Lecture 12: Cameras

Reading

• Szeliski 2.1.3-2.1.6
Let’s design a camera
  – Idea 1: put a piece of film in front of an object
  – Do we get a reasonable image?

Add a barrier to block off most of the rays
  – This reduces blurring
  – The opening known as the aperture
  – How does this transform the image?
Camera Obscura

- Basic principle known to Mozi (470-390 BC), Aristotle (384-322 BC)
- Drawing aid for artists: described by Leonardo da Vinci (1452-1519)

Source: A. Efros
Home-made pinhole camera

Why so blurry?

http://www.debevec.org/Pinhole/

Pinhole photography

6-month exposure
Shrinking the aperture

- Why not make the aperture as small as possible?
  - Less light gets through
  - *Diffraction* effects...

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Adding a lens

- A lens focuses light onto the film
  - There is a specific distance at which objects are “in focus”
    - other points project to a “circle of confusion” in the image
  - Changing the shape of the lens changes this distance