Title: Creating, Rendering and Interacting with Images based on the Study of Perception

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Abstract:
The research directions of the CRISP associate team can be summarized as follows:

1. Perception: Images are generated from the interaction of lighting, material, and geometry. We will evaluate how people perceive material, lighting, and geometry in realistic images such as photographs, and non realistic images such as drawings and paintings. This knowledge of human perception is essential for developing efficient rendering algorithms and interaction tools that focus on the most important perceptual features of an image.

2. Rendering: We will develop rendering algorithms that generate images that are plausible with respect to the user's intent and allocate resources on the visual features that best contribute to perception. We will also explore the use of non-photorealistic rendering to enhance perception of lighting, material, and geometry.

3. Interaction: We will facilitate the creation and manipulation of images by developing novel drawing and editing interfaces for novice and professional users. Our aim is to give users direct and high-level handles on the relevant visual features that contribute to the perception of material, lighting and geometry in an image. CRISP builds on an existing collaboration initiated with the postdoctoral fellowship of Adrien Bousseau at Berkeley, and involves both computer science professors (M. Agrawala, R. Ramamoorthi) and a professor in (human) vision science (M. Banks).

In this talk, we will present several ongoing collaborative projects in the domains mentioned above. We will first describe a recently initiated study of the effect of stereo and head tracking on material perception, which uses the immersive space equipment at INRIA Sophia-Antipolis. We then discuss a project on the use of crowdsourcing as a way to perform perceptual validation of computer graphics algorithms, or to investigate perceptual measures which are useful in graphics and image processing. We will also discuss a study of how users perceive materials in stylized (i.e., non realistic, artistic) renderings. Finally, we will present our results on an approach which attempts to find the best lighting environment to enhance the perception of material properties.