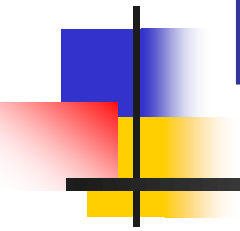

Lightmaps from HDR Probes

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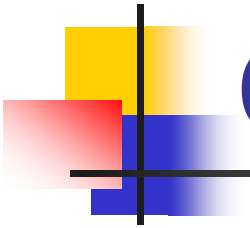
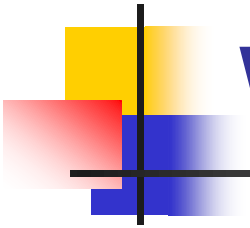


Overview

- What are Lightmaps
- Related Work
- Motivation for using Radiance
- Capturing HDR Probes
- Creating Lightmaps
- Results
- Conclusion



What are Lightmaps

- Precomputed illumination for interactive walkthroughs stored in texture memory
- Only view independent surfaces (Lambertian)
- Not vertex colour (usually Radiosity)
- Can be stored in low-res texture for blending original texture if MultiTexture hardware

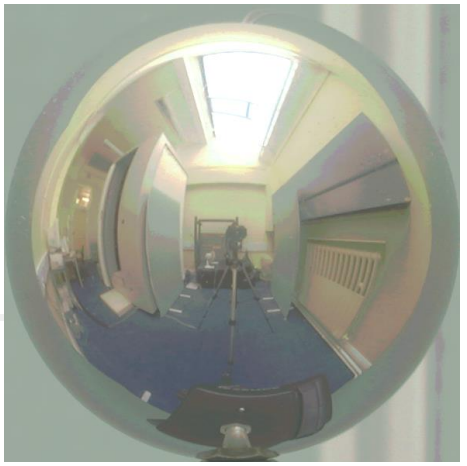
Related Work

- Radiosity solution (LightScape, stored in vertex colour, adaptive mesh subdivision)
- Games Engines (eg. Quakes qrad)
- Texture bakers in Lightwave and 3D Studio Max5, Brazil, FinalRender, etc.

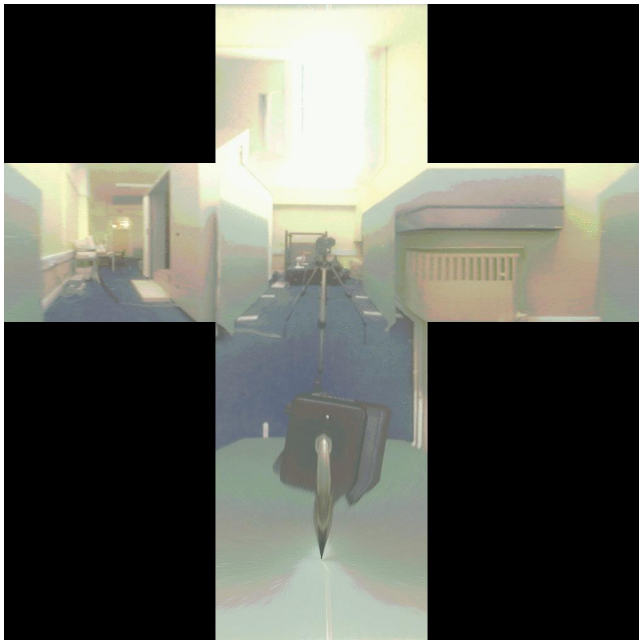
Motivation for using Radiance

- Physically accurate rendering
- Natural lighting with HDR
- Postprocessing using Radiance tools (exposure, falsecolor, etc.)
- Daylight simulation with real surroundings

