

VISION-BASED ANALYSIS OF CONVENTIONAL SURGICAL PROCEDURES

Contact Details:

Prof. Darius Burschka and Dipl.-Inf. Oliver Ruepp
Machine Vision and Perception Group
Technische Universität München, Germany

Email:

{burschka|ruepp}@cs.tum.edu



Abstract:

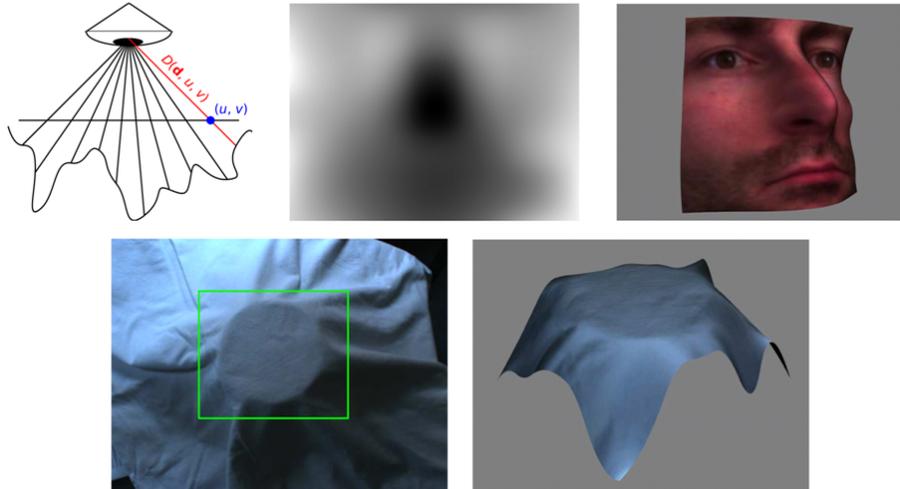
Analysis tools for surgical procedures typically rely completely on motion data provided by a medical surgery robot, and thus are not able to work in absence of such data during conventional manual surgeries. Our aim is to extract essential information about the procedure itself (workflow-synchronization) and the motion constraints during the consecutive steps of the procedure from observations of standard procedures. This information can be used for several important safety features during the procedure. An important outcome of the work is a procedural data description for a better skill-assessment of a surgeon which allows to monitor the skill level and which may give suggestions for improvement in some steps of the surgery. The second safety relevant information derived from the processing is the information about fixtures and motion constraints during the surgery which may help to assess dangerous situation by a system monitoring the surgery and which also provides essential information to map a conventional surgery on a robotic system. We will present a system observing conventional surgery that provides the motion data and our approach for robust 3D reconstruction in poor textured environments which are common in many domains of surgical procedures.



Source: MedGadget

Fig. 1. Skill-Transfer from Conventional to Robotic Surgery [1].

Problem: Monocular 3D reconstruction from sparsely textured images



Novel photogrammetric approach applied to medical imaging domain

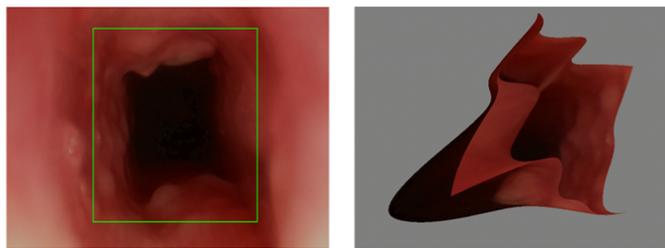
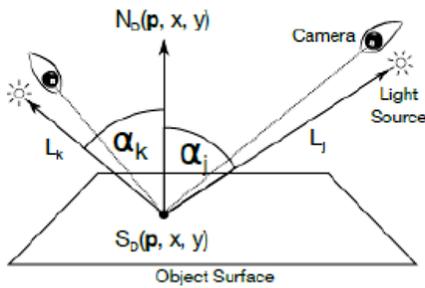


Fig. 2. Safety through robust monocular 3D reconstruction from endoscopic images.

Publications:

[1] Susanne Petsch and Darius Burschka. Estimation of Spatio-Temporal Object Properties for Manipulation Tasks from Observation of Humans. In Proceedings of the IEEE International Conference on Robotics and Automation, pages 192-198, Anchorage, Alaska, USA, May 2010. [2] Oliver Ruepp and Darius Burschka. Fast Recovery of Weakly Textured Surfaces from Monocular Image Sequences. Asian Conference on Computer Vision (ACCV) 2010