Photorealistic Modeling of Large-Scale Scenes

3-D models of large-scale scenes, buildings, and eventually entire cities are of great importance for use in many virtual reality applications, for example computer-generated film scenes. Creating these models is difficult, since normal camera views provide only 2-D information. Range scanners, the current approach, are expensive tools that generate 3-D point clouds, but without the color and texture information available from simply taking many ordinary photographs.

A research team led by Professor George Wolberg and Professor Ioannis Stamos of Hunter College has developed a system to create photorealistic 3-D models. The technique integrates multiview geometry and automated 3-D registration methods to map high resolution 2-D images onto dense 3-D laser range data. The system generates accurate, life-like 3-D simulations that can be used for virtual tours, role-playing games and automated driving programs, among many other applications. Here is their model of the historic Shepard Hall as an example.

1: Photograph of Shepard Hall
2: A 3-D model of Shepard Hall that is accurate to 5 mm, generated from 24 laser range scans of the building using 3-D registration software.
3: Digital photos are taken all around the building. The program recovers the location of the cameras and maps the resulting pictures onto the 3-D model.
4: The resulting phototextured 3-D model and the recovered 3-D camera pose information.