Capturing HDR Probes

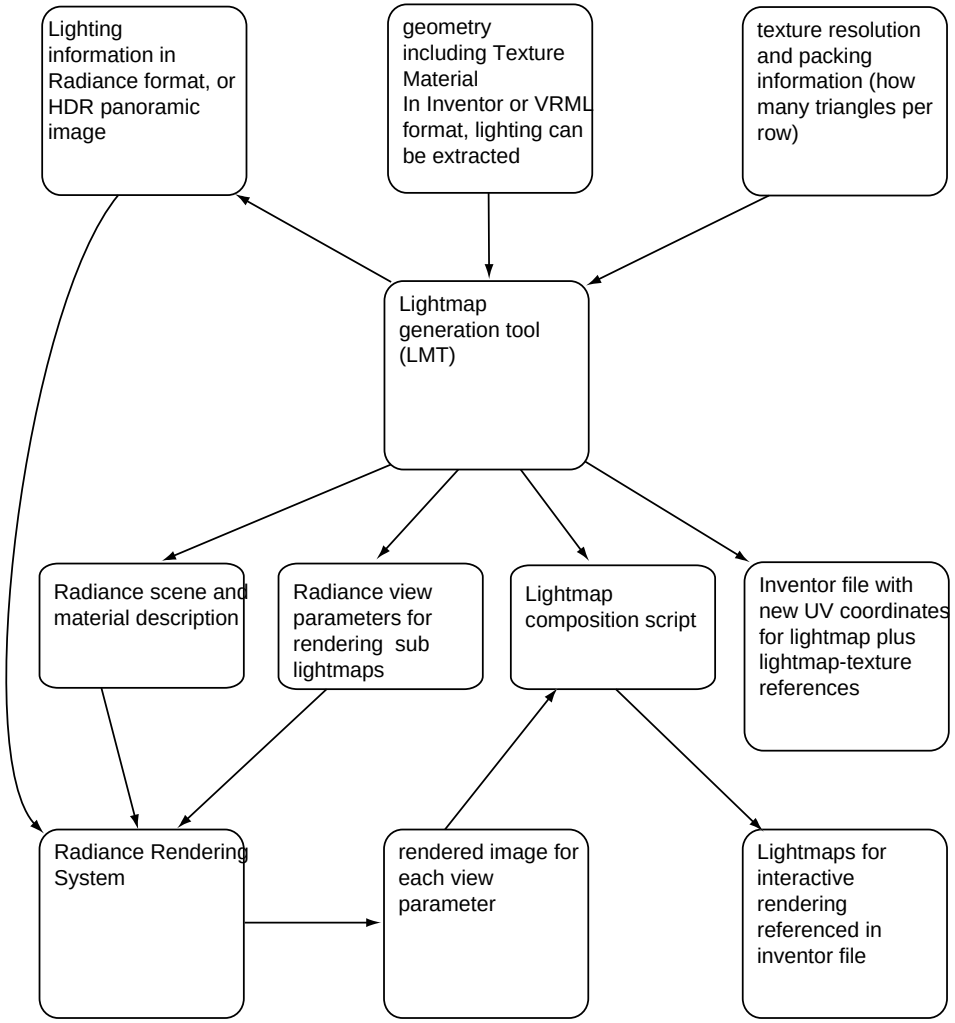


- Camera response
- Merging multiple exposures
- For image alignment use a remotly controlled camera
- Reflective sphere (Ball bearing)
- Cubic mapping HDRShop
- Removing Camera???



