

HPG 2019

High-Performance Graphics 2019 – Short Papers –

Strasbourg, France
July 8–10, 2019

General Chairs

David McAllister, Samsung
Richard Membarth, DFKI

Papers Chairs

Markus Steinberger, TU Graz
Tim Foley, NVIDIA

Proceedings Production Editor

Dieter Fellner (TU Darmstadt & Fraunhofer IGD, Germany)

Sponsored by EUROGRAPHICS Association

This work is subject to copyright.

All rights reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machines or similar means, and storage in data banks.

Copyright ©2019 by the Eurographics Association
Postfach 2926, 38629 Goslar, Germany

Published by the Eurographics Association
–Postfach 2926, 38629 Goslar, Germany–
in cooperation with
Institute of Computer Graphics & Knowledge Visualization at Graz University of Technology
and
Fraunhofer IGD (Fraunhofer Institute for Computer Graphics Research), Darmstadt

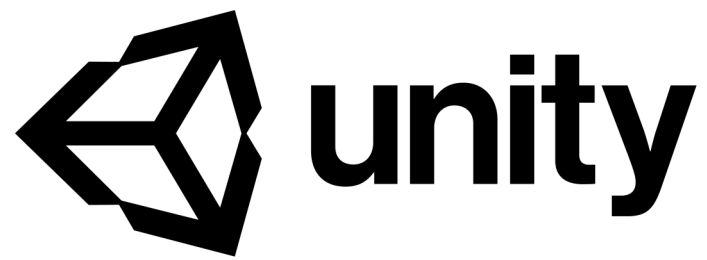
ISBN 978-3-03868-092-5
ISSN 2079-8687

The electronic version of the proceedings is available from the Eurographics Digital Library at
<https://diglib.eg.org>

Table of Contents

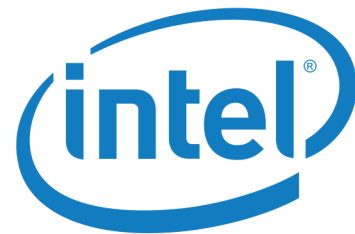
Table of Contents	iii
Sponsors	iv
International Programme Committee	vi
Additional Reviewers	vii
Author Index	viii
Keynotes	ix
Ray Tracing: Hardware and Performance	
Mach-RT: A Many Chip Architecture for Ray Tracing	1
<i>Elena Vasiou, Konstantin Shkurko, Erik Brunvand, and Cem Yuksel</i>	
RTX Beyond Ray Tracing: Exploring the Use of Hardware Ray Tracing Cores for Tet-Mesh Point Location	7
<i>Ingo Wald, Will Usher, Nathan Morrical, Laura Lediaev, and Valerio Pascucci</i>	
Wide BVH Traversal with a Short Stack	15
<i>Karthik Vaidyanathan, Sven Woop, and Carsten Benthin</i>	
Doing More With Each Ray	
Dynamic Many-Light Sampling for Real-Time Ray Tracing	21
<i>Pierre Moreau, Matt Pharr, and Petrik Clarberg</i>	
Stochastic Lightcuts	27
<i>Cem Yuksel</i>	
Temporally Dense Ray Tracing	33
<i>Pontus Andersson, Jim Nilsson, Marco Salvi, Josef Spjut, and Tomas Akenine-Möller</i>	
Rasterization Techniques and Ray-Tracing Applications	
Patch Textures: Hardware Implementation of Mesh Colors	39
<i>Ian Mallett, Larry Seiler, and Cem Yuksel</i>	
A Practical and Efficient Approach for Correct Z-Pass Stencil Shadow Volumes	45
<i>Baran Usta, Leonardo Scandolo, Markus Billeter, Ricardo Marroquim, and Elmar Eisemann</i>	
Real-Time Ray Tracing on Head-Mounted-Displays for Advanced Visualization of Sheet Metal Stamping Defects	51
<i>Andreas Dietrich, Jan Wurster, Eric Kam, and Thomas Gierlinger</i>	

