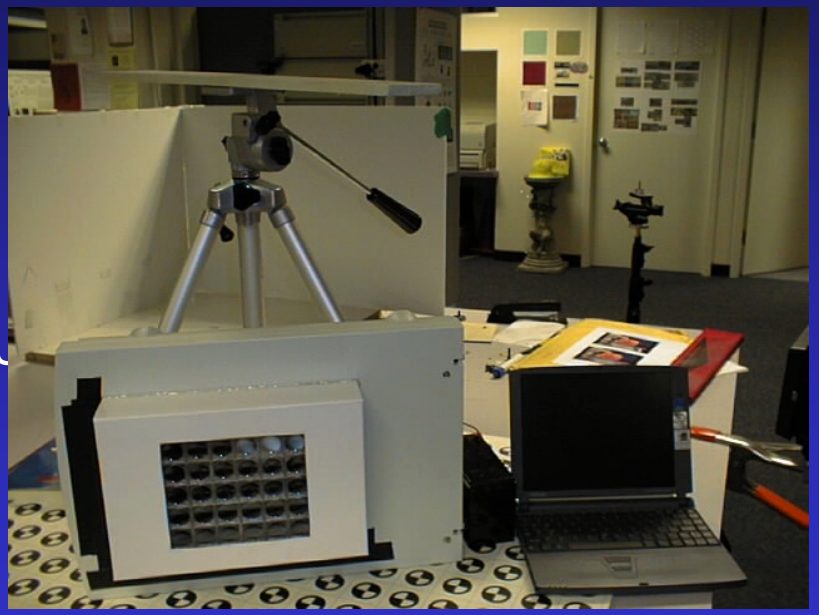
- Levoy & Hanrahan, Light-Field Rendering, SIGGRAPH 1995
- Gortler, Grzeszczuk, Szeliski & Cohen, The Lumigraph, SIGGRAPH 1995
- Isaksen, McMillan, Gortler, Dynamically Reparameterized Light Fields

Motivation

- High costs of making the camera system is a barrier to entry
- Want to make it cheaper

The Device

- UMAX 2000P Scanner ($71.95)
  - 36 bit color
  - 600 x 1200 dpi
- 6x5 Grid of 1" Bu Boxes
  - focal length 2.5
  - field of view ≈ 3°
- 12V Lead Acid Bat.



What Comes Out

After 7 min. we get
light field, but…

- Color problems
- Aspect ratio
- Radial distortion
- Parallax “problem

Color Correction

- Mount an IR filter inside CCD housing
- Auto levels correction by Photoshop
- or white balancing by Matlab
  - Calculate average value of each channel
  - Multiply values of red and green channel by a gain factor

