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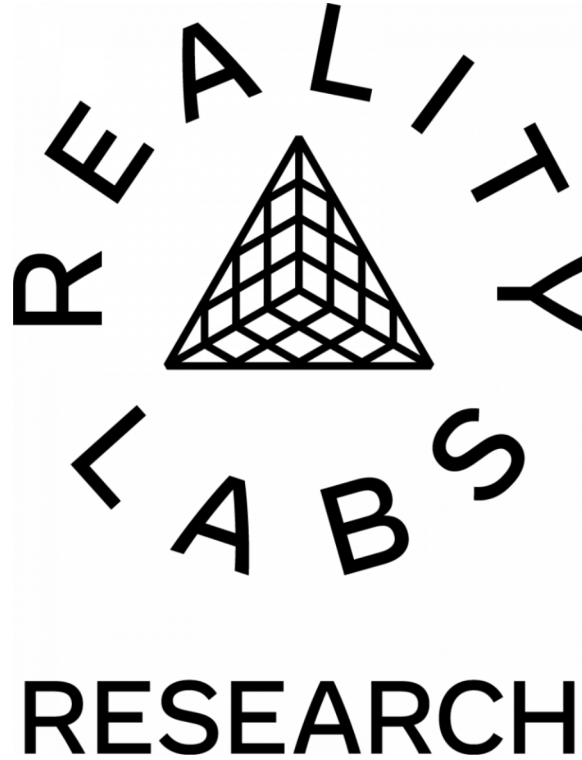
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TABLE OF CONTENTS

Ray Tracing

- Markov Chain Mixture Models for Real-Time Direct Illumination* e14881
Addis Dittebrandt, Vincent Schüßler, Johannes Hanika, Sebastian Herholz, and Carsten Dachsbacher
- Ray-aligned Occupancy Map Array for Fast Approximate Ray Tracing* e14882
Zheng Zeng, Zilin Xu, Lu Wang, Lifan Wu, and Ling-Qi Yan

Neural Rendering

- NEnv: Neural Environment Maps for Global Illumination* e14883
Carlos Rodriguez-Pardo, Javier Fabre, Elena Garces, and Jorge Lopez-Moreno
- Efficient Path-Space Differentiable Volume Rendering With Respect To Shapes* e14884
Zihan Yu, Cheng Zhang, Olivier Maury, Christophe Hery, Zhao Dong, and Shuang Zhao
- Neural Free-Viewpoint Relighting for Glossy Indirect Illumination* e14885
Nithin Raghavan, Yan Xiao, Kai-En Lin, Tiancheng Sun, Sai Bi, Zexiang Xu, Tzu-Mao Li, and Ravi Ramamoorthi

Spectral

- One-to-Many Spectral Upsampling of Reflectances and Transmittances* e14886
Laurent Belcour, Pascal Barla, and Gaël Guennebaud
- A Hyperspectral Space of Skin Tones for Inverse Rendering of Biophysical Skin Properties* e14887
Carlos Aliaga, Mengqi Xia, Hao Xie, Adrian Jarabo, Gustav Braun, and Christophe Hery

NeRF

- ModalNeRF: Neural Modal Analysis and Synthesis for Free-Viewpoint Navigation in Dynamically Vibrating Scenes* e14888
Automne Petitjean, Yohan Poirier-Ginter, Ayush Tewari, Guillaume Cordonnier, and George Drettakis

Materials

- Practical Acquisition of Shape and Plausible Appearance of Reflective and Translucent Objects* e14889
Arvin Lin, Yiming Lin, and Abhijeet Ghosh

Video and Editing

- PVP: Personalized Video Prior for Editable Dynamic Portraits using StyleGAN* e14890
Kai-En Lin, Alex Trevithick, Keli Cheng, Michel Sarkis, Mohsen Ghafoorian, Ning Bi, Gerhard Reitmayr, and Ravi Ramamoorthi

TABLE OF CONTENTS

Interactive Control over Temporal Consistency while Stylizing Video Streams e14891
Sumit Shekhar, Max Reimann, Moritz Hilscher, Amir Semmo, Jürgen Döllner, and Matthias Trapp

LoCoPalettes: Local Control for Palette-based Image Editing e14892
Cheng-Kang Ted Chao, Jason Klein, Jianchao Tan, Jose Echevarria, and Yotam Gingold

