

SURFACE RECONSTRUCTION USING VIDEO DATA FROM A MOVING CAMERA

Thesis defense: Masters of Science in Electrical Engineering

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ABSTRACT

There are many applications in engineering wherein a camera is used to investigate the interior surface of an object, such as a pipeline, a borehole, or a patient's trachea. In this thesis, a method is proposed for reconstructing a single panoramic image of the interior surface of an object using feature point correspondences in video data from an endoscopic camera. The applications of this approach would include pipeline inspection, computer assisted endoscopy, robotic vision, and various other areas in non-destructive testing. Here, we assume the object of interest has a cylindrical shape and that the camera focal length is known. The location and motion of the camera is estimated from feature point correspondences extracted via the Scale-Invariant Feature Transform (SIFT) applied to sequential video images. Finally, a panoramic image of the interior surface of the object is reconstructed from the entire video sequence based upon the estimated parameters. The performance of the algorithm was demonstrated using both simulated and actual video data sets.