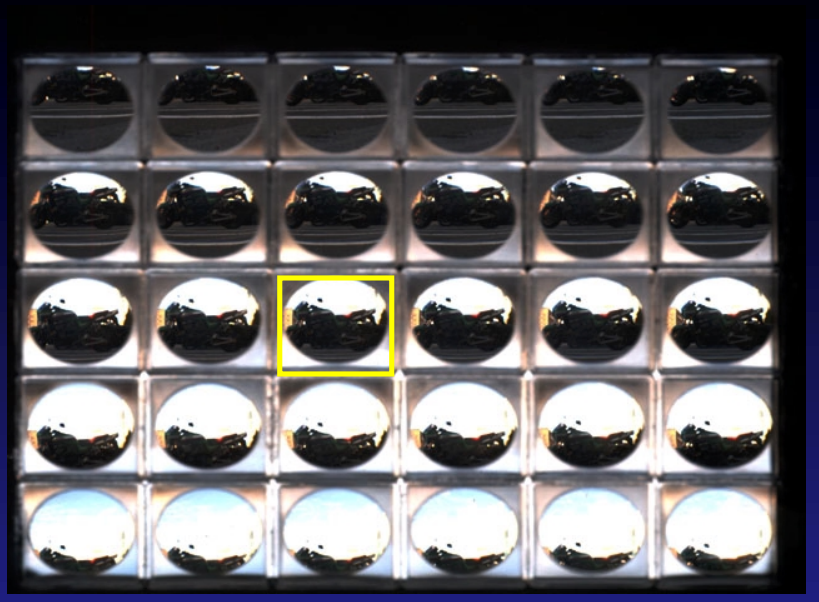
Original

After Auto Levels

≈600x520 image

Taken by Digital Camera

Before

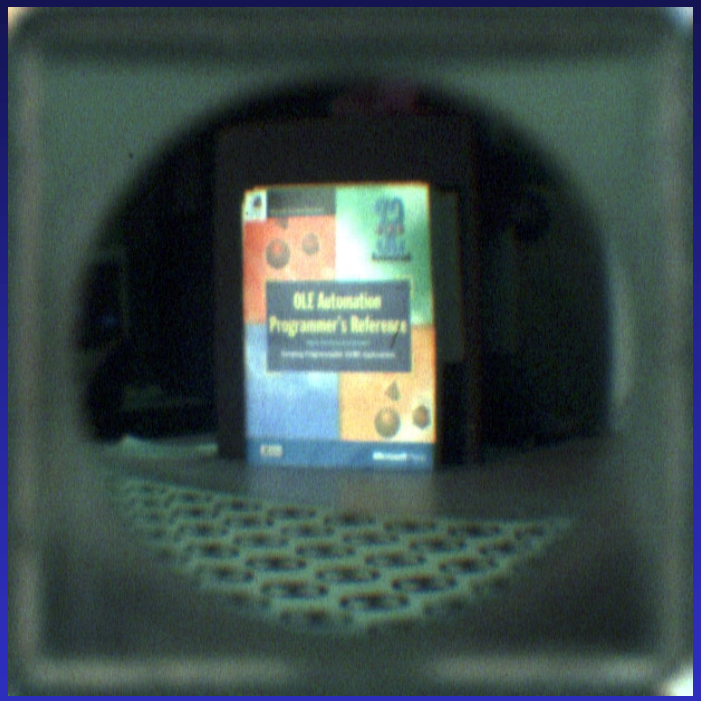


