Digital Image Processing

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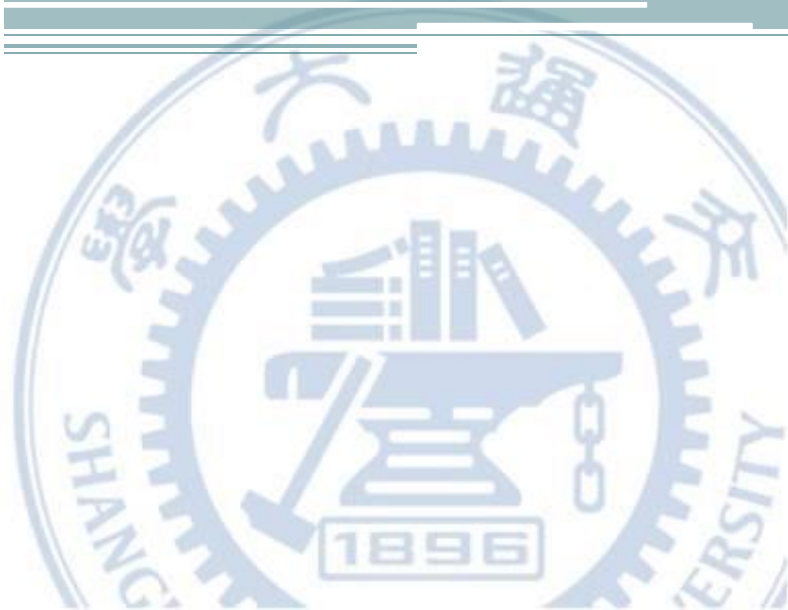
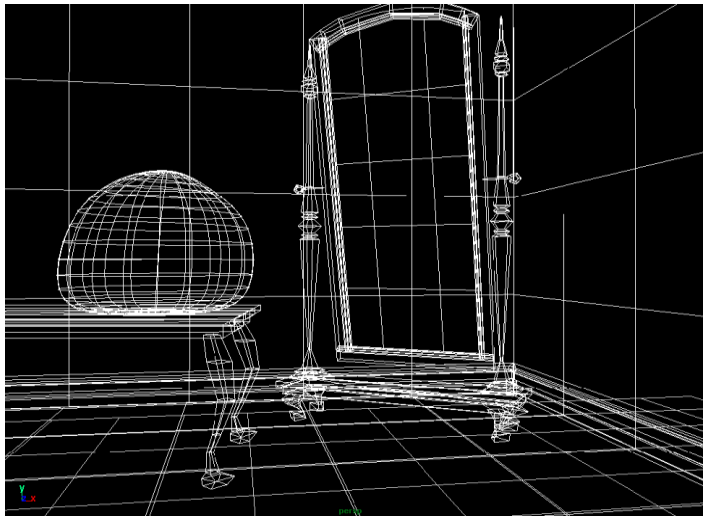
Computational Photography



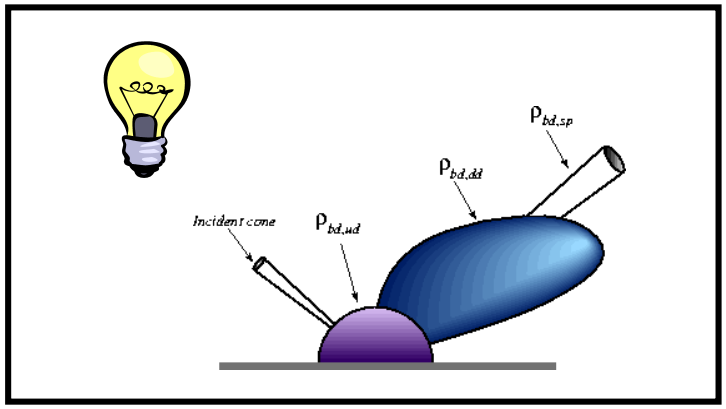
Why computational photography?

Select from the ppt of CP courses of CMU and MIT

Traditional Computer Graphics



3D geometry



physics

projection

Simulation

GRAPHICS

State of the Art

- Amazingly real
- But so sterile, lifeless, *futuristic (why?)*

Photography-the richness of our everyday world

Photo by Svetlana Lazebnik

Beauty in complexity

University Parks, Oxford

Which parts are hard to model?