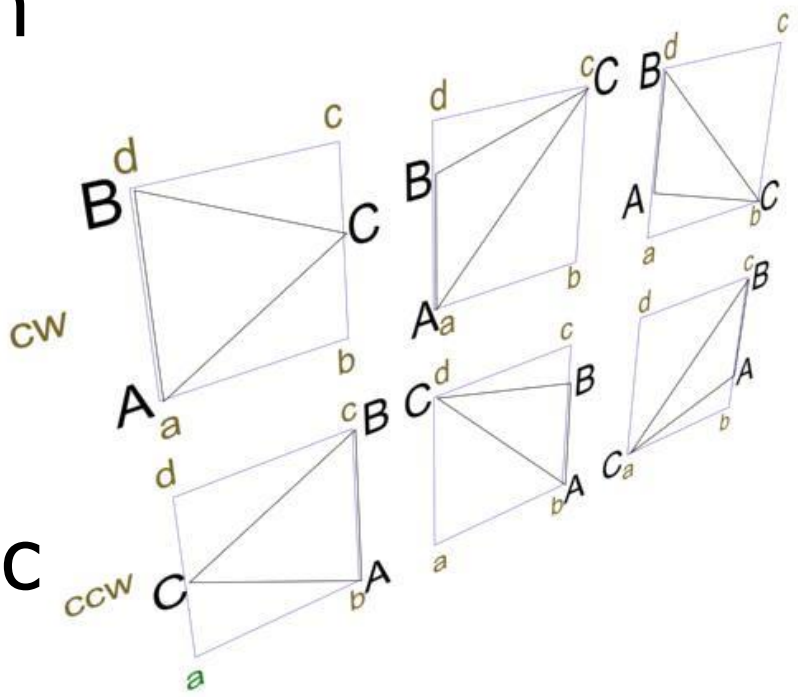
void glow mat_glow
0
0
4 1 1 1 0

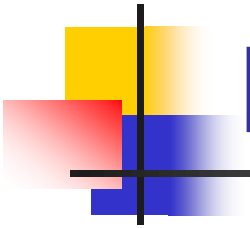
Lightmap Flow Chart



Placing Radiance Cameras

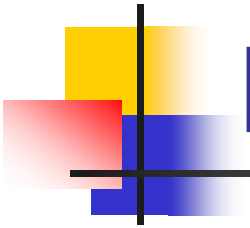
- In front of each triangle
- Centre of surrounding rectangle
- An orthographic camera (-vtl)





Rendering the Surfaces

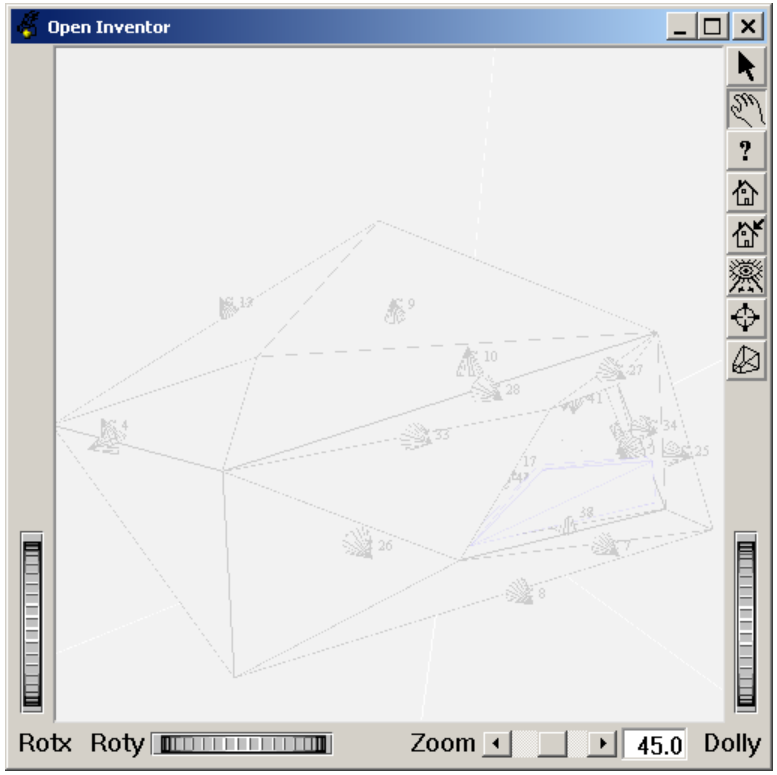
- Using Radiances' view file (normally used for walkthrough animations)
- Exploiting the ambient cache (-af file)
- Allows parallel execution
- Unfortunately there is no way to set the resolution in the view file.
- Bug in Desktop Radiance –pa option ignored.



