Efficient Large Scale Acquisition of Building Interiors

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Geometry and color models of large scale indoor environments are invaluable to numerous applications in science, engineering, defense, art, and entertainment. The state of the art in automated modeling offers good solutions for /outside-looking-in/ modeling, when a relatively small scene is acquired using a few viewpoints located outside the scene. No complete solution exists for modeling in the /inside-looking-out/ case, when the acquisition device and the operator are immersed in the scene to be acquired. The sheer size of the scene with complex occlusions and large range of depths make inside-looking-out acquisition particularly challenging.

We developed a system for modeling and visualizing large scale building interiors. The system is efficient and the resulting model supports high-quality visualization at interactive rates. We extended the capabilities of color panoramas by sampling sparsely the geometry during color acquisition. The geometry allowed us to remove the single viewpoint limitation of color panoramas without sacrificing their acquisition efficiency and low cost. As a proof of our system capabilities we have captured corridors spanning 6 floors of the Math building, with 20 attached rooms. To the best of our knowledge, this is the largest acquired indoor scene model.