Photo by Svetlana Lazebnik

From “Final Fantasy”

On the Tube, London

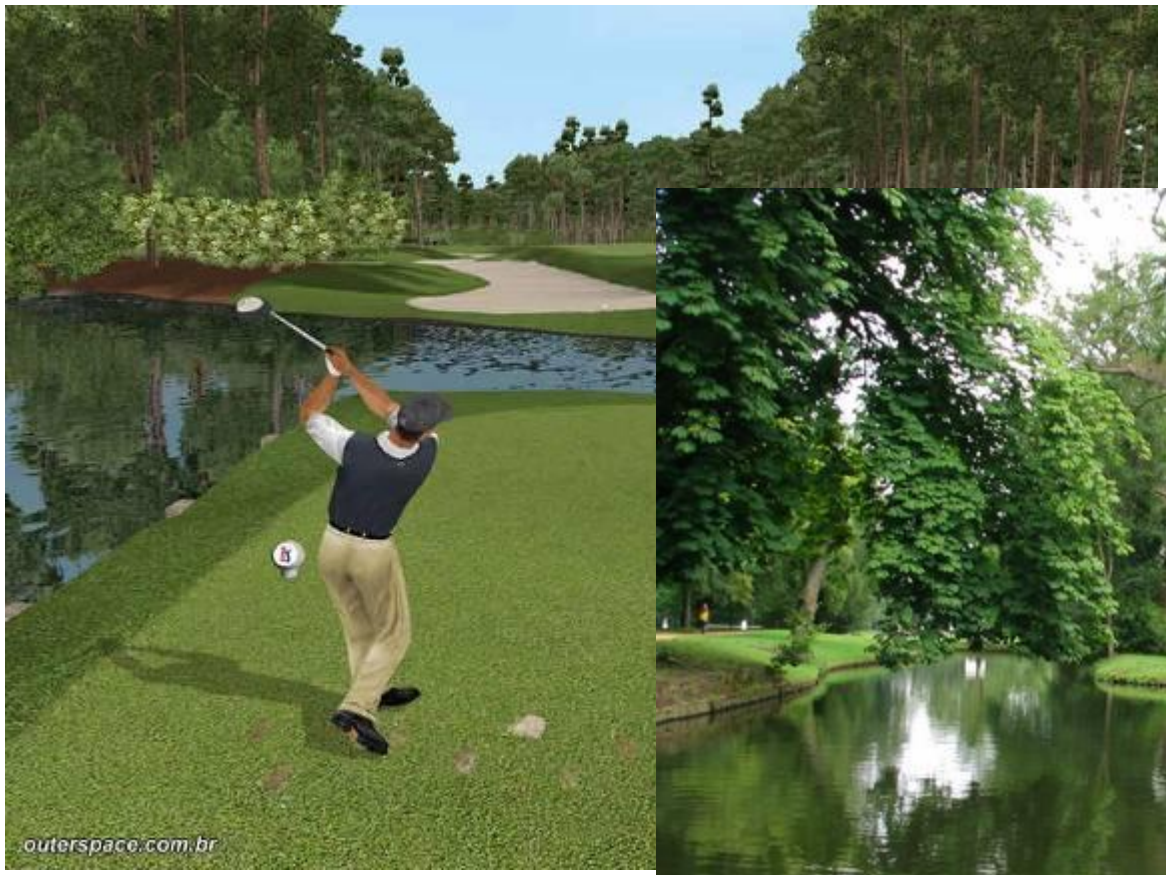
From “Final Fantasy”

Photo by Joaquin Rosales Gomez

Virtual LA (SGI)