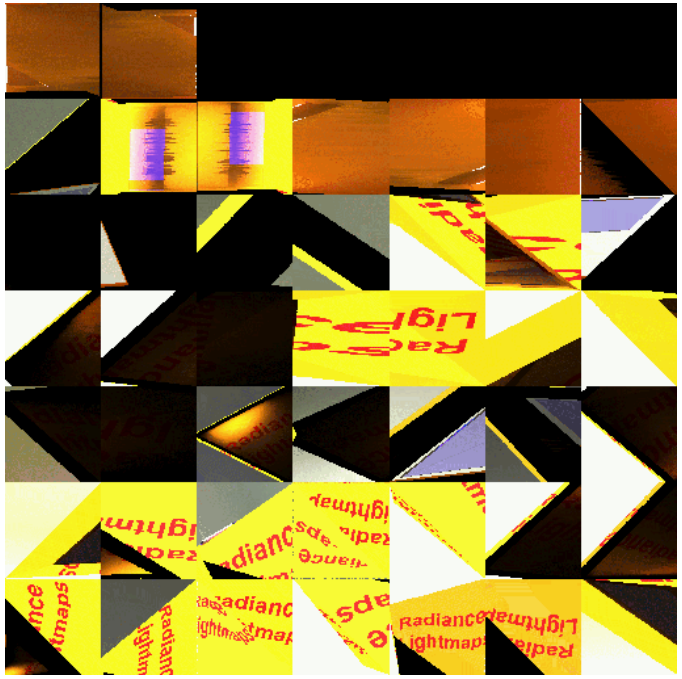
Lightmap Composing

- Aim is to merge all rendered surfaces to a single texture for efficient hardware rendering
- Simplest approach: use pcompos placing the images next to and above each other.
- UV coordinates of resulting VRML file have to reflect this.
- ra_ppm –e converts Radiance file to ppm file at a specified exposure.

Results(1/4)

