Posters Fast Forward

1. “Massive Networks,” Daniel Filonik @UNSW EPICentre, CSIRO Data61
2. “Hybrid Ray-Traced Ambient Occlusion,” Morgan McGuire @NVIDIA
3. “A 2D to 3D Video Converter using Optical Flow Information and Least Squares Regression,” Hui-Yun Lee @Chang Gung University
4. “Blender based Rendering-as-a-Service Platform for High Performance Computing Clusters,” Milan Jaros @Technical University of Ostrava
5. “Energy Consumption Optimization of Rendering in Blender Cycles on x86 Architectures” Lubomir Riha @Technical University of Ostrava
Massive Networks

Daniel Filonik, Dominic Branchaud, Robert Lawther, Piotr Szul, Alex Collins, Tomasz Bednarz

UNSW EPICentre, CSIRO Data61
Massive Networks
Visualising Large-Scale Graphs in Immersive Environments

Extraction
Cloud / HDD
SQL

Preparation
Graph Summary
Cloud / CPU
Graph Layout

Visualisation
GLTF
Graph Rendering
Local / GPU
Pixels
Massive Networks
Visualising Large-Scale Graphs in Immersive Environments

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Massive Networks
Visualising Very Large-Scale Graphs in Immersive Environments
Hybrid Ray-Traced Ambient Occlusion
Louis Bavoil  Edward Liu  Peter Shirley  Morgan McGuire
Tracing: 1.5 ms on TITAN V @ 1080p
Brute force: 2 Geometric Rays

Tracing: 6.4 ms on TITAN V @ 1080p
Tracing: **5.8 ms** on TITAN V @ 1080p

1 Screen + 1 Geometric Ray + Denoising
A 2D to 3D Video Converter using Optical Flow Information and Least Squares Regression

Hui-Yun Lee
Chang Gung University
Introduction

• 3D visual technology and media contents
  • more attractive than traditional media
  • increasing attention from people

• Current methods to model 3D scenes
  • hardware solutions: dual lens, motion capture
  • software solutions: Maya and 3Ds max.

• For existing 2D media
  • can only develop a method to transferring 2D to 3D
  • also an economic method to produce 3D contents
Our Method

• Read the video into frames.
• Calculate the optical flow values for each frame.
• Assign six grades, from 0 to 5 with uniform steps, as the depth values to the corresponding pixels.
• Use the mean-shift technique to partition a given image frame into superpixels, and assign the maximum depth grade thereof to everywhere of the same mean-shift region.
• Smooth the change of depth by building a high order polynomial surface according to the depth map.
• Render the reorganized 3D video.
Examples

(a) (b) (c)
(d) (e) (f)
Examples
Blender based Rendering-as-a-Service Platform for High Performance Computing Clusters

August 10-12, Vancouver, BC

Authors: Milan Jaros, Petr Strakos, Lubomir Riha
Our approach

- Our platform is based on Blender renderers and upgrades them with HPC technologies.
- In this way we can offer not only standard offline but also interactive rendering mode which relies on fast HPC interconnecting networks.
Rendering tests

- Scalability performance in offline rendering mode

- Rendering time comparison

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**Scalability performance in offline rendering mode**

**Rendering time comparison**

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**Scalability performance in offline rendering mode**

**Rendering time comparison**
Energy Consumption Optimization of Rendering in Blender Cycles on x86 Architectures

August 10-12, Vancouver, BC

Authors: Milan Jaros, Ondrej Vysocky, Petr Strakos, Lubomir Riha
Our approach

- Extend Blender's renderer to support HPC resources and allow optimization of the energy consumption.

- The energy measurement of the whole node is defined by the equation:

\[ E = energy_{cpu} + baseline \times time \]
Architectures comparison

- Comparing between architectures **up to 18% of energy can be saved while increasing the rendering time just by 3%** (The Fishy Cat scene).

<table>
<thead>
<tr>
<th>Platform</th>
<th>Default settings</th>
<th>Default HW configuration</th>
<th>Optimal settings</th>
<th>Optimal HW configuration</th>
<th>Energy and time savings</th>
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<tr>
<td>Classroom scene</td>
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<tr>
<td>HSW AC</td>
<td>19318 J; 65 s</td>
<td>3 GHz (U); 2.8 GHz (C)</td>
<td>18286 J; 79 s</td>
<td>1.6GHz (U); 2.4 GHz (C)</td>
<td>E+5%; T-22%</td>
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<td>18699 J; 65 s</td>
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<tr>
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<td>16681 J; 66 s</td>
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<td>16681 J; 66 s</td>
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