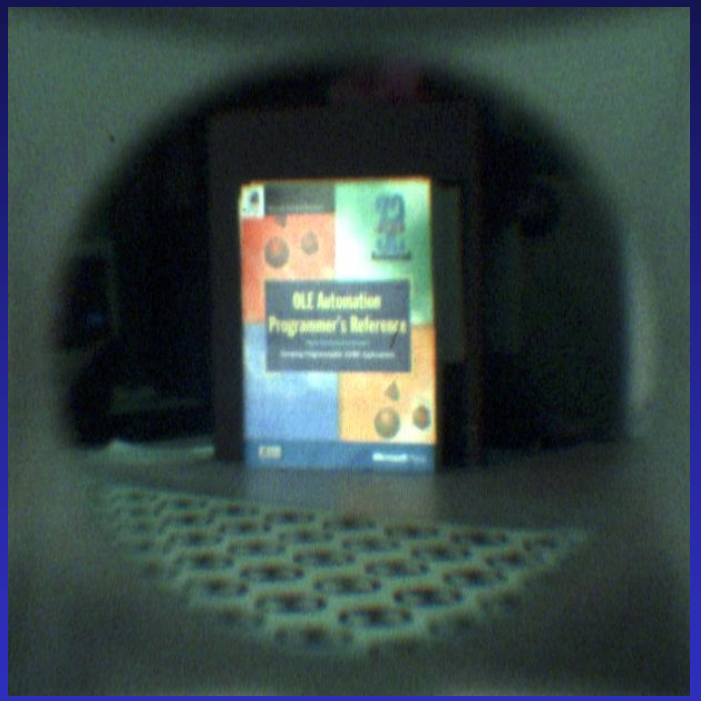
After

Just a reference

Aspect Ratio

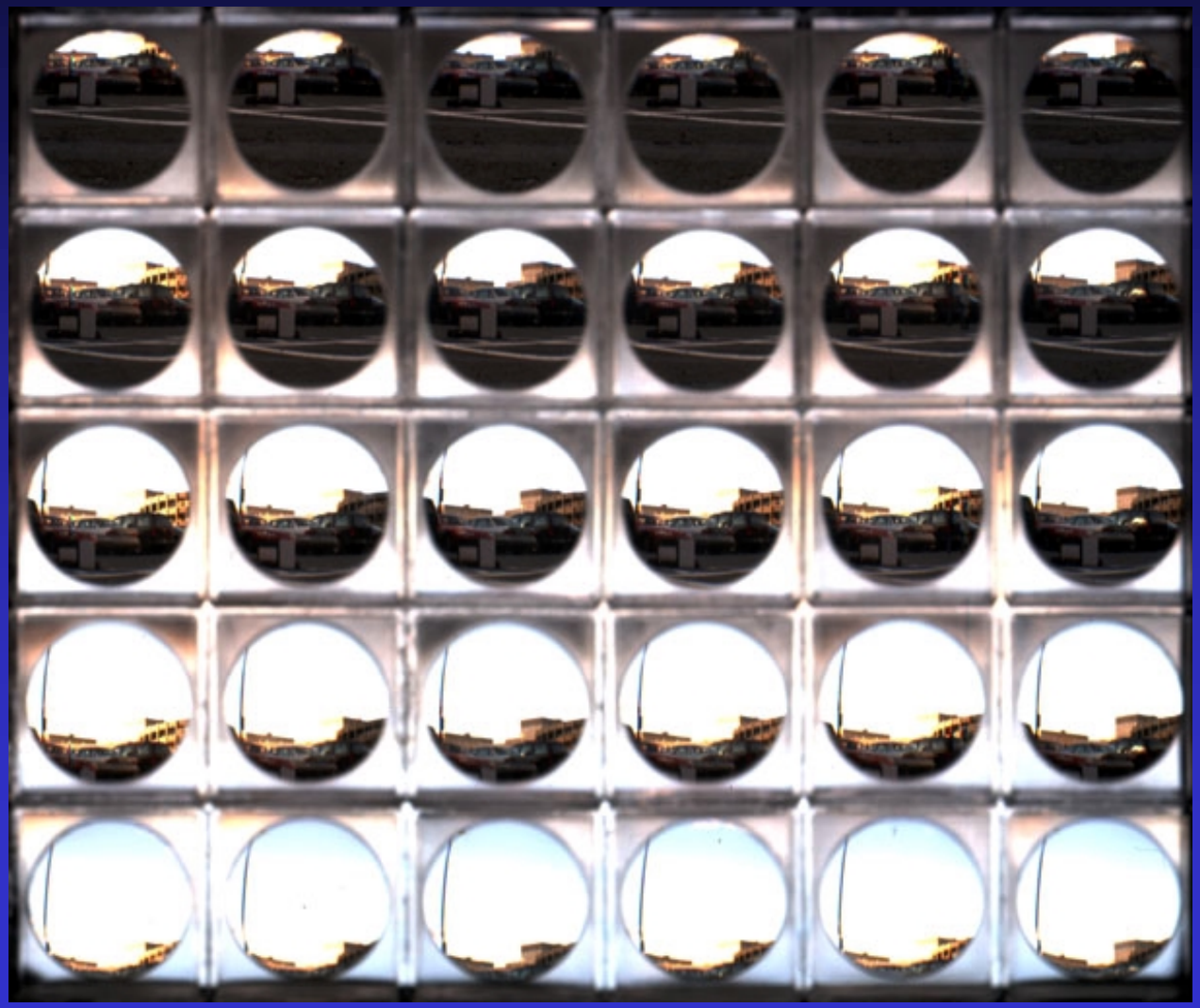
Radial Distortion



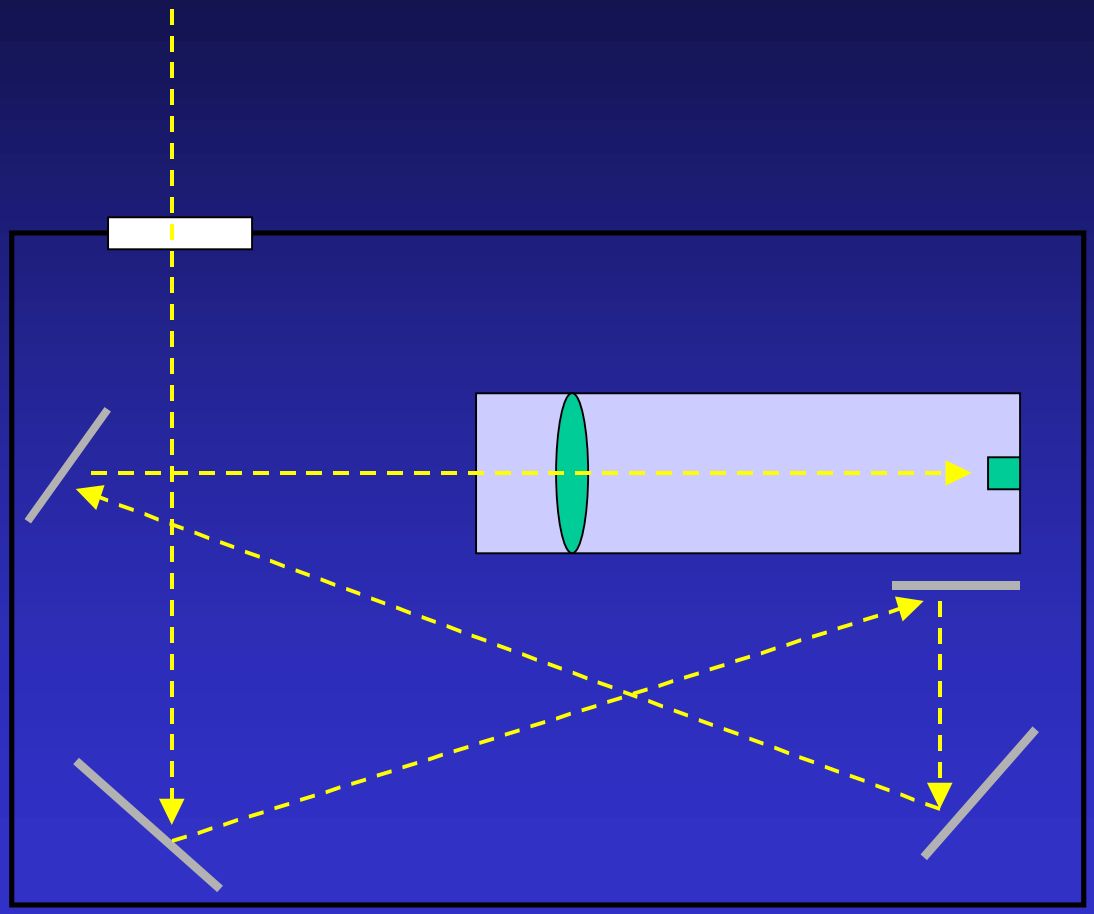


