The 2016 VGTC Virtual Reality Best Dissertation Award

Ravish Mehra
UNC Chapel Hill
Award Recipient 2016

Ravish Mehra

The 2016 IEEE VGTC Virtual Reality Best Dissertation Award goes to Ravish Mehra, a 2014 graduate from the University of North Carolina at Chapel Hill, for his dissertation entitled: "Efficient Techniques for Wave-Based Sound Propagation in Interactive Applications".

Ravish Mehra is a Research Scientist at the Oculus Research lab. He completed his PhD in Computer Science at the University of North Carolina at Chapel Hill under the supervision of Prof. Dinesh Manocha and Prof. Ming Lin. His dissertation addresses the problem of designing efficient algorithms for simulating sound propagation in VR, with the goal of enabling high-fidelity audio for increased immersion and presence in virtual reality applications.

Specifically, Dr. Mehra's dissertation proposed several new methods for efficiently solving the acoustic wave equation. His first major algorithm was based on adaptive rectangular decomposition using pre-computation and GPU parallelism to handle multiple moving sound sources at runtime. He also proposed a new set of algorithms for handling large outdoor scenes, using concepts from acoustics and electromagnetics related to radiation and scattering, and a novel mathematical solver based on computing transfer functions. Next, he presented an efficient approach for handling directional sound sources as well as listener directivity for wave-based sound propagation. Finally, he presented a novel algorithm to simultaneously handle both moving sound sources and a moving receiver for wave-based propagation.

Dr. Mehra's work in computing personalized head-related transfer functions has generated considerable interest in the spatial audio community, and his sound propagation and spatial sound system has already been integrated into virtual reality systems (Oculus HMD) and game products (Microsoft), with demonstrated benefits.

Audio/video demonstrations of Dr. Mehra's work are available at http://www.cs.unc.edu/~ravishm and YouTube.

AWARD INFORMATION

The IEEE VGTC Virtual Reality Best Dissertation Award was established in 2016. This award is given every year to the author of the best doctoral dissertation in the broad field of virtual reality, defended within the preceding two calendar years. Eligible nominees for the 2016 award included the authors of all relevant dissertations defended between January 1, 2014 and December 31, 2015. A total of 16 nominations were received by the IEEE VR Best Dissertation awards committee and were carefully reviewed by a panel of five leading experts in the field. Each dissertation was read in full by two panel members and after an initial binning process, the top-ranked dissertations were subsequently read (or re-read) by all panelists to determine the winner.

2016 VGTC Virtual Reality Best Dissertation Honorable Mentions

Bireswar Laha
Virginia Tech

Dissertation Title
Immersive Virtual Reality and 3D Interaction for Volume Data Analysis

Advisor
Doug Bowman

Dr. Laha's dissertation centered on the use of virtual reality and 3D interaction technologies by scientists and students working with volumetric data. In addition to presenting a series of controlled experiments on the effects of various display fidelity characteristics on performance in visualization tasks with volume datasets, his research featured the introduction and evaluation of several novel 3D interaction techniques to assist in volume data analysis.

Merwan Achibet
Inria/IRISA Rennes

Dissertation Title
Contributions to the Design of Novel Hand-based Interaction Techniques for Virtual Environments

Advisors
Anatole Lécuyer and Maud Marchal

Dr. Achibet tackled the difficult topic of hand-based haptic interaction with virtual environments, introducing novel models, novel rendering techniques, and novel interaction paradigms for improving manipulation in virtual scenes with haptic feedback, using the full capacities of the hand. His research, which has already resulted in one patent, has potential applications in the automotive industry for improving the learning of complex manipulation tasks.