

# Measurement Based Appearance Modelling

## Abstract

This tutorial will cover measurement based appearance modelling for graphics and vision, with a focus on acquisition of facial and material appearance including shape and reflectance properties. The tutorial will first introduce fundamentals such as the BRDF and the BSSRDF and physically based surface and subsurface scattering models. Building upon these, the tutorial will present various techniques for acquisition of facial geometry and reflectance including state of the art techniques employed for high quality facial acquisition for visual effects and games. Central to these acquisition techniques will be measurements under various types of controlled illumination. Specifically, we will cover practical ways of measuring layered skin reflectance including surface and subsurface scattering using a small set of measurements as well as state of the art techniques for multi-view facial geometry and reflectance acquisition with polarized spherical gradient illumination. The tutorial will also cover a recent technique for measuring skin micro-geometry at the resolution of a few microns for very high resolution (16K) rendering of skin for increased realism.

The second half of the tutorial will focus on measurement and modelling of material reflectance properties. Here, the discussion will be restricted to BRDFs and spatially varying BRDFs for representing material appearance. Once again, controlled illumination techniques using various lighting setups will be presented for estimation of spatially varying diffuse and specular reflectance properties including albedo, surface normals, specular roughness and in some cases anisotropy. The tutorial will conclude with discussion of some recent advances in material appearance acquisition using commodity hardware such as LCD screens and mobile devices.



### Biography

Dr Abhijeet Ghosh is currently a Lecturer in the Department of Computing at Imperial College London. His main research interests are in appearance modelling, realistic rendering, and computational photography. Previously, he was a senior researcher and research assistant professor at the University of Southern California Institute for Creative Technologies where he worked on Light Stage based acquisition. Abhijeet received his PhD in computer science from the University of British Columbia. His doctoral dissertation, “Realistic Materials and Illumination Environments”, received an Alain Fournier Award and his doctoral work on BRDF acquisition received a Marr Prize Honorable Mention (ICCV 2007). He currently holds a Royal Society Wolfson Research Merit Award and an EPSRC Early Career fellowship at Imperial College London.