Photo of l LA

Nature



River Cherwell, Oxford

The Realism Spectrum

Computer Graphics | **Computational Photography** | **Photography**

Realism
Manipulation
Ease of capture

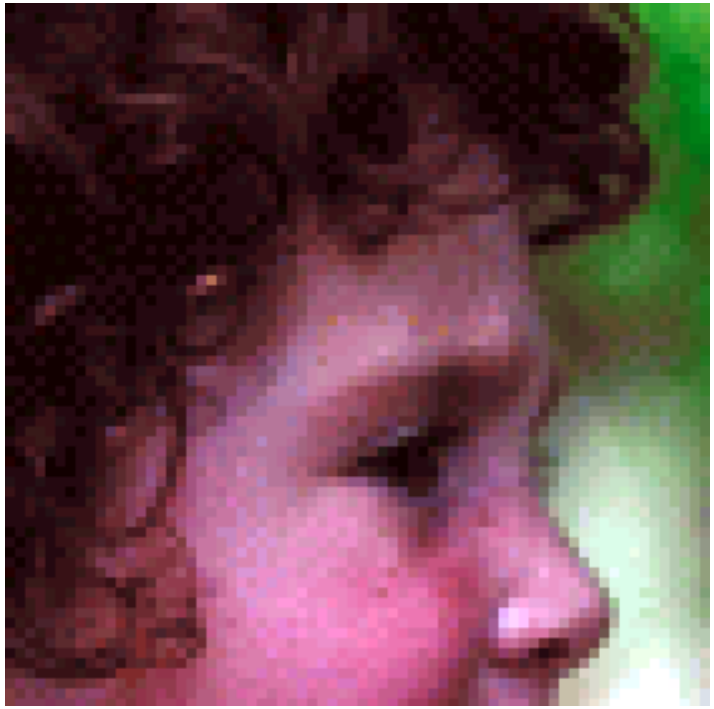
+ easy to create new worlds
+ easy to manipulate objects/viewpoint
- Very hard to look realistic

+ instantly realistic
+ easy to aquire
- very hard to manipulate objects/viewpoint

What is computational photography?

Something Cool!!!

Super-resolution

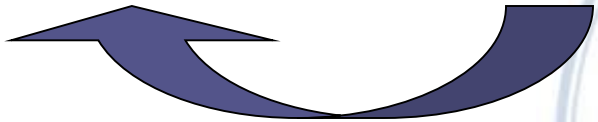


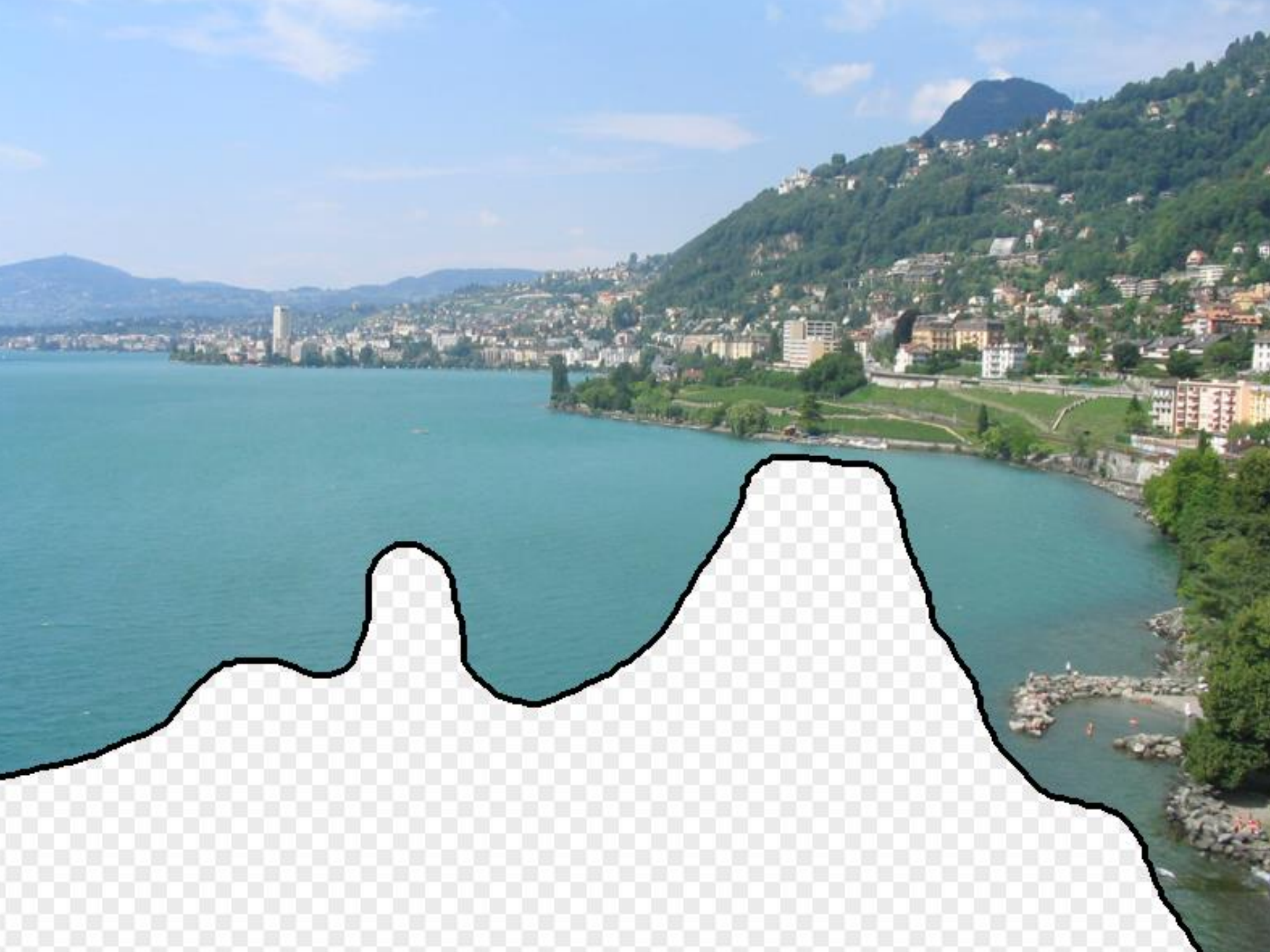
Something Cool!!!

