Image Space Gathering

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Example Phenomena

- Soft Shadows
- Depth of Field
- Motion Blur
- Color Bleeding
- Subsurface Scattering
- **Glossy Reflection**





Plan of Attack

- Identify salient features of phenomenon
- Find cheap approximation for some or all of those features
- As hardware and techniques improve, find better approximations that capture more features







Glossy Reflection







Selected Previous Work

Reflection Occlusion [Landis 2002]

Percentage Closer Soft Shadows (PCSS) [Fernando 2005]



Courtesy of Industrial Light & Magic



See Paper for Additional Work





Variable Radius Blur - Spreading







Variable Radius Blur - Gathering







Cross Bilateral Filtering









Image Space Gathering

- Image space, post processing convolution with a two-pass signal dependent filter
 - General framework for blurring
 - Tailor our parameters to implement the desired phenomenon
- Filter integral can be computed many ways
 - We chose to point sample and MC integrate





Algorithm Pipeline









Normal

t_{refl}





Position

Reflection







Phase 1: the parameter search











Phase 2: the gather











Undersampling Artifacts



























PCF (Screen Space)



















Future Work

Add structure to filter kernel sample distribution

Approximate anisotropic BRDFs, shaped area lights, lens bokeh, etc.







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Questions?

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