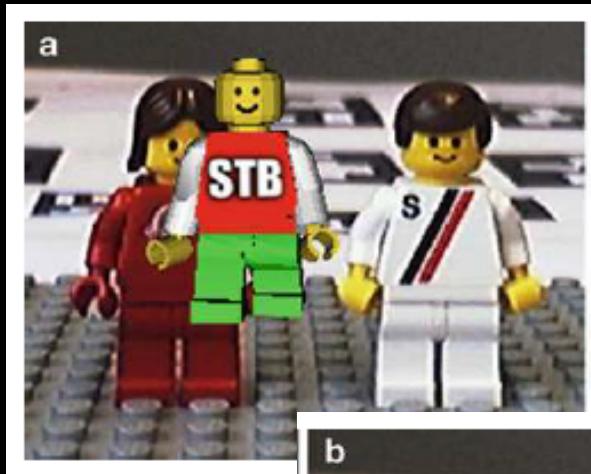


Part 3: Coherent Rendering

Occlusion

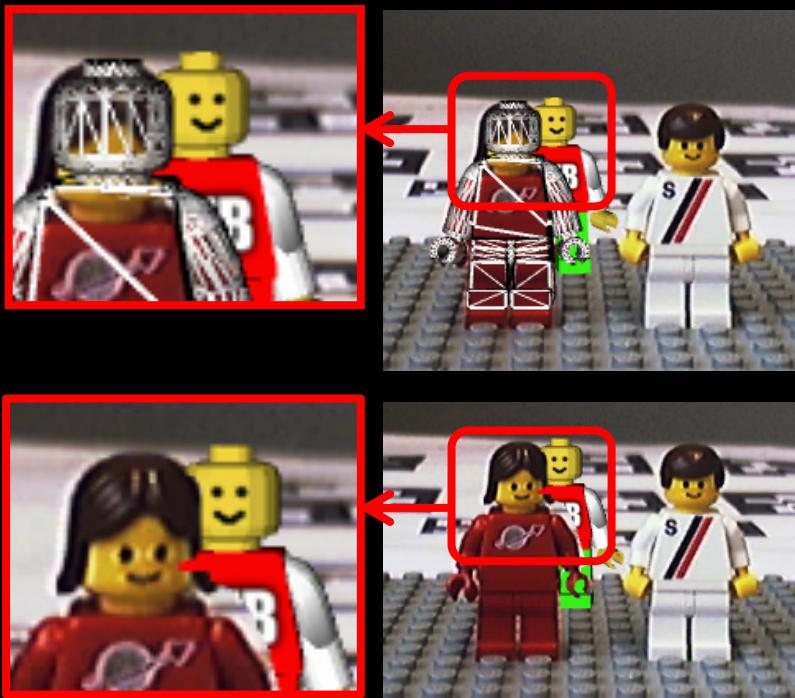


- Problem
 - Virtual objects do not occlude real objects.



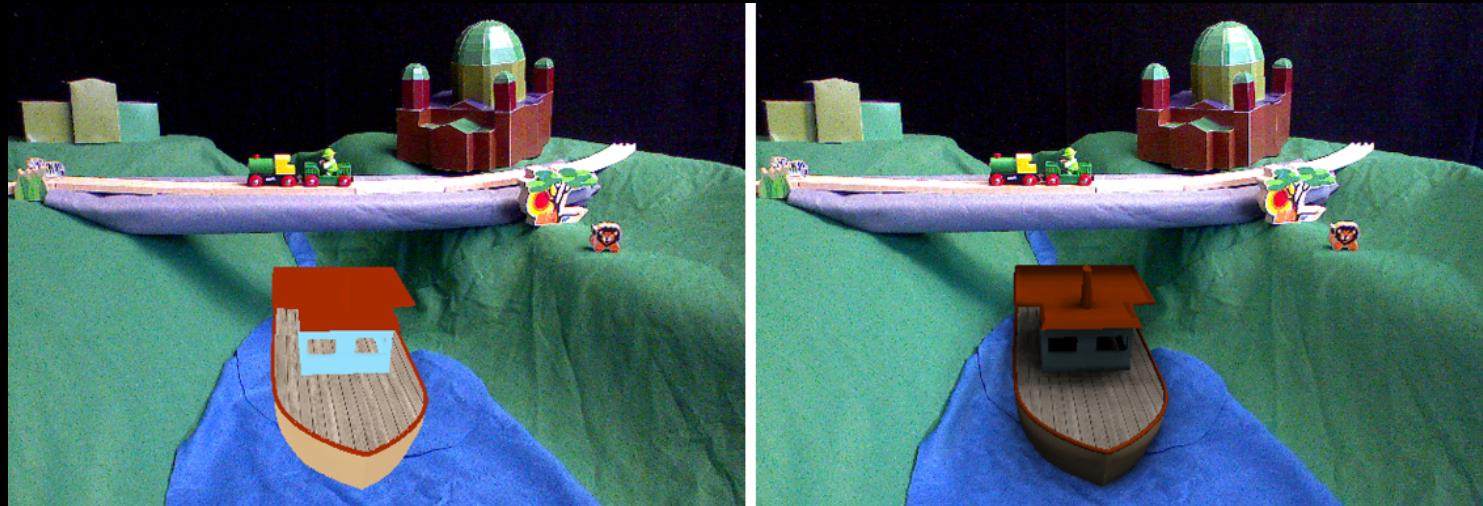
- Solution
 - Render registered virtual representations (Phantoms) of real objects.
 - Occlusions handled by graphics hardware.

