

# **Lightfield Photography**

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### **Background and Motivation**





## What's Wrong with This Picture?







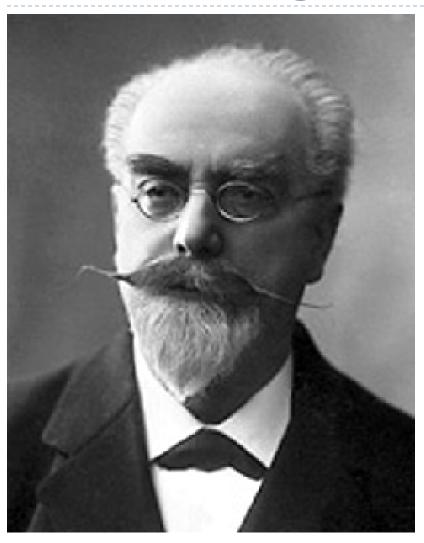
### What Is Wrong? It's Just a Picture!







#### What is Wrong with Pictures?

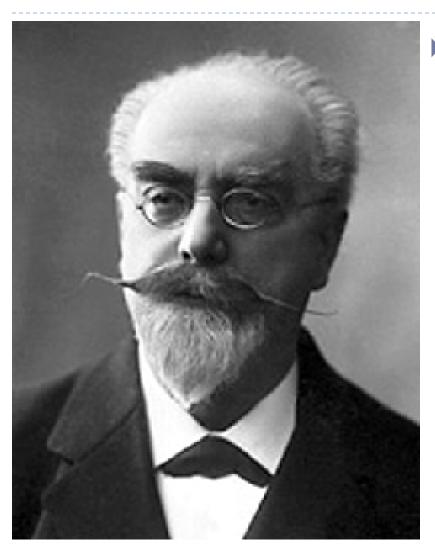


▶ The current most perfect photographic print only shows one aspect of reality; it reduces to a single image fixed on a plane, similar to a drawing or a handdrawn painting. The direct view of reality offers, as we know, infinitely more variety. We see objects in space, in their true size, and with depth, not in a plane.





#### **Can We Create More than Pictures?**



• Can we request that Photography renders the full variety offered by the direct observation of objects? Is it possible to create a photographic print in such a manner that it represents the exterior world framed, in appearance, between the boundaries of the print, as if those boundaries were that of a window opened on reality.





































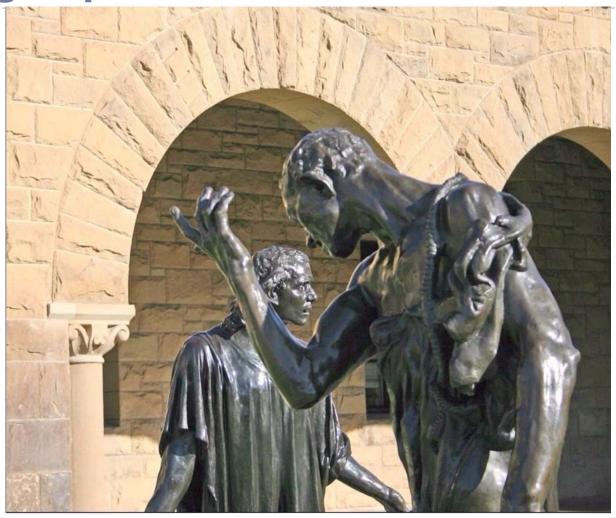








### **Change Aperture / All-In-Focus**



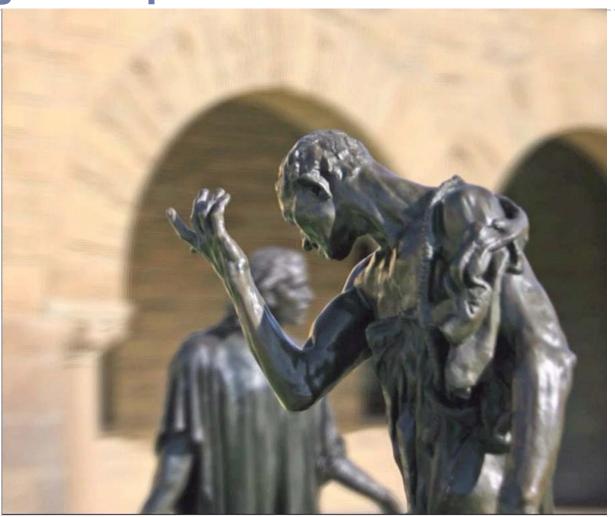


### **Rodin Radiance Capture**



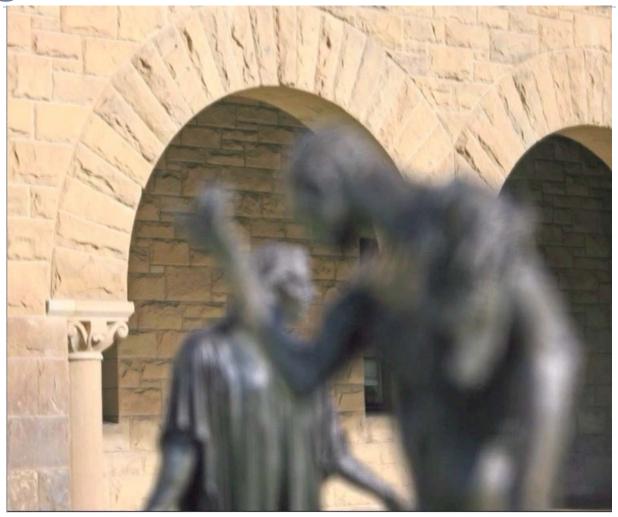


## **Change Viewpoint**





## **Change Focus**





## **Change Focus**







#### Radiance (aka Lightfield) Photography

- A picture is a rendering of the light rays in a scene
- Determined by lenses, aperture, viewpoint, etc.
- Radiance (lightfield) photography records the rays
  - Rays can be reproduced to render "the full variety offered by the direct observation of objects"
  - We can also synthesize arbitrary pictures
- Idea is over 100 years old (Integral photographs)
  - Technology now exists to make radiance photography practical



#### **Course Schedule**

Time	Topic
1:30-1:40	Intro and Background
1:40-2:10	Lightfield in Projective Space
2:10-2:50	Ray Transforms
2:50-3:00	Radiance and Radiance Capture (Plenoptic Cameras)
3:00-3:15	=== Break ===
3:15-3:45	Focused Plenoptic Camera
3:45-4:00	Radiance Manipulation, Basic Rendering
4:00-4:25	Refocusing, Depth, Stereo: GPU Implementation
4:45-5:00	Hands On and Software Demo