Fix using correction software

Parallax Problem



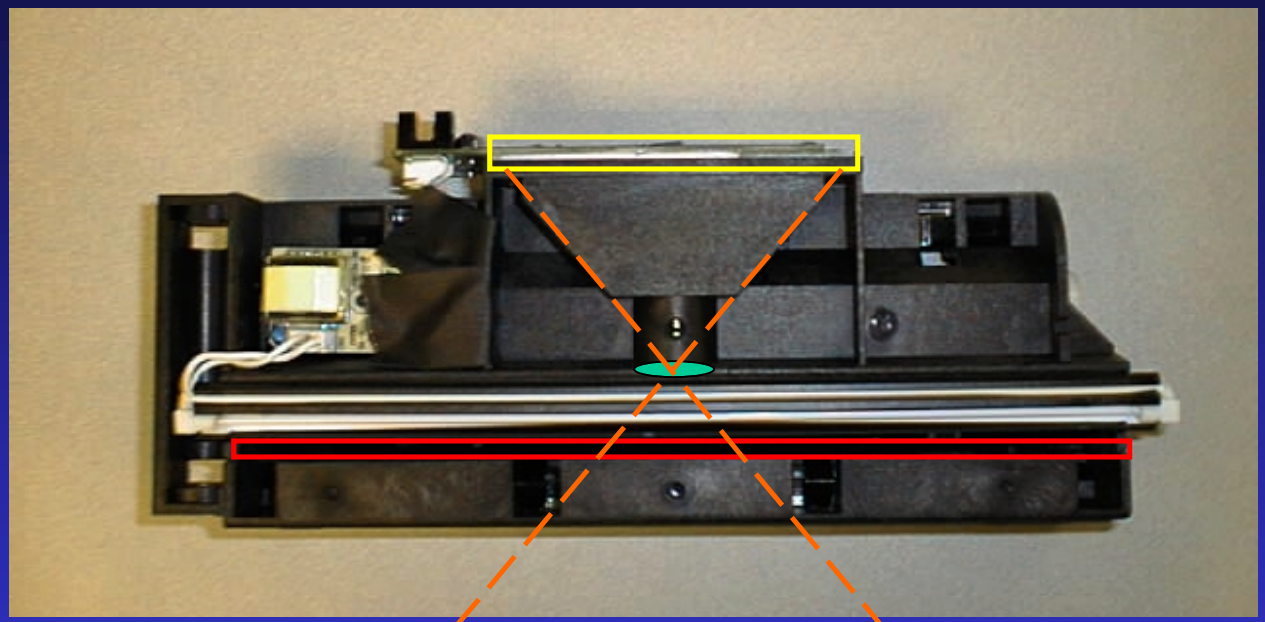
Scanner Optics



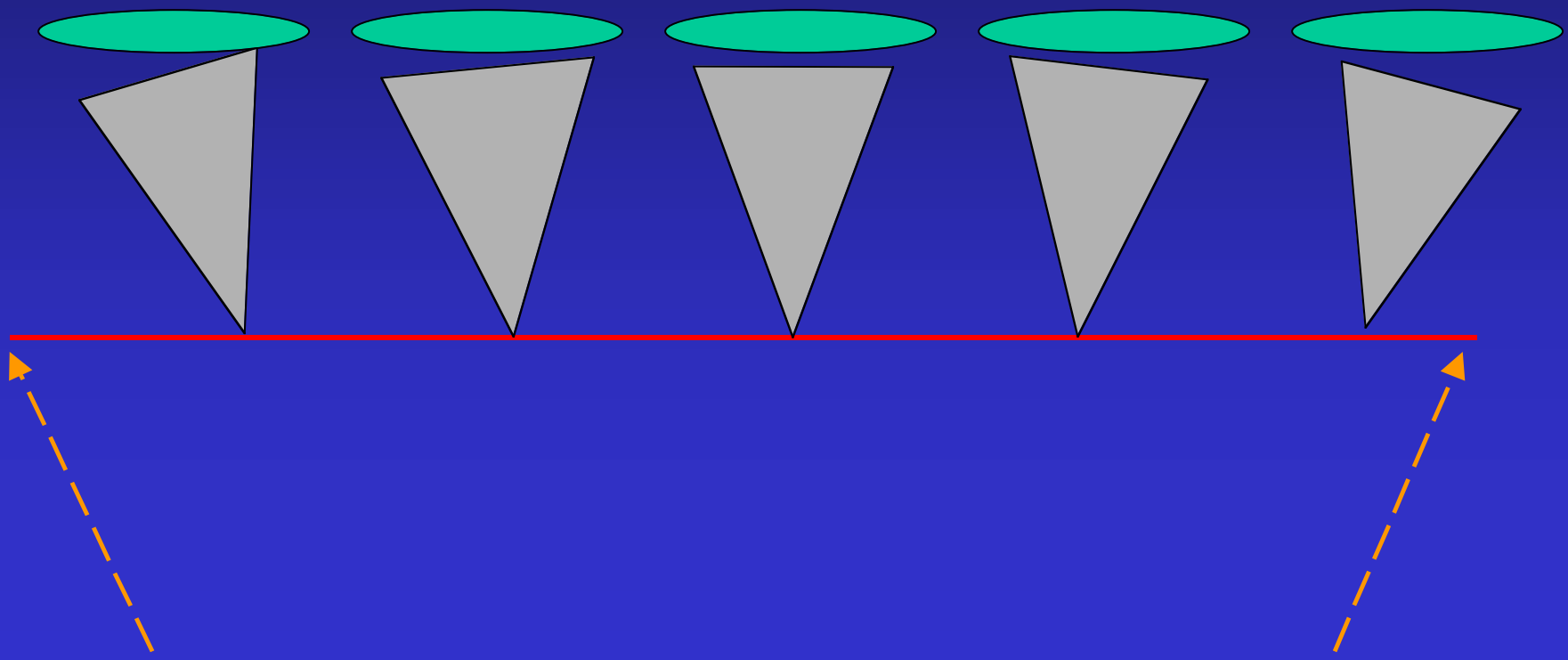
