

Exploring and Slicing Volumetric Medical Data in Augmented Reality Using a Spatially-Aware Mobile Device

Weizhou Luo*, Eva Goebel*, Patrick Reipschläger*, Mats Ole Ellenberg, Raimund Dachsel

*These authors contributed equally to this work.



TECHNISCHE
UNIVERSITÄT
DRESDEN



INTERACTIVE
MEDIA LAB
DRESDEN

ISMAR
2021

Motivation and Basic Idea

Our goal is to address the lack of immersion and intuitive input of conventional systems.

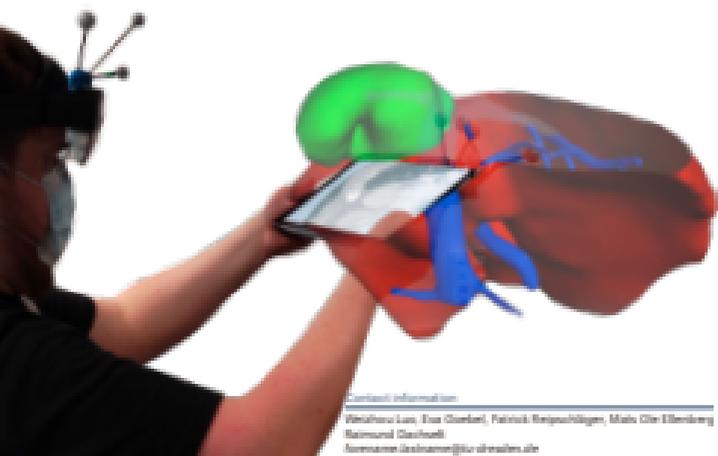
Combine Augmented Reality (AR) with a spatially tracked tablet

3D Immersive Space

Using AR for displaying 3D models of the medical data

Spatial Navigation

Extracting arbitrary 3D slices from 3D models by tablets



Contact Information
Weizhou Luo, Eva Goebel, Patrick Reipschläger, Mats Ole Ellenberg
Raimund Dachsel
loew@inf.fhnw.ch

Concepts for Volumetric Data Exploration

- 1 Placement in the Environment**

Placement

We aim to present a novel way for physicians to interact with medical scans from MRI or CT imaging to analyse them for diagnosis and to prepare for surgeries or other procedures.
- 2 Transformation**

Push Gesture to Zoom in

We thus present techniques that facilitate this overall concept.
- 3 Exploration in Detail**

Free Exploration

Freeze Mode

Axis Locking
- 4 Capturing, Revisiting and Working with Slices**

Slide Gallery

Eye Mode

Measurement

Current Prototype

To demonstrate our concepts, we realized a proof-of-concept prototype consisting of a **HoloLens 2**, a **Surface Pro 6** tablet and a **OptiTrack** motion tracking system.

We implemented our core techniques in the **Unity 3D** engine, utilizing the **Mixed Reality Toolkit (MRTK)**.



▲ **Free Exploring and Revisiting:** Users can explore by moving the tablet spatially and walking around. Interesting slices can be captured and revisited later.



▲ **Freezing then Annotating:** The current cross-section can be frozen on the tablet, and users can move for a comfortable posture and then further work on it.



▲ **Transparency Setting:** When exploring the AR model, the transparency (adjustable) of the model in front of and behind the cutting plane differs.