The 2004 Visualization Technical Achievement Award

Amitabh Varshney

This 2004 Visualization Technical Achievement Award goes to Amitabh Varshney, University of Maryland, in recognition of seminal achievements in scientific visualization of molecular surfaces.

Amitabh Varshney has been working on molecular visualization for drug design over the last decade. Drug design is now a well-established area of scientific inquiry. In fact, the 1908 Nobel laureate Paul Ehrlich was one of the first to systematically test over 600 chemical compounds against diseases. Today, we do not operate quite as much in the dark as he did, and part of the reason is the work on visualization of molecular structures by researchers such as Amitabh. The IEEE VGTC is pleased to award Amitabh Varshney the 2004 Visualization Technical Achievement Award.

Amitabh Varshney
University of Maryland

Award Recipient 2004

Biography

Amitabh Varshney is an Associate Professor of Computer Science at the University of Maryland, College Park. He received his B. Tech. in Computer Science from the Indian Institute of Technology, Delhi in 1989 and his MS and Ph.D. from the University of North Carolina at Chapel Hill in 1991 and 1994.

Amitabh's Ph.D. dissertation "Hierarchical Geometric Approximations" under the guidance of Fred Brooks describes methods for progressive approximations of molecular surfaces and general 3D meshes. This led to papers at IEEE Visualization 93 and IEEE Visualization 95 that outlined parallel, linearly scalable, and analytically accurate approaches to fast computation and visualization of smooth molecular surfaces and their interfaces. Interactive computation and display of molecular surfaces and their interfaces provided powerful visualization tools to the biochemists that helped them interactively visualize the effects of changing the probe-radius, changing atom positions due to user-defined forces, and in incorporating the effects of the solvent into the overall potential energy computations during interactive molecular modeling. The software to compute and display molecular surfaces, SURF, that Amitabh has developed is being widely used, including as a component of the University of Illinois's VMD system and IBM's Blue Gene project.

Amitabh joined the State University of New York at Stony Brook as an Assistant Professor of Computer Science in 1994 and received an NSF CAREER award in 1995. While at Stony Brook, Amitabh became interested in fast rendering of molecular surfaces using triangle strips (IEEE Visualization 96) and view- and illumination-dependent simplifications (IEEE Visualization 96). These papers, presented in the same session at this conference, have since then gone on to become two of the most cited papers in the history of the Visualization conference.

After moving to the University of Maryland in 2000,

Amitabh explored methods to define and visualize uncertainty in molecular surfaces and computation and visualization of molecular electrostatics. Amitabh's joint work with his students and colleagues has resulted in one of the first definitions of fuzzy molecular surfaces that incorporate uncertainty in atom positions due to thermal motion. He and his students have also contributed inspiring research in analysis of precision-guided rendering of molecular surfaces. Electrostatic interactions influence nearly all aspects of biochemical reactions, including macromolecular folding and conformational stability, as well as the structural and functional properties of proteins, such as their shapes, binding energies, and association rates. Recent research by Amitabh and his colleagues has shown how molecular surfaces can be used to efficiently calculate and visualize protein electrostatics.

Amitabh's research on visualization of molecular surfaces has also had a significant impact beyond molecular visualization. His research results have strongly influenced ensuing developments in the areas of level-of-detail modeling and view-dependent rendering of large meshes used in various application areas of scientific visualization.

Award Information

The IEEE VGTC Visualization Technical Achievement Award was established in 2004. It is given every year to recognize an individual for a seminal technical achievement in visualization. VGTC members may nominate individuals for the Visualization Technical Achievement Award by contacting the awards chair, John Staudhammer, at http://tab.computer.org/vgtc/.