

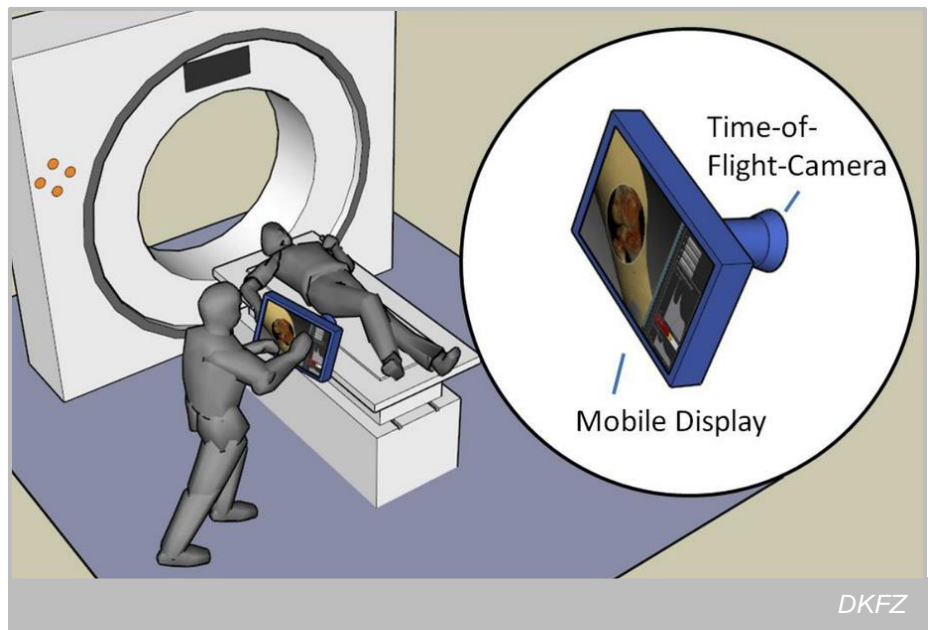
TECHNOLOGY OFFERS

Mobile On-Patient Visualization Device of Medical Images (P-952)

A handy and cheap visualization device that makes medical images visible directly on the patient

EXECUTIVE SUMMARY

We developed a new concept for on-patient visualization of anatomical data acquired with an arbitrary modality (typically CT or MRI). The method is based on a mobile device consisting of a flat display and a Time-of-Flight (ToF) camera which can be moved along the patient to provide a view on internal anatomical structures via augmented reality. For this purpose, the pose of the mobile device, which represents the viewing direction of the user, is continuously estimated by registering (i.e., aligning) the ToF data acquired during the visualization process with the patient surface extracted from the 3D medical data set. During camera pose estimation, a custom-designed algorithm accounts for the camera specific localization errors. In the current implementation, four different visualization modes are available.



DKFZ

Category

Devices,
Software

Indication

MRI, CT Scan

Development stage

Prototype

Seeking

Licensing

BENEFITS

- No reference markers are needed for localization
- Movements of the patient are allowed
- Inexpensive hardware/software equipment suitable not only for bigger hospitals, but also for smaller doctors' practice

TECHNOLOGY BACKGROUND

Visualization of patients' anatomical data is mainly done on a monitor of a radiological workstation after subsequently manipulation of static 3D images acquired with computed tomography (CT) or magnetic resonance imaging (MRI) scanners. Although image-guided surgery profits from today's powerful image acquisition and processing techniques, visualization and interaction with preoperatively acquired images is still challenging and rather non-intuitive. This is because the provided displays require the physician to mentally transfer the 3D virtual image to the patient. This not only requires considerable skill and experience, but is also prone to failures, which might have very serious consequences for the patient under therapy.

DEVELOPMENT STAGE

DKFZ is developing a prototype including hard- and software in order to validate it.

APPLICATIONS

Since the developed visualization device combines many advantages, the applicability ranges from all kind of classical surgical planning to e.g. anatomy teaching and dialog between patient and doctor.

INTELLECTUAL PROPERTY

Patented.

- A patent family "Visualization of anatomical data by augmented reality" was published as WO2012062482A1
- EP2637593B1 (granted), US9498132B2 (granted)

PUBLICATIONS & REFERENCES

- Maier-Hein L. et al. (2011) "Towards Mobile Augmented Reality for On-Patient Visualization of Medical Images." In: Handels H., Bildverarbeitung für die Medizin 2011. Informatik aktuell.
- Müller, Michael, et al. "Mobile augmented reality for computer-assisted percutaneous nephrolithotomy" - International Journal of Computer Assisted Radiology and Surgery. 10.1007/s11548-013-0828-4ID
- Kilgus, T. & Bux, R. & Franz, et al. (2016). "Structure Sensor for mobile markerless augmented reality." 97861L. 10.1117/12.2216057.

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ABOUT THE DKFZ INNOVATION MANAGEMENT

Working at the interface of research and industry, the Innovation Management of the German Cancer Research Center (DKFZ) helps to get new cancer medications, diagnostic tests, and research instruments onto the market as quickly as possible.

The DKFZ with its more than 3,000 employees is the largest biomedical research institution in Germany. At the Center more than 1,300 scientists investigate how cancer develops, identify cancer risk factors and endeavor to find new strategies to prevent people from getting cancer. They develop novel approaches to make tumor diagnosis more precise and treatment of cancer patients more successful. DKFZ is a member of the Helmholtz Association of National Research Centers, with ninety percent of its funding coming from the German Federal Ministry of Education and Research and the remaining ten percent from the State of Baden-Württemberg