Tutorial: Advanced Material Appearance Models

Date: Tuesday, April 15th
Time: 09:00 - 12:30 (**Half-day Tutorial)**

Presenters:
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Abstract: This tutorial will cover the foundational elements of advanced material appearance models. For many years appearance models in computer graphics focused on general models for reflectance functions coupled with texture maps. However, over the past few years it has been recognized that even very common materials such as hair, skin, fabric, and rusting metal require more sophisticated models to appear realistic.
In the tutorial we will begin by briefly reviewing basic reflectance models and the use of texture maps. We will then describe some common themes in advanced material models that include combining the effects of layers, groups of particles and or fibers. We will survey the detailed models necessary needed to model materials such as (but not limited to) skin (including pigmentation, pores, subsurface scattering), plants (including internal structure affecting scattering and characteristic shapes) and paints (including color flop and sparkle effects in automotive paints). In the next section of the tutorial we will treat the modeling of complex appearance due to aging and weathering processes. A general taxonomy of these effects will be presented, as well as methods to simulate and to capture these effects. The tutorial will close with a look at current trends in material modeling research.

Tutorial: Advanced Material Appearance Models

Julie Dorsey is a Professor of Computer Science at Yale University, where she teaches computer graphics. She came to Yale in 2002 from MIT, where she held tenured appointments in both the Department of Electrical Engineering and Computer Science (EECS) and the School of Architecture. She received undergraduate degrees in architecture and graduate degrees in computer science from Cornell University. With architecture as a driving application, she has studied a wide range of problems in computer graphics, including sketch-based interfaces for early conceptual design, acceleration methods for real-time rendering, and the creation of detailed photorealistic renderings. Her contributions also include algorithms for lighting and acoustical design and visualization. She is particularly well known for her research in modeling the appearance of materials – for example, she pioneered techniques to model the visual richness of irregular metal patinas and eroded stone. Her current research interests include photorealistic image synthesis, material and texture models, illustration techniques, and interactive visualization of complex scenes, with an application to urban environments. In addition to serving on numerous conference program committees, she is an associate editor for IEEE Transactions on Visualization and Computer Graphics and The Visual Computer, and was Papers Chair for ACM SIGGRAPH 2006. She has received several professional awards, including MIT's Edgerton Faculty Achievement Award, a National Science Foundation Career Award, and an Alfred P. Sloan Foundation Research Fellowship.

Holly Rushmeier received the BS, MS and PhD degrees in Mechanical Engineering from Cornell University in 1977, 1986 and 1988 respectively. Between receiving the BS and returning to graduate school in 1983 she worked as an engineer at the Boeing Commercial Airplane Company and at Washington Natural Gas Company (now a part of Puget Sound Energy). In 1988 she joined the Mechanical Engineering faculty at Georgia Tech. While there she conducted sponsored research in the area of computer graphics image synthesis and taught classes heat transfer and numerical methods at both the undergraduate and graduate levels. At the end of 1991 Dr. Rushmeier joined the computing and mathematics staff of the National Institute of Standards and Technology, focusing on scientific data visualization.

From 1996 to early 2004 Dr. Rushmeier was a research staff member at the IBM T.J. Watson Research Center. At IBM she worked on a variety of data visualization problems in applications ranging from engineering to finance. She also worked in the area of acquisition of data required for generating realistic computer graphics models, including a project to create a digital model of Michelangelo's Florence Pieta, and the development of a scanning system to capture shape and appearance data for presenting Egyptian cultural artifacts on the World Wide Web. Dr. Rushmeier was Editor-in-Chief of ACM Transactions on Graphics from 1996-99. She has also served on the editorial board of IEEE Transactions on Visualization and Computer Graphics. She is currently on the editorial boards of Computer Graphics Forum, IEEE Computer Graphics and Applications and ACM Transactions on Applied Perception. In 1996 she served as the papers chair for the ACM SIGGRAPH conference, in 1998,2004 and 2005 as the papers co-chair for the IEEE Visualization conference and in 2000 as the papers co-chair for the Eurographics Rendering Workshop. She has also served in numerous program committees including multiple years on the committees for SIGGRAPH, IEEE Visualization, Eurographics, Eurographics Rendering Workshop, and Graphics Interface. Dr. Rushmeier has lectured at many meetings and academic institutions, including three invited keynote presentations at international meetings (including Eurographics Rendering Workshop 94 and Eurographics Conference 2001.) She has spoken at and/or organized many tutorials and panels at the SIGGRAPH and IEEE Visualization conferences.