

Title: Grab-A-Slice: In Situ Visualization of 3D Data Using a Movable Tracked Touchscreen

G. Shukla¹, B. Wang¹, J. Galeotti², B. Wu¹, R. Klatzky², D. Shelton², B. Unger¹, B. Chapman¹, and G. Stetten¹

¹University of Pittsburgh, Pittsburgh, PA, ²Carnegie Mellon University, Pittsburgh, PA

We describe here the first working prototype of a novel display for viewing 3D medical images. The position and orientation of a freely movable touch-screen display are optically tracked and used to continuously determine which slice to display within a 3D data set. The slice is registered “in situ” relative to a fixed coordinate system, through which the display is moved. We have coined the term “grab-a-slice” for the new display, to connote the intuitive nature of the interaction it provides with volumetric data, potentially more so than that provided by traditional fixed displays. With grab-a-slice, the user experiences the illusion of slicing through an invisible patient. The touch-screen allows the user to directly identify the location of any point of interest within the 3D image data. Grab-a-slice has a number of possible clinical and scientific applications. In particular, we are exploring its utility for improved vascular tracing to identify pulmonary embolus in contrast-enhanced computed tomography (CT). In addition, we are planning psychophysical studies of how users explore and navigate through medical image data with this new display. We are also developing methods of graphical augmentation for grab-a-slice using stereo display, to improve the ability of users to understand the raw content of a tomographic slice in the context of the surrounding 3D anatomy and to improve their ability to navigate through a 3D dataset. Finally, we are exploring the use of grab-a-slice to supervise semi-automated image analysis routines.