

## Summary 2:

### BrainWatch software for interactive exploration of brain scans in 3D virtual reality systems

Complicated structures of the brain have commonly been expressed using 2D imaging in the medical field (PET or MRI scans). However, it is more effective to use 3D viewing methods for humans to gain a true understanding of the brain because it is a complex 3D object. With the increasing quality and availability of VR technology, an application called BrainWatch was developed. BrainWatch processes brain scan slices in DICOM format (Digital Imaging and Communications in Medicine) and converts these scans into texture2D objects, which are eventually used to generate a 3D volume that can be rendered to the VR environment. Users may move around the outside and inside the brain to explore the object. Movement is designed to be natural and incorporates user's natural gaze among keyboard controls. Users ranged from students to clinicians and expressed that it would have been easier to learn brain anatomy using this method instead of using 2D cross-sectional images and diagrams. Current model focus more on testing the concept and future work will go towards perfecting the image processing and rendering processes.

#### BibTeX:

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@INPROCEEDINGS{8037662,  
author={S. K. Taswell and T. Veeramacheneni and C. Taswell},  
booktitle={2017 39th Annual International Conference of the IEEE Engineering in  
Medicine and Biology Society (EMBC)},  
title={BrainWatch software for interactive exploration of brain scans in 3D virtual  
reality systems},  
year={2017},  
volume={},  
number={},  
pages={3704-3707},  
abstract={The ability to view medical images as 3D objects, which can be explored  
interactively, has now become possible due to the advent of rapidly emerging virtual  
reality (VR) technologies. In the past, VR has been used as an educational tool for  
learning anatomy, a visualization tool for assisting surgery, and a therapeutic tool  
for rehabilitating patients with motor disorders. However, these older systems were  
either expensive to build or difficult to acquire and use. Exploiting the arrival of new  
consumer devices such as the Oculus Rift that are now affordable, we have  
developed a software application called BrainWatch for VR ready computers to  
enable 3D visualization and interactive exploration of DICOM data sets focusing on  
PET and MRI brain scans. BrainWatch software provides a unique set of 3  
approaches for interacting with the virtual object which we have named the  
observatory scenario with an external camera, the planetarium scenario with an  
internal camera, and the voyager scenario with a mobile camera. A live interactive  
demo of BrainWatch VR with the Oculus Rift CV1 will be available for conference  
attendees to experience at EMBC 2017.},
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keywords={biomedical MRI;brain;cameras;medical image processing;positron emission tomography;virtual reality;3D objects;3D virtual reality systems;3D visualization;BrainWatch software;DICOM data sets;EMBC 2017;MRI brain scans;Oculus Rift;PET brain scans;brain scans;educational tool;external camera;interactive exploration;internal camera;learning anatomy;medical images;mobile camera;motor disorders;patient rehabilitation;planetarium scenario;surgery;therapeutic tool;visualization tool;voyager scenario;Cameras;Computers;DICOM;Headphones;Software;Three-dimensional displays;Two dimensional displays},  
doi={10.1109/EMBC.2017.8037662},  
ISSN={1557-170X},  
month={July},}