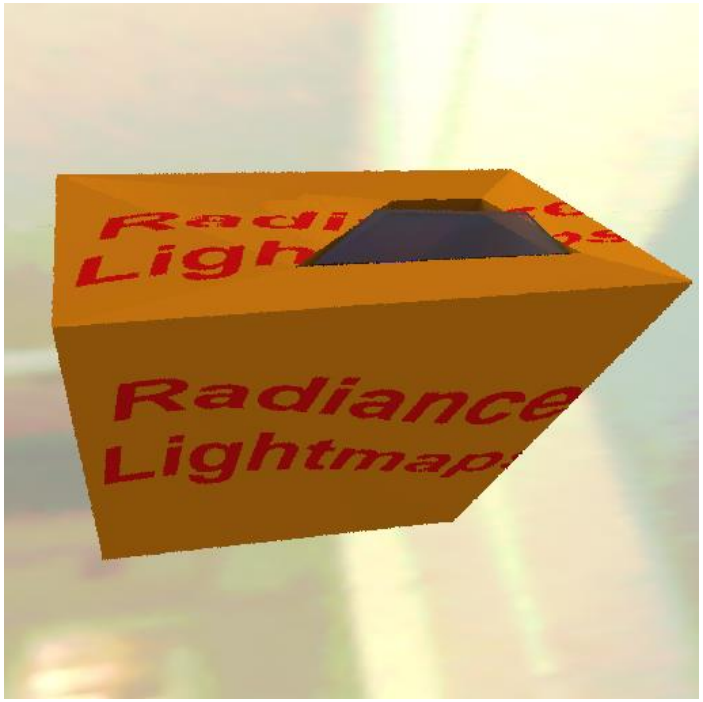


Cameras on Geometry

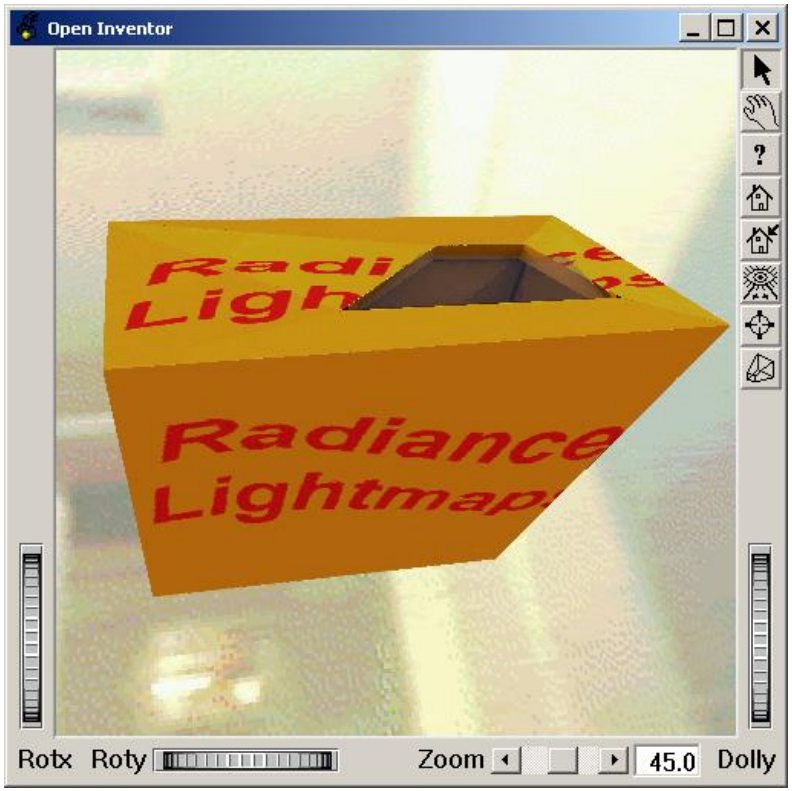


Composed Lightmaps

Results(2/4)



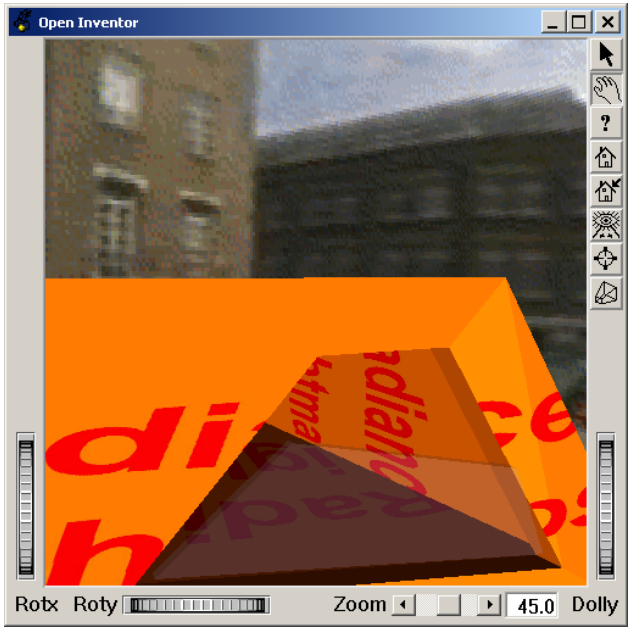
Radiance



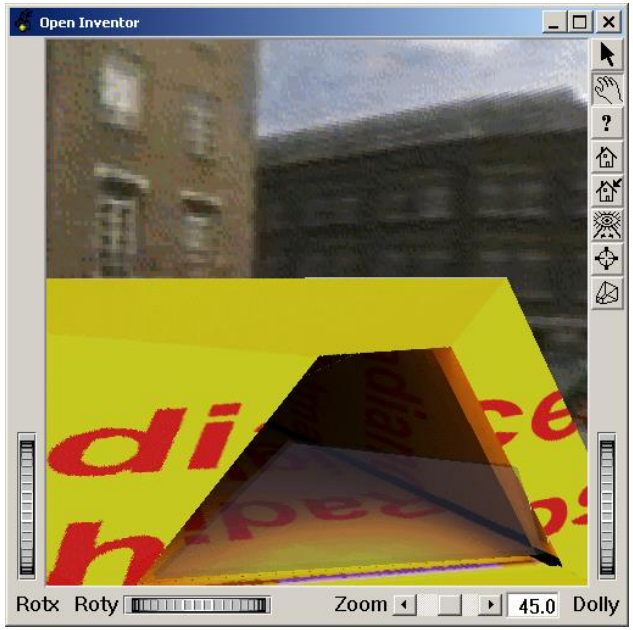
Interactive Lightmaps

Results(3/4)

