Technical specifications

- 3-D panoramas can be displayed on stereoscopic and auto-stereoscopic output devices
- Support of various image file formats (JPEG, TIFF, PNG)
- Intuitive user interface
- Can be integrated into your own software applications
- System requirement: dual-core standard PCs with NVIDIA graphic cards

Endorama-3D is not yet approved as a medical product. Fraunhofer IIS is presenting Endorama 3-D with the objective of gaining partners for further development, production, and marketing.

www.iis.fraunhofer.de/endorama

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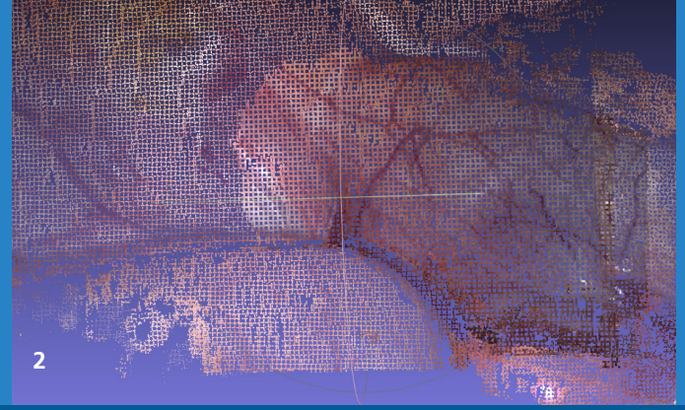
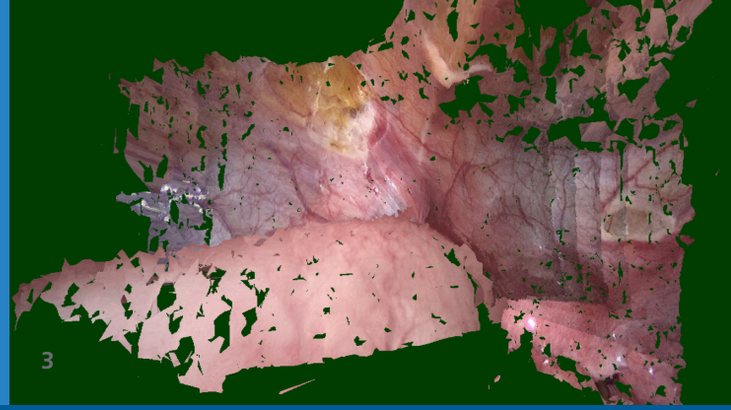
ENDORAMA-3D: 3-D PANORAMA ENDOSCOPY FOR EXTENDING THE FIELD OF VIEW





Clinical challenge

A limited field of view (so-called »keyhole view«) as well as limited orientation and navigation are challenges for minimally invasive endoscopic procedures such as laparoscopy, arthroscopy, or transnasal interventions.
Recently, these procedures are performed more often using stereo endoscopes because they maintain the visual depth for the surgeons. To visually capture the entire surgical field during such a minimal invasive procedure and, in so doing, obtain an overview of the operating area, the endoscope (laparoscope, arthroscope, etc.) is moved in spirales around an entry point (trocar).
Because the view captured by the endoscope is spatially limited and only temporarily visible, the examiner must create theoretical associations between the field of view and its anatomical context.

Our solution – panorama views at a glance

So-called »Stitching technologies« can be used to generate 3-D panorama images of the surgical area from the recorded image data streams of a stereo endoscope (Fig. 3). These 3-D panorama images allow several views from the endoscope to be displayed simultaneously, while maintaining the visual depth impression.

To do so, each endoscopic stereo image in a series is broken up into its texture and depth components. A 2-D panorama is created from the sequence of texture images (Fig. 1) and the associated depth maps are merged into an overall depth map (Fig. 2).
Both of these parts (texture and depth) are then combined and presented as a 3-D panorama (Fig. 3).

The created 3-D panoramas can be displayed on stereoscopic and autostereoscopic output devices.
The 3-D panorama representation of the operating area allows the field of view to be expanded dynamically during the procedure, which speeds up orientation and improves navigation.

Your benefits at a glance

- Expanded field of view during stereo endoscopy
- Faster orientation
- Improved navigation
- Documentation of the expanded field of view
- Panorama image can be integrated into digital patient records
- Intuitive interaction (pan and zoom) for viewing the 3-D panorama image

1 *2-D panorama (texture only) from the abdomen*

2 *Depth map panorama from a stereoscopic sequence of the abdomen*

3 *3-D panorama (texture and depth) of the abdomen with Endorama 3-D*