

SONY PICTURES IMAGeworks ARNOLD

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SIGGRAPH 2018

OVERVIEW

Why branch from SolidAngle's Arnold?

What is different about our version?

OUR PATH TO PATH TRACING



Monster House, 2006



Cloudy with a Chance of Meatballs, 2009



Alice In Wonderland, 2010

A FORK IN THE PATH

Why fork a mature production renderer?

- Fast iteration (vs. API stability)
- Single user focus (vs. wide customer base)
- Remove unused features (vs. backwards compatibility)

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BIG PICTURE



Spider-Man: Homecoming, 2017



Hotel Transylvania 3, 2018

Modules:

- Geometry
- Shading
- Integrators

GEOMETRY



- Single level instancing, upfront scene load
- Fast subdivision with approximate patches
- Optimized storage for high *and* low tessellation



SHADING ARCHITECTURE

Open Source:

- OpenImageIO
 - Scalable texture system
- Open Shading Language (OSL)
 - Runtime Specialization for large shading networks

Shading Models:

- See “Revisiting PBS at Imageworks” from last year

Volume Modeling:

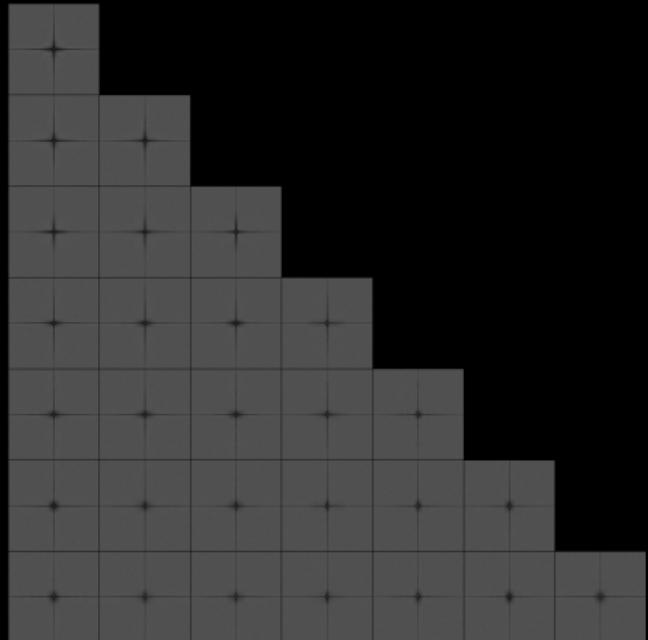
- See “Production Volume Rendering” from last year

INTEGRATORS

- Path tracer (NEE+MIS+tricks) by default
 - FIS + Adaptive Pixel Sampling

INTEGRATORS

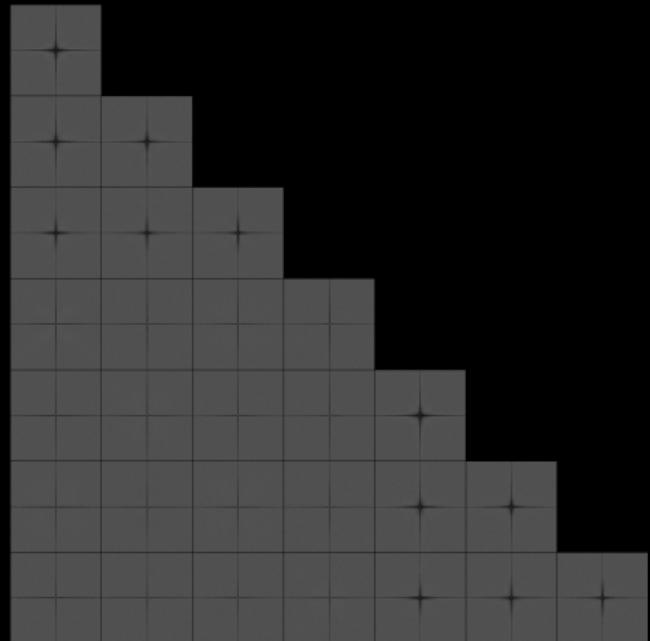
- Path tracer (NEE+MIS+tricks) by default
 - FIS + Adaptive Pixel Sampling
 - High quality sampling patterns



8D pattern

INTEGRATORS

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4D pattern + shuffle

INTEGRATORS

- Path tracer (NEE+MIS+tricks) by default
 - FIS + Adaptive Pixel Sampling
 - High quality sampling patterns
 - Many light sampling (w/ light linking)



363,063 lights

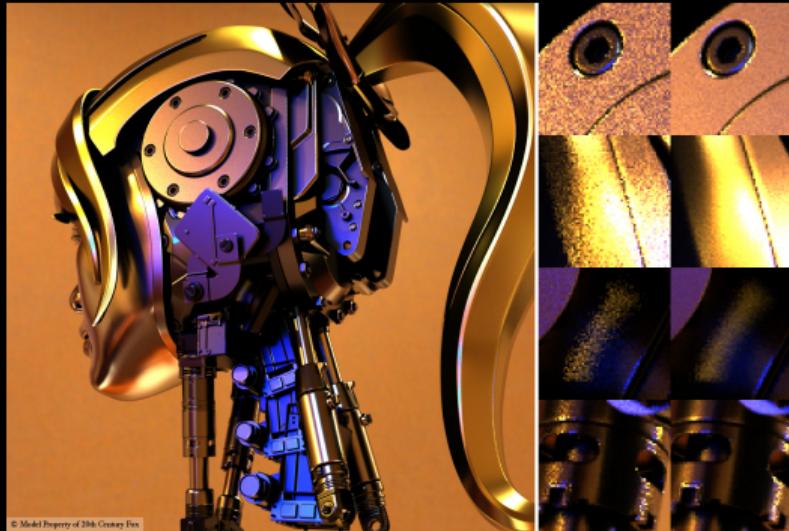
INTEGRATORS

- Path tracer (NEE+MIS+tricks) by default
 - FIS + Adaptive Pixel Sampling
 - High quality sampling patterns
 - Many light sampling (w/ light linking)
- BDPT, VCM (with Metropolis)
 - Used in special situations only



Underwater caustics test

RECENT IMPROVEMENTS - IBL PRODUCT SAMPLING



Fast Product Importance Sampling of Environment Maps

Alejandro Conty, Pascal Lecocq

Thursday 10:45am, “Sampling the Product”, East Building, Ballroom A

RECENT IMPROVEMENTS - NPR



Spider-Man: Into the Spider-Verse, 2018

MORE RECENT IMPROVEMENTS

- Faster Non-Uniform Motion Blur
- Faster Light Linking
- Improved Adaptive Sampling
- Improved Denoising
- Revamped Image Output
- Improved SSS
- Simplified Ray Differentials
- Unified Thread Pool
- Improved Light Sampling
- Improved Shading LOD
- Improved Sampling Patterns
- Improved BSDF sampling
- More Robust Path Guiding
- And more...

ACKNOWLEDGMENTS

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- Clifford Stein
- Larry Gritz
- Pascal Lecocq

Shading Team:

- Lee Kerley
- Ole Gulbrandsen
- Daniel Greenstein

Render Support:

- Jesse Andrewartha
- Nick Fowler

And our amazing artists!