Panoramas

Automatic Mosaic Stitching

Something Cool!!!





Something Cool!!!

Face warping and morphing

Light field photography using a handheld plenoptic camera

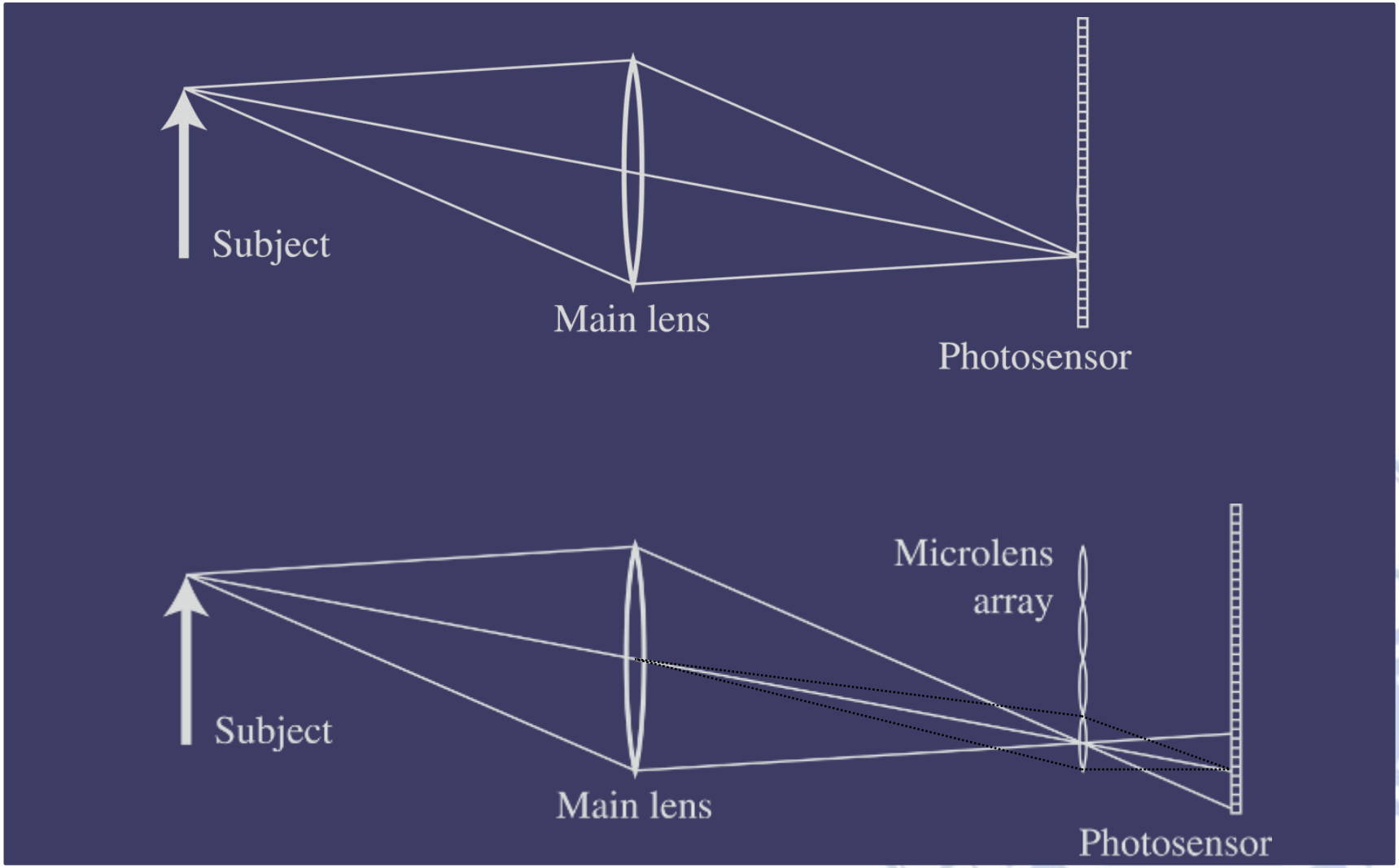
Ren Ng, Marc Levoy, Mathieu Br édif,
Gene Duval, Mark Horowitz and Pat Hanrahan