Sponsors



facebook
Reality Labs

Sponsors



International Programme Committee

Attila Áfra (Intel)
Ulf Assarsson (Chalmers University of Technology)
Carsten Benthin (Intel)
Jiří Bittner (Czech Technical University in Prague)
Petrik Clarberg (NVIDIA)
Cyril Crassin (NVIDIA)
Carsten Dachsbacher (Karlsruhe Institute of Technology)
Michael Doggett (Facebook Reality Labs)
Jonathan Dupuy (Unity Technologies)
Elmar Eisemann (Delft University of Technology)
Takahiro Harada (AMD)
Yong He (Google)
Anton Kaplanyan (Facebook Reality Labs)
Won-Jong Lee (Intel)
Aaron Lefohn (NVIDIA)
Gabor Lipton (Intel)
Jacob Munkberg (NVIDIA)
Mathias Niessner (Technical University Munich)
John Owens (UC Davis)
Anjul Patney (NVIDIA)
Matt Pharr (Google)
Alexander Reshetov (NVIDIA)
Tobias Ritschel (University College London)
Marco Salvi (NVIDIA)
Peter-Pike Sloan (Activision)
Philipp Slusallek (DFKI & Saarland University)
Karthik Vaidyanathan (Intel)
Ingo Wald (NVIDIA)
Rui Wang (Zhejiang University)
Rüdiger Westermann (TUM)
Michael Wimmer (TU Wien)
Chris Wyman (NVIDIA)
Sungeui Yoon (KAIST)
Kun Zhou (Zhejiang University)
Michael Zollhöfer (Stanford University)

Additional Reviewers

Barringer, Rasmus
Behley, Jens
Bender, Jan
Bikker, Jacco
Binder, Nikolaus
Bitterli, Benedikt
Breedon, Katherine
Brunvand, Erik
Conty, Alejandro
Costa, Vasco
Davis, Tim
Denes, Gyorgy
Ernst, Manfred
Fuetterling, Valentin
Gong, Minmin
Goswami, Nilanjana
Gu, Yan
Hadwiger, Markus
Hanika, Johannes
Herholz, Sebastian
Hinkenjann, André
Hornus, Samuel
Hou, Qiming
Huang, Jian
Hunt, Warren
Iehl, Jean-Claude
Karis, Brian
Kondapaneni, Ivo
Lier, Alexander
Loubet, Guillaume
Maierhofer, Stefan
Mara, Michael
Mark, Bill
McGuire, Morgan
Meyer, Quirin
Moon, Bochang
Mora, Frédéric
Nah, Jae-Ho
Nonaka, Jorji
Nowrouzezahrai, Derek
Olano, Marc
Patow, Gustavo
Peters, Christoph
Reuter, Patrick
Schied, Christoph
Sharpe, Brian
Ström, Jacob
Sun, Xin
Tarini, Marco
Thuerey, Nils
Toth, Robert
Vasiou, Elena
Viitanen, Timo
Walter, Bruce
Wu, Jun
Xiao, Lei
Zhao, Shuang

Author Index

Akenine-Möller, Tomas	33	Pascucci, Valerio	7
Andersson, Pontus	33	Pharr, Matt	21
Benthin, Carsten	15	Salvi, Marco	33
Billeter, Markus	45	Scandolo, Leonardo	45
Brunvand, Erik	1	Seiler, Larry	39
Clarberg, Petrik	21	Shkurko, Konstantin	1
Dietrich, Andreas	51	Spjut, Josef	33
Eisemann, Elmar	45	Usher, Will	7
Gierlinger, Thomas	51	Usta, Baran	45
Kam, Eric	51	Vaidyanathan, Karthik	15
Lediaev, Laura	7	Vasiou, Elena	1
Mallett, Ian	39	Wald, Ingo	7
Marroquim, Ricardo	45	Woop, Sven	15
Moreau, Pierre	21	Wurster, Jan	51
Morrical, Nathan	7	Yuksel, Cem	1, 27, 39
Nilsson, Jim	33		

Keynotes

The Story of NVIDIA RTX

Steve Parker

Managing Ultra-high Complexity in Real-time Graphics: Some Hints and Ingredients

Fabrice Neyret

Modern Movie Rendering: How Raytracing Changed my Industry

Luca Fascione (Weta digital)

The movie industry is in the last steps of completing a shift in rendering technology from rasterization-based workflows to path tracing-based ones. We will discuss how and why this change has happened, and propose ideas for where this new path may lead.

Jaakko Lehtinen (NVIDIA, Aalto University)