Occlusion



1. Draw Video.
2. Disable writing to color buffer .
3. Render phantoms of real scene.
→ sets depth buffer.
4. Enable writing to color buffer.
5. Draw virtual objects.

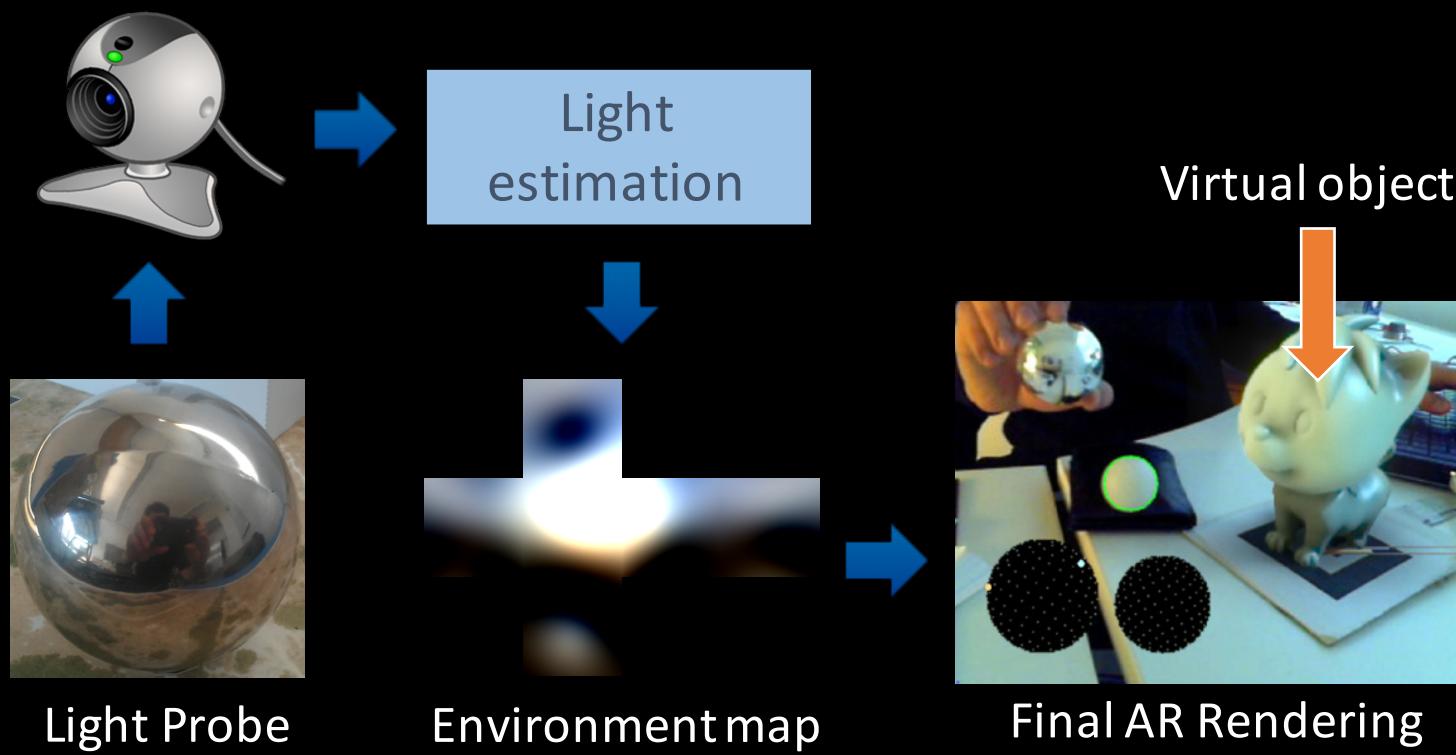
Photometric Registration



Without Illumination

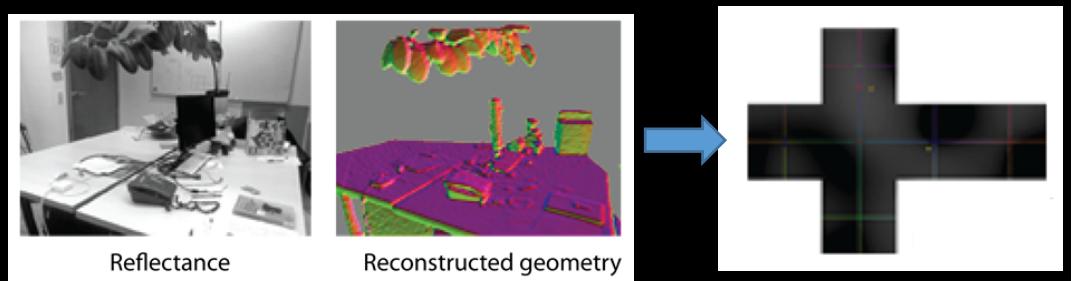
With Illumination

Transferring Illumination

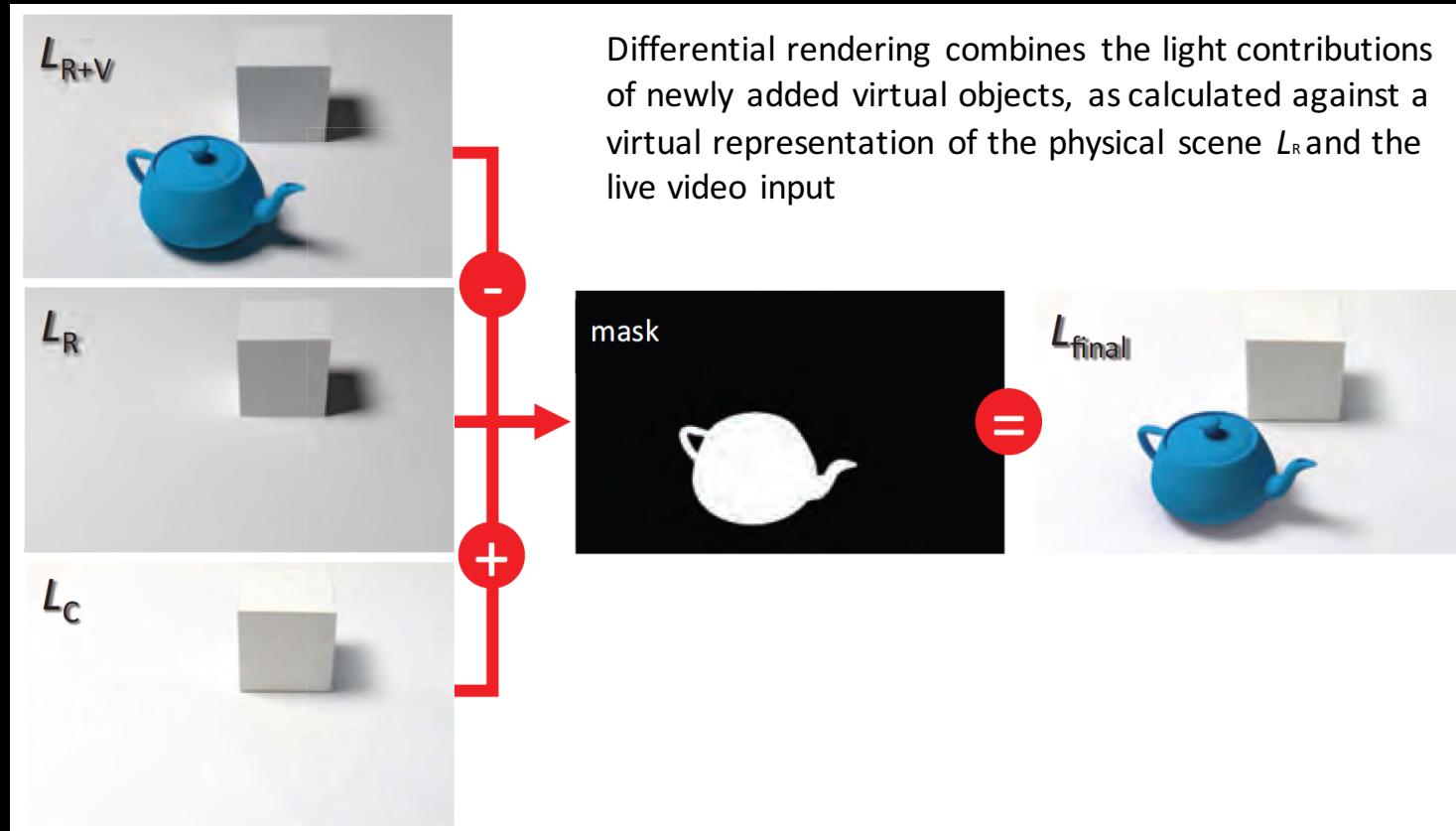


Inverse Rendering

- We can estimate lighting directly from reflections in the scene