Scatter

Iridescent Water Droplets Beyond Mie Scattering e14893
Mengqi (Mandy) Xia, Bruce Walter, and Steve Marschner

A Practical and Hierarchical Yarn-based Shading Model for Cloth e14894
Junqiu Zhu, Zahra Montazeri, Jean-Marie Aubry, Ling-Qi Yan, and Andrea Weidlich

Accelerating Hair Rendering by Learning High-Order Scattered Radiance e14895
Aakash KT, Adrian Jarabo, Carlos Aliaga, Matt Jen-Yuan Chiang, Olivier Maury, Christophe Hery, P. J. Narayanan, and Giljoo Nam

Author Index

Aliaga, Carlos	e14887, e14895	Maury, Olivier	e14884, e14895
Aubry, Jean-Marie	e14894	Montazeri, Zahra	e14894
Barla, Pascal	e14886	Nam, Giljoo	e14895
Belcour, Laurent	e14886	Narayanan, P. J.	e14895
Bi, Ning	e14890	Petitjean, Automne	e14888
Bi, Sai	e14885	Poirier-Ginter, Yohan	e14888
Braun, Gustav	e14887	Raghavan, Nithin	e14885
Chao, Cheng-Kang Ted	e14892	Ramamoorthi, Ravi	e14885, e14890
Cheng, Keli	e14890	Reimann, Max	e14891
Chiang, Matt Jen-Yuan	e14895	Reitmayr, Gerhard	e14890
Cordonnier, Guillaume	e14888	Rodriguez-Pardo, Carlos	e14883
Dachsbacher, Carsten	e14881	Sarkis, Michel	e14890
Dittebrandt, Addis	e14881	Schüßler, Vincent	e14881
Dong, Zhao	e14884	Semmo, Amir	e14891
Drettakis, George	e14888	Shekhar, Sumit	e14891
Döllner, Jürgen	e14891	Sun, Tiancheng	e14885
Echevarria, Jose	e14892	Tan, Jianchao	e14892
Fabre, Javier	e14883	Tewari, Ayush	e14888
Garces, Elena	e14883	Trapp, Matthias	e14891
Ghafoorian, Mohsen	e14890	Trevithick, Alex	e14890
Ghosh, Abhijeet	e14889	Walter, Bruce	e14893
Gingold, Yotam	e14892	Wang, Lu	e14882
Guennebaud, Gaël	e14886	Weidlich, Andrea	e14894
Hanika, Johannes	e14881	Wu, Lifan	e14882
Herholz, Sebastian	e14881	Xia, Mengqi	e14887, e14893
Hery, Christophe	e14884, e14887, e14895	Xiao, Yan	e14885
Hilscher, Moritz	e14891	Xie, Hao	e14887
Jarabo, Adrian	e14887, e14895	Xu, Zexiang	e14885
KT, Aakash	e14895	Xu, Zilin	e14882
Klein, Jason	e14892	Yan, Ling-Qi	e14882, e14894
Li, Tzu-Mao	e14885	Yu, Zihan	e14884
Lin, Arvin	e14889	Zeng, Zheng	e14882
Lin, Kai-En	e14885, e14890	Zhang, Cheng	e14884
Lin, Yiming	e14889	Zhao, Shuang	e14884
Lopez-Moreno, Jorge	e14883	Zhu, Junqiu	e14894
Marschner, Steve	e14893		

Keynote

Wētā FX: The Way of Water Technology

Pavani Rao Boddapati

Abstract

Join Wētā FX's VFX Supervisor, Pavani Rao Boddapati, as she takes a deep dive into the story behind the creation of the 2,225 water shots seen in *Avatar: The Way of Water*. The ambitious story required new technology and techniques as well as close collaboration between researchers, developers, artists, production, and of course, Director James Cameron, to bring his artistic vision to life. The film's development spanned over five years, beginning in 2017 with the Water Development Project. Pavani will discuss what this project entailed and how it was used to evaluate and continuously refine the water pipeline to ensure the toolset could support a crew rapidly onboarding to deliver thousands of these shots with consistent industry leading high fidelity. It was essential that the look and feel of the water felt cohesive throughout the sequences as it interacted with other elements and characters. To achieve this realism and ensure scalability and consistency across the shots, the team took a physics-based approach while developing our in-house technology. Pavani will touch on some of the new features that were introduced to our existing rendering system Manuka – including the ability to look through water and manipulate reflections and refractions using secondary deep data. Pavani will also explore our new unified simulation framework, Loki, which enabled meticulous control of water, fire, hair and cloth elements. The culmination of these technological advancements helped push the boundaries of visual effects and expanded the immersive world of Pandora.

