Real Time High Fidelity Augmented Reality

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September, 2008

Introduction

Augmented reality systems mix real images with virtual objects. Rendered virtual objects are composited with still images or video. There is a wide range of applications, including medical imaging, cartography, special effects for the movie industry and entertainment.

For the composition of virtual objects with real ones to be of acceptable quality several different types of information must be retrieved from the images, including:

- Depth, to allow more distant objects to be occluded by closer ones;

- Lighting conditions, to allow virtual objects to be lighten using the same light distribution as in the real environment;

- Geometric information, to allow mutual illumination effects among virtual and real objects, e.g. casting shadows onto each others and accounting for indirectly reflected/transmitted light.

Although many advances have been done over the last few years regarding augmented reality systems and techniques there is still a lack for a systematic, unified approach and real time response times are only possible for very limited functionality. However, real time is a major requirement for the entertainment industry in interactive settings.

Goals

- Propose and evaluate a systematic approach to retrieve from real images/video the information necessary to implement high fidelity augmented reality effects;

- Extend and evaluate the previous approach to interactive conditions;

- Develop a prototype to demonstrate both the potential of the proposed approach and the acceptability of the overall concept for a carefully selected interactive application.

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