



**Fraunhofer**  
IIS

FRAUNHOFER INSTITUTE FOR  
INTEGRATED CIRCUITS IIS

# **ENDORIENTATION: ENDOSCOPIC ORIENTATION**





**Video endoscopes with an image sensor on the distal end of the endoscope are more and more common in endoscopic surgery. Though delivering excellent image quality, these devices do not provide a stable horizon on endoscopic images. The rotation of the endoscopic camera is not compensated. The image displayed on the screen rotates with it impeding orientation and diminishing efficiency in various specialist fields – from surgery to urology to modern interventional procedures like NOTES and single-port surgery – especially also during hybrid interventions.**

### **Our Solution: Endorientation**

To improve orientation and efficiency of surgical interventions Fraunhofer IIS developed the Endorientation technology. A tiny MEMS tri-axial inertial sensor is integrated into the distal tip of an endoscope measuring the impact of gravity on each of the three orthogonal axes. External magnetic field generating and referencing devices are not required, which would take up precious space in the operating room.

Special advantage: our solution does not require the integration of extra cables for additional sensor data, since they can be combined with the image data at the distal end for transmission.



After filtering the acceleration values, the orientation of the tip of the endoscope is constantly recalculated. Achievable repetition rate is above the usual endoscopic video frame rate of 30Hz; accuracy is about one degree. The image rotation is performed in video frame rate by digitally rotating the endoscopic image.

### **Benefits**

Improvements and benefits have been evaluated in animal studies. The simultaneous coordination and guiding of different instruments was rated to be much more intuitive with a stable horizon on endoscopic images. The established times per work step and motion paths clearly sustain this observation. Better orientation provides for more efficiency and accuracy during endoscopic intervention.

<http://www.iis.fraunhofer.de/EN/bf/nl/technologie/in/index.jsp>

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*Endorientation has not yet been certified as a medical product.*

*Fraunhofer IIS presents this functional prototype with the aim of engaging partners for further development as well as for production and marketing.*

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