Discover a New Kind of Camera-Lytro

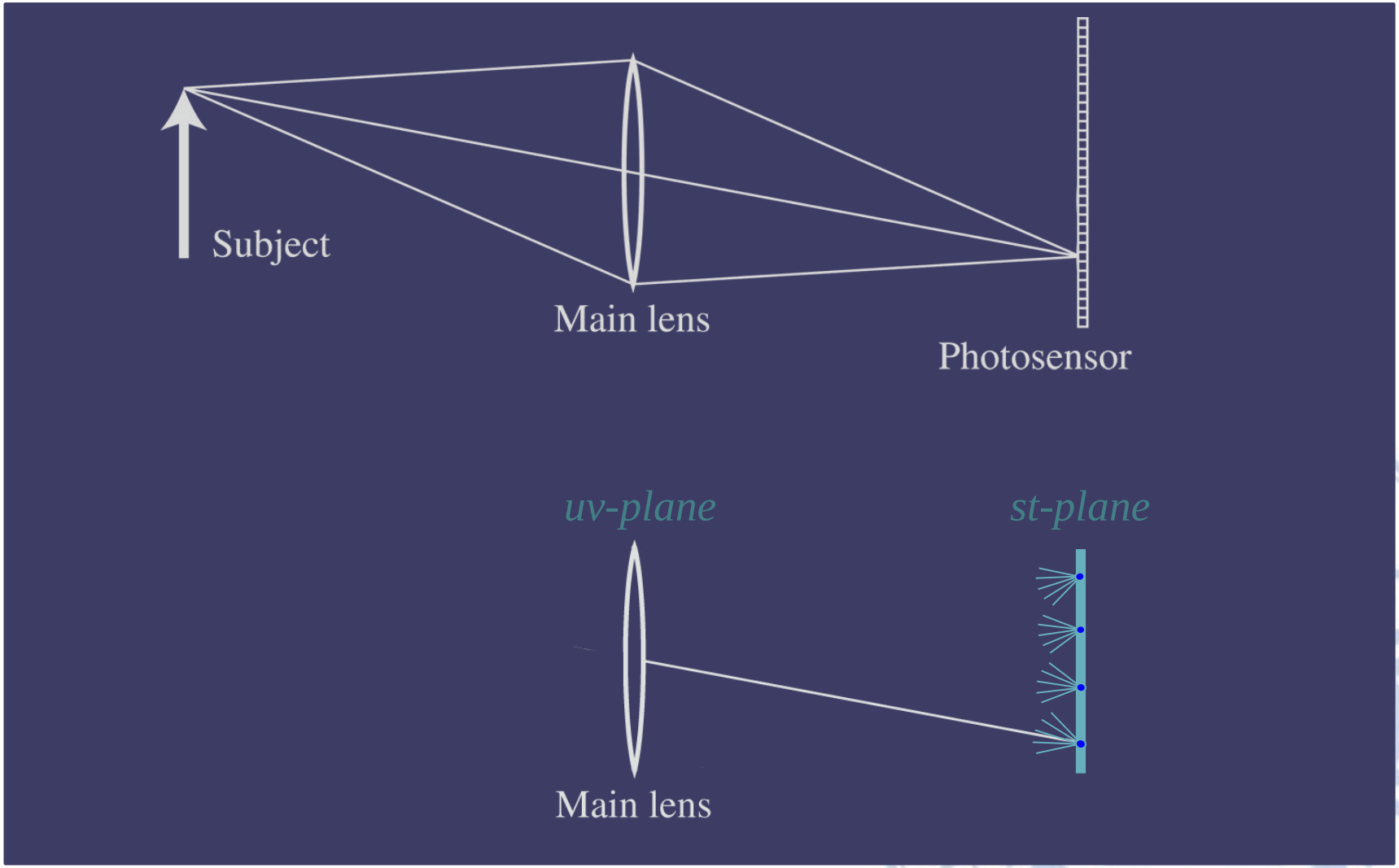
The Lytro camera lets you create living pictures that you can endlessly refocus after you take them.

