FRAUNHOFER IGD: THE INTERNATIONAL LEADING INSTITUTE FOR APPLIED RESEARCH IN VISUAL COMPUTING

Competence Center “Visual Healthcare Technologies”
Topics and competencies at a glance:

- Medical image processing
- Image-guided therapy
- Tracking and navigation
- Computational anatomy

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Improved orientation with image-guided intervention

We present a state-of-the-art navigation solution which combines technologies such as augmented reality (AR) and tracking. This solution assists doctors in the operating room, improving orientation during surgical interventions. It enables doctors to locate anatomic structures more accurately and position instruments with greater precision.

AR glasses overlay the position of the lymph node as a virtual mark for the doctor. The AR glasses work in combination with:

- A powerful software for medical navigation
- A stereo system of near-infrared cameras (NIR)
- The fluorescent dye indocyanine green (ICG)

...and this is how it works:

- The doctors inject the patient with a fluorescent dye in the immediate vicinity of the tumor, where the dye then accumulates in the affected lymph node.
- Infrared light renders the dye fluorescent, making the lymph node directly linked to the tumor visible, ready for removal.
- NIR cameras capture the fluorescence and reconstruct the lymph node in 3D.

- The AR glasses then overlay the node's precise position for the doctor in real time.
- The dye allows doctors to ensure that they have actually removed everything that they needed to.

Advantages for patients: Fluorescent dye in place of radioactive nanocolloid

The new system uses the dye indocyanine green (ICG) in place of the radioactive substance used to date. Less harmful to the human body, ICG also presents a good alternative when used in combination with an infrared camera and AR glasses. It enables doctors to mark affected lymph nodes and remove them completely.

...and doctors also gain an advantage in terms of time

Lymph nodes did not irradiate very strongly when the previous radioactive marker was used. Scintillation cameras were required to provide images to locate the exact position of the lymph node, a process which takes about 30 minutes. Here, AR glasses overlay the affected node immediately and the operator does not need to look at the additional monitor to align the image on the monitor screen with the camera image.