- Obtain geometry and appearance with KinectFusion scan
- Solve inverse rendering problem
 - Linear system $\mathbf{T}^* \mathbf{b} = \mathbf{r}$
 - \mathbf{b} ...directional light
 - \mathbf{r} ...reflected light
 - \mathbf{T} ...radiance transfer of scene geometry



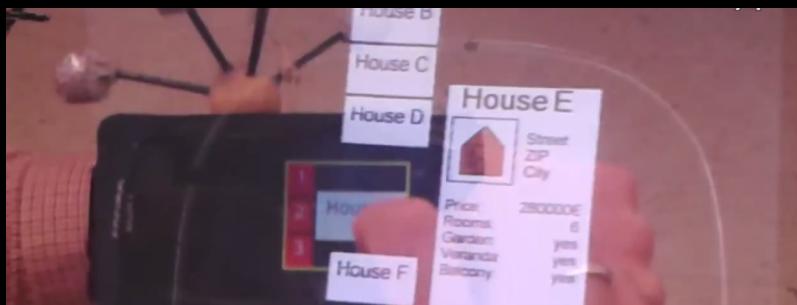
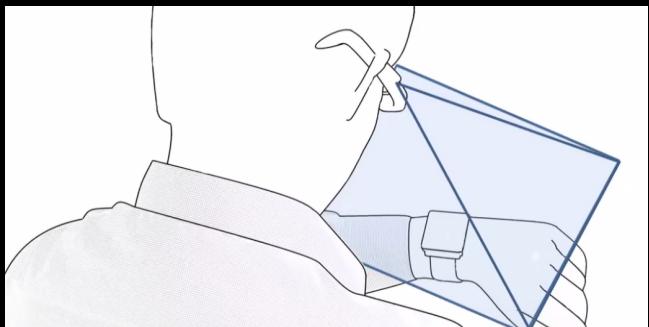
Differential Rendering



Future Uses

AR as an interface to IoT

- Internet of things allows control over physical environment
- But physical objects have no input or output
- AR can provide direct manipulation of the parameters



AR as a communication medium

- Content provided by
 - Professionals (entertainment, journalists etc.)
 - Authorities (traffic etc.)
 - Individuals → *social*
- Not geo-location, but precise spatial annotation (part of an object)
- *Linking* (like web links) between virtual and *real*
- *Channels* (like blogs) to organize content
- Always-on, context-driven, non-linear streams



Microsoft HoloLens Concept

Recording of supposed
MagicLeap rendering.