- See the light. All of it.
- Refocus pictures after you take them.
- Move the picture in any direction to change your perspective.

Conventional versus light field camera



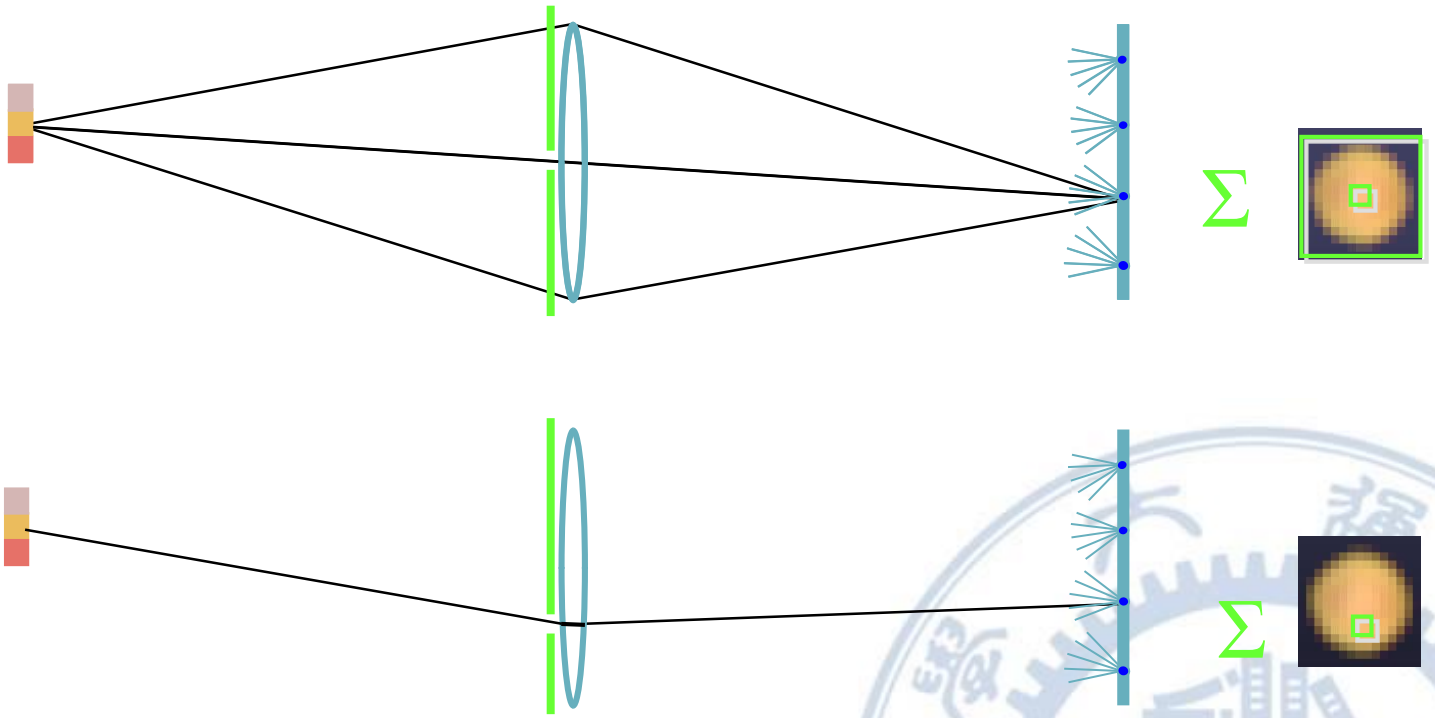
Conventional versus light field camera



Something Cool!!!

Digital Refocusing

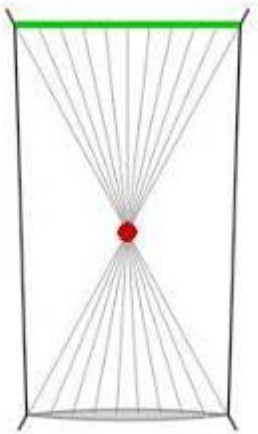
Digitally moving the observer



moving the observer = moving the window we extract from the microlenses

Something Cool!!!

Something Cool!!!



Thank You!