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Computational illumination techniques for appearance acquisition and modeling

Abhijeet Ghosh
Imperial College London, UK

This talk will cover state of the art techniques for acquisition of facial and material appearance including shape and reflectance properties. Central to the acquisition will be measurement under controlled illumination using various acquisition setups. The first part of the talk will present state of the art techniques for acquisition of facial geometry and reflectance using polarized illumination which are currently employed for facial acquisition for visual effects in movies and games. Specifically, the talk will cover practical ways of measuring layered skin reflectance including surface and subsurface scattering using a small set of measurements as well a state of the art technique for multi-view facial geometry and reflectance acquisition with polarized spherical gradient illumination. The talk will also present some recent results of 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 talk will focus on measurement and modeling of material reflectance properties. Once again, controlled spherical illumination from various lighting setups will be presented for estimation of spatially varying diffuse and specular reflectance properties including albedo, surface normals, specular roughness and anisotropy.

abhijeet.ghosh@imperial.ac.uk

The implementation of an interactive phenomenological narrative through real time 3D animations, 2D animations, 3D models, images, and virtual environments using augmented reality

Andres Montenegro
Purdue University, USA

This presentation will articulate the conceptual and practical implementation of an interactive system based on animations and 3D models. It will utilize the Augmented Reality quick responses (QR) display graphics. The proposed model will open a discussion about how to display a dynamic navigation within an artificial setting or environment created through AR as well. Augmented Reality in the world of computer graphics is simply defined as the action of superimposing, via software generation, an artificial construction (computer generated) over the real world surface. This visualization process occurs when the camera of a mobile device like the iPhone, iPad, or other holographic optical based gadget, perceives and exposes graphics and images linked to a marker component that is attached to a real world object. Today the potential of interactive animations and images combined with text makes the content development in Augmented Reality a very promising venue to implement an artistic narrative based on multiple responses. Of course the viewer will be able to organize or manipulate this system. The same conceptual and practical model can be implemented for Virtual Reality immersive environments. In this presentation there will be several examples developed by my students, including my personal projects as well. The audience will appreciate the use of tactile gestures, body movements (through accelerometers) and other sensing capabilities provided by mobile devices (based on Android, or iOS). The ultimate goal of the presentation is to feature a compelling narrative based on an experiential phenomenological approach. It will be achieved by the manipulation of animations, images, 3D models, and virtual environments.

montenea@ipfw.edu