

Medical Technology | Technology Offer

## Novel Radar Wave Endoscope

### Innovation

Radar waves offer a substantially better space and time resolution than optical or ultrasonic waves, particularly in near field applications.

Researchers at Stuttgart University developed the concept for an endoscope for investigating cavities in the human body, for example the stomach and the intestinal tract, by means of millimeter waves and/or sub-millimeter waves. It produces a 3D image of the region surrounding the endoscope probe.

The emitted radiation together with the signal reflected by the object under investigation – in general a section of the wall of the cavity under examination – provide useful information based on the radar principle by making use of the Doppler effect regarding the distance from the probe to the wall and the speed of the probe relative to the wall. The method also reveals details of the consistence of the cavity wall itself, i.e.:

- the information about the distance and relative speed assists the safe manipulation within the cavity, i.e. accidental contacts that could damage the wall can be prevented
- the information regarding the tissue constitution of the wall allows the detection of changes induced by diseases, e.g. by tumors; it can also be used to analyze alterations of the tissue *in vivo*.

In principle, it is possible to build a novel type of endoscope by using this radar wave technology. Moreover, it should also be possible to upgrade conventional endoscopes by adding a fully integrated radar in the form of an adequate chip (radar chip).

### Current State of the Technology

Rigid endoscopes deliver the visual information of the object to be investigated by means of a system of lenses within the endoscope up to the eye piece.

Flexible endoscopes deliver the image information via optical fibers after recording it by means of optical sensors. In lieu of light signals, it is also possible to use ultrasound. However, then the operator must rely on the information gained while guiding the probe, which can lead to mistakes and consequently tissue damage.

The analysis of the object under investigation is undertaken *in situ* on the basis of the same image information, which can imply uncertainties, even with experienced operators, or by biopsy, i.e. through analysis outside the body, which involves significant delay.

### Fields of Application

Investigations of cavities in the human body, e.g. the stomach and the intestinal tract, regarding disease related changes of the tissue, e.g. as a consequence of tumors.

Industrial applications are also possible, for example internal inspections for corrosion or for damages to machines, pipes, containers and tanks.

### Your Advantage at a Glance:

- ✓ Better and safer navigation
- ✓ Contact-free analysis of tissue *in situ*, no sample excision is needed
- ✓ Relatively modest instrumental requirements
- ✓ Feasible retro-fitting of conventional endoscope

### Patent Portfolio

Patent application has been filed.

### Technology Transfer

The Technologie-Lizenz-Büro GmbH is encharged with the commercialization of this innovative development and it now offers companies the opportunity to obtain a license to exploit this new and promising technology.

For more information, please contact:

Dr Frank Schlotter  
[fschlotter@tlb.de](mailto:fschlotter@tlb.de)

Technologie-Lizenz-Büro (TLB)  
 der Baden-Württembergischen Hochschulen GmbH  
 Ettlinger Straße 25, D-76137 Karlsruhe, Germany  
 Tel. +49 721 79004-0, Fax +49 721 79004-79  
[www.tlb.de](http://www.tlb.de)