Lecture notes: Range cameras

Stereo can be made to work, but it is cumbersome. Difficult problems must be solved, including camera calibration and the correspondence problem. Range cameras are alternatives to stereo rigs that can measure the 3D locations of world points directly.

We will cover two types of range cameras. There are two documents posted at the course web site named RangeCamerasIntro.pdf and RangeCameras.pdf. The former contains a series of illustrations and images to explain how range cameras work. The latter is a chapter from this author's dissertation providing details on how they work. Both documents will be used during the lecture.

Summarizing the differences between different types of range cameras:

range camera type	**strength(s)**	**weakness(es)**
stereo rig	passive inexpensive	correspondence problem poor for non-textured surfaces two optical paths required
structured light scanner	inexpensive works on plain surfaces	slow (for active sensor) two optical paths required
laser radar finder	fast one optical path okay for plain surfaces	expensive (mirrors) phase wrap
confocal depth camera	fast one optical path	poor for smooth surfaces okay precision