Short Biography

Pavani began her visual effects career at Rhythm and Hues in Los Angeles before joining the lighting team at Wētā FX for James Cameron's *Avatar*. She moved on to *Rise of the Planet of the Apes* and worked as a CG Supervisor on all three of Peter Jackson's *The Hobbit* films. Pavani was also CG Supervisor on *Maze Runner: The Scorch Trials* and on Steven Spielberg's *The BFG*. She was a Sequence VFX Supervisor on *Alita: Battle Angel*, for which she spearheaded the underwater sequence for the Crashed Warship environment. Pavani has been leading the development of Wētā FX's next generation water pipeline. As part of this, a cross-functional team of artists and researchers across disciplines integrates lighting, fluids, rendering and animation to create photorealistic water for any conceivable situation or sequence. This monumental work has led to Pavani's role as a VFX Supervisor on *Avatar: The Way of Water*.

Keynote

What are mental images, and why do we have them?

Thomas Naselaris

Abstract

For many people the experience of mental imagery is inseparable from thinking and remembering. Others don't experience mental imagery at all. Individual variation in the subjective experience of mental imagery has fueled millennia of debate about what mental images are, and what our minds do with them. We argue that mental images are approximate visual representations that are independent of visual input. Using computational models that map mental images to human brain activity, and map human brain activity to mental images, we provide strong evidence for this characterization of mental imagery, and reveal some of the ways in which mental images approximate seen ones. To answer the "why" question, we propose a theory about the computational work that mental images do. According to this hypothesis, mental imagery functions as a useful form of inference that is conditioned on visual beliefs. We implement this form of inference in a simple generative model of natural scenes, and show that it makes testable predictions about differences in tuning to seen and imagined features. We confirm these predictions with a large-scale neuroimaging experiment in which human brain activity was sampled while subjects generated hundreds of mental images. Finally, we will offer some speculations about why the subjective experience of mental imagery varies so dramatically across individuals and states of consciousness.

Short Biography

Thomas Naselaris received a Ph.D. in Neuroscience at the University of Minnesota and completed a postdoctoral fellowship at the University of California, Berkeley. He is an Associate Professor in the Department of Neuroscience at the University of Minnesota, and a member of the Medical Discovery Team on Optical Imaging and Brain Science at the Center for Magnetic Resonance Research. He is co-founder and currently Executive Chair of the Conference on Cognitive Computational Neuroscience.

Keynote

Multum In Parvo: Level of Detail and Approximation Models at the Graphics Nexus

Tamy Boubekeur

Abstract

MIP maps, level-of-details, approximation models, multiresolution processing and multiscale analysis play a central role in 3D computer graphics. In this talk, I will delve into some aspects of our recent contributions to the 3D digital content creation pipeline. From material capture to real-time ray tracing, through surface reconstruction, I will emphasize how these methodologies not only allow for faster and more scalable 3D graphics, but indeed play a major role in the way we design algorithms in 3D and, ultimately, are a fundamental aspect of what we do in our field and how we can impact other areas of applied sciences.

Short Biography

Tamy Boubekeur is a researcher in computer science, specialized in 3D computer graphics. He is currently a Lab Director and Senior Principal Research Scientist at Adobe Research, as well as a Professor at the Computer Science Department of Ecole Polytechnique, Institut Polytechnique de Paris. He is also a Professor (on leave) at Telecom Paris, Institut Polytechnique de Paris. He was previously the founder and head of the Computer Graphics Group at Telecom Paris and chief scientist at Allegorithmic. He was also an Associate Researcher at TU Berlin and a PhD student at INRIA. His lab at large works on 3D visual computing. His personal research areas focus on 3D Computer Graphics, with a special interest in Modeling, Rendering and Learning efficiently 3D data.