

Computer Vision for Visual Effects

CVFX 2015

Image Formation



為什麼白牆上看不到自己的影像？

？



針孔



針孔



針孔的效果: 限制光的方向

Camera Obscura (Dark Chamber)— A Room Sized Pinhole Camera

<http://www.digicamhistory.com/>

- › "In 15th century, Leonardo da Vinci wrote the first detailed description of camera obscura"

http://en.wikipedia.org/wiki/Camera_obscura



[Wikipedia]

Abelardo Morell's Photo of Camera Obscura

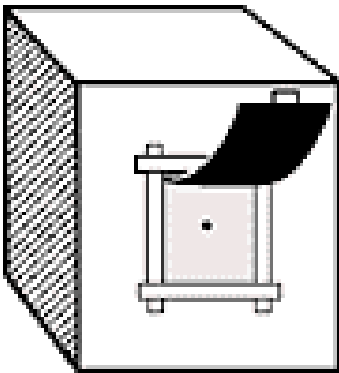
<http://www.abelardomorell.net/posts/camera-obscura/>

相關介紹

http://www.abelardomorell.net/pdf/Fantom_10.pdf

如何做針孔相機

- › <http://www.kodak.com/global/en/consumer/education/lessonPlans/pinholeCamera/>



pinhole size: 1/75 in.
film-to-pinhole distance: 4 1/2 in.
exposure: 2 sec.
subject in bright sunlight



[Kodak]

Digital Camera Obscura

- › MIT course, Advances in Computer Vision, Prof. Torralba
 - › <http://people.csail.mit.edu/torralba/courses/6.869/psets/pset1.pdf>

針孔成像的缺點?

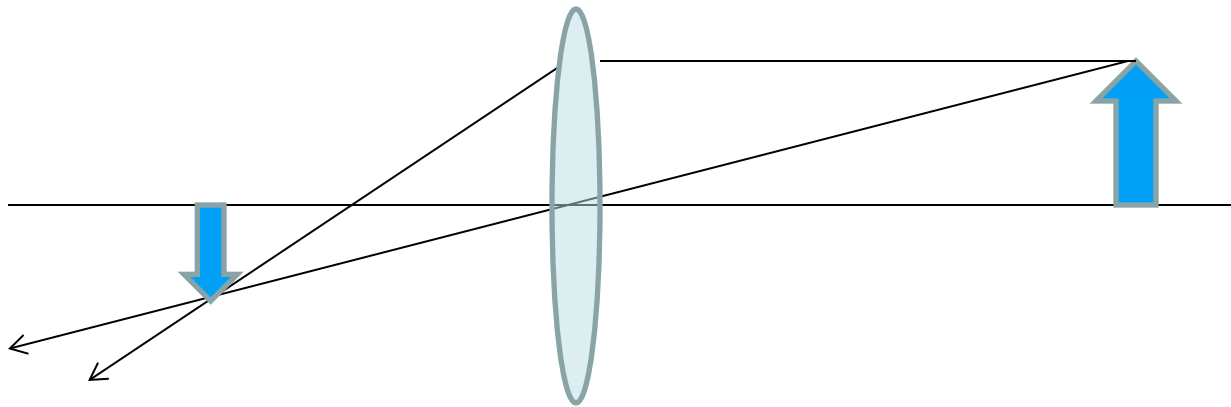
用透鏡聚集更多光線



透鏡成像

› Focus

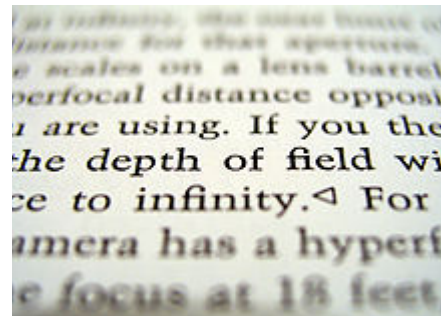
Ideal lens: same projection as pinhole but gathers more light



Exposure

- › Shutter speed
 - › Motion blur
 - › Camera shake

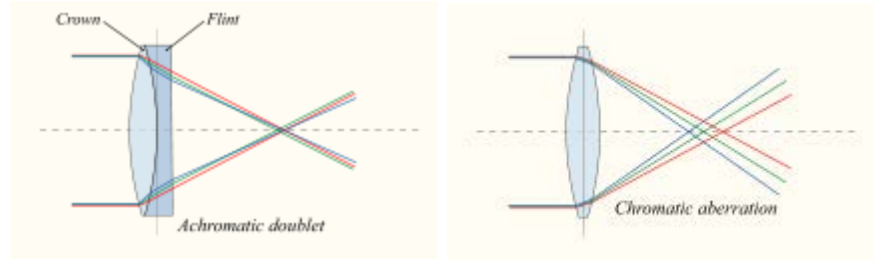
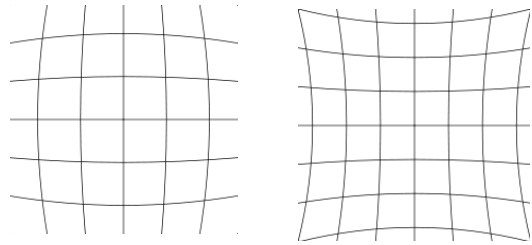
- › Aperture
 - › Depth of field
 - › Effect of shallow DOF



[Wikipedia]

Problems of Lenses

distortion, chromatic aberration,
purple fringe





Project I

- › Building a camera obscura
 - › Due on March 24

- › References
 - » MIT course
 - » <http://people.csail.mit.edu/torralba/courses/6.869/psets/pset1.pdf>
 - » Camera obscura workshop
 - » <https://www.youtube.com/watch?v=vVUATd8PGPY>

 - » Make Magazine Weekend Project
 - » <http://www.youtube.com/watch?v=pNEyIt0yqUU>

Project I

- › Building a camera obscura
 - › Panorama stitching
 - › High-dynamic-range imaging

Project I

- › Weekly progress report