Radiance

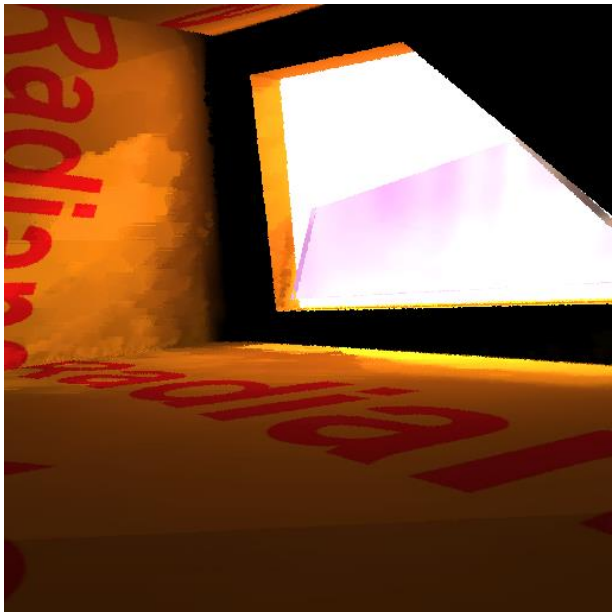


OpenGL

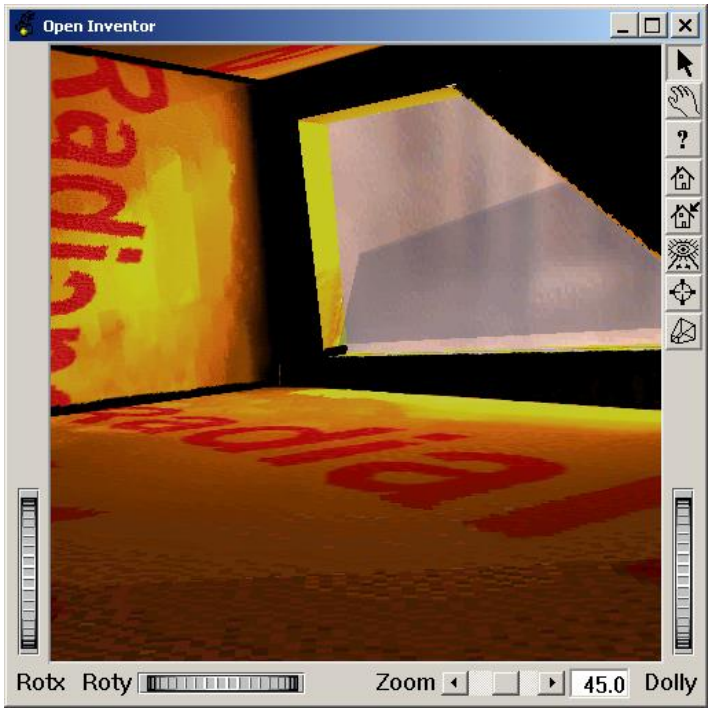


Lightmaps

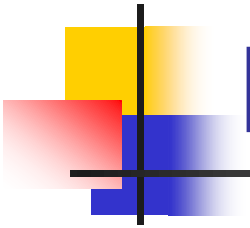
Results(4/4)



Radiance

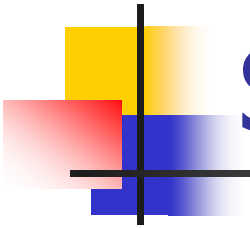


Lightmap



Possible Improvements

- Maintain connectivity of 3D triangles for 2D UV texture coordinates
- Where not possible add extra pixels for interpolation (Sand pixels)
- Triangle areas reflected in texture size
- Coplanar surfaces represented by one lightmap element
- Packing lightmap elements



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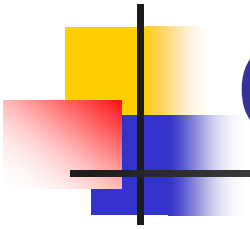

Questions

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