CCD

Lens

Hole

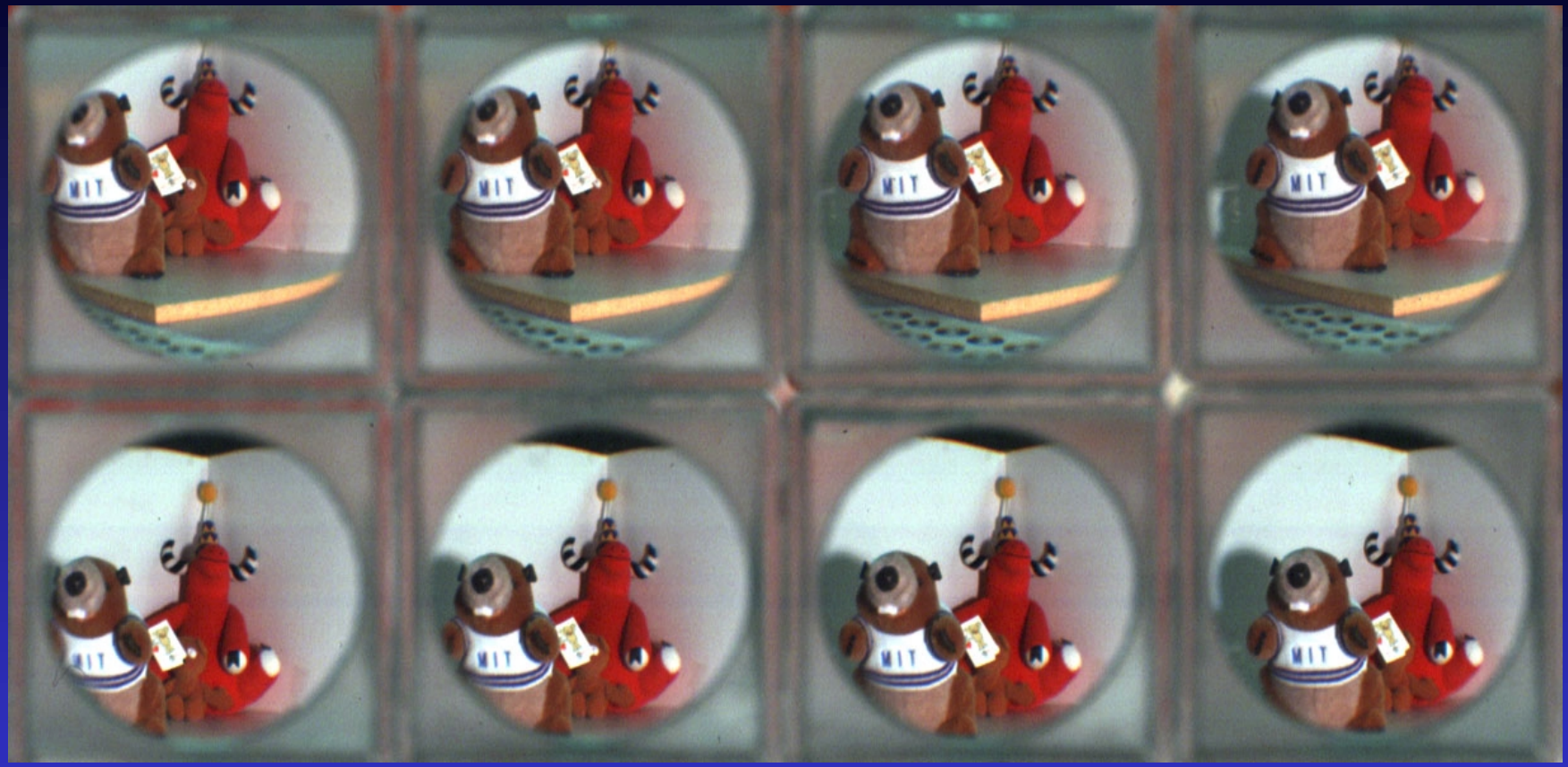


Why Does it Occur?



Summary

- Capture device is built
- Images are pretty good
- Needs image-processing
  - Color
  - Aspect ratio
  - Radial distortion
- Future:
  - Better distortion correction
  - Calibration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