

# Designing and Creating a 3D Display Software

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At the Department of Image Processing and Neurocomputing at the University of Veszprém there are several researches, in which we examine the user's behavior in virtual worlds. These researches can help to understand various occurrences (for example: different kind of phobias: claustrophobia, agoraphobia etc.; left handedness, examining reaction time under different circumstances etc.). Up to now for each research we had to write a suitable display software, we didn't have such a program, which can display almost any kind of virtual world, can treat the interaction between the user and the virtual world and can record the user's actions for further examination.

Creating such a program brings on to a lot of problem and question. One of the basic questions is how to build our virtual world. The most comfortable way is to create the world in a well known and efficient three dimensional modeling software, and export it in a format that can be read by the display software. So we build our virtual worlds in professional modeling software called Maya. The exported data is not directly read by the display software, it is processed by an editor program wrote by us. This program is needed because of