



UNIVERSITY OF CENTRAL FLORIDA
CENTER FOR RESEARCH IN COMPUTER VISION

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“Interactive Sound Simulation and Rendering”
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ABSTRACT

Extending the frontier of visual computing, sound rendering utilizes sound to communicate information to a user and offers an alternative means of visualization. By harnessing the sense of hearing, audio rendering can further enhance a user's experience in a multimodal virtual world and is required for immersive environments, computer games, engineering simulation, virtual training, and designing next generation human-computer interfaces.

In this talk, we will give an overview of our recent work on sound propagation, spatial sound, sound synthesis, and sound rendering. These include generating realistic physically-based sounds from rigid body dynamics simulations and liquid sounds based on bubble resonance and coupling with fluid simulators. We also describe new and fast algorithms for sound propagation based on improved wave-based techniques and fast geometric sound propagation. Our algorithms improve the state of the art in sound propagation by almost 1-2 orders of magnitude and we demonstrate that it is possible to perform interactive propagation in complex, dynamic environments by utilizing the computational capabilities of multi-core CPUs and many-core GPUs. We describe new techniques to compute personalized HRTFs and have integrated our algorithms the Oculus VR Headset. We also demonstrate applications to design of next-generation musical instruments, computer gaming, room acoustics, and outdoor sound propagation.

Joint work with faculty and students of GAMMA group at UNC Chapel Hill.

BIOGRAPHY

Dinesh Manocha is currently the Phi Delta Theta/Mason Distinguished Professor of Computer Science at the University of North Carolina at Chapel Hill. He has received Junior Faculty Award, Alfred P. Sloan Fellowship, NSF Career Award, Office of Naval Research Young Investigator Award, Honda Research Initiation Award, Hettleman Prize for Scholarly Achievement. Along with his students, Manocha has also received 12 best paper & panel awards at the leading conferences on graphics, geometric modeling, visualization, multimedia, and high-performance computing. He is a Fellow of ACM, AAAS, and IEEE. He received Distinguished Alumni Award from Indian Institute of Technology, Delhi. Manocha has published more than 400 papers in the leading conferences and journals. Some of the software systems related to collision detection, GPU-based algorithms, sound simulation, and geometric computing developed by his group have been downloaded by more than 150K users and are licensed to more than 50 leading companies in computer graphics, CAD, simulation, gaming, and robotics. He has supervised 26 Ph.D. dissertations.