

Session Speakers/Panellists

Karol Myszkowski



Short Biography: Karol Myszkowski is a senior researcher at the MPI Informatik, Saarbruecken, Germany. In the period from 1993 till 2000 he served as an associate professor in the Department of Computer Software at the University of Aizu, Japan. In the period from 1986 till 1992 he worked for Integra, Inc. a Japan-based, company specialized in developing rendering and global illumination software. He received his PhD (1991) and habilitation (2001) degrees in computer science from Warsaw University of Technology (Poland). In 2011 he was awarded with a lifetime professor title by the President of Poland. His research interests include global illumination and rendering, perception issues in graphics, high dynamic range imaging, and stereo 3D. He co-authored the book High Dynamic Range Imaging, and participated in various committees and editorial boards. He also chaired ACM SIGGRAPH Asia 2020, and co-chaired Rendering Symposium in 2001, ACM Symposium on Applied Perception in Graphics and Visualization in 2008, Spring Conference on Computer Graphics 2008, and Graphicon 2012.

Presentation Title: The effect of shape and illumination on material perception: model and applications

Abstract: Material appearance hinges on material reflectance properties but also surface geometry and illumination. The unlimited number of potential combinations between these factors makes understanding and predicting material appearance a very challenging task. In this work, we collect a large-scale dataset of perceptual ratings of appearance attributes with more than 215,680 responses for 42,120 distinct combinations of material, shape, and illumination. The goal of this dataset is twofold. First, we analyze for the first time the effects of illumination and geometry in material perception across such a large collection of varied appearances. We connect our findings to those of the literature, discussing how previous knowledge generalizes across very diverse materials, shapes, and illuminations. Second, we use the collected dataset to train a deep learning architecture for predicting perceptual attributes that correlate with human judgments. We demonstrate the consistent and robust behavior of our predictor in various challenging scenarios, which, for the first time, enables estimating perceived material attributes from general 2D images. Since the predictor relies on the final appearance in an image, it can compare appearance properties across different geometries and illumination conditions. Finally, we demonstrate several applications that use our predictor, including appearance reproduction using 3D printing, BRDF editing by integrating our predictor in a differentiable renderer, illumination design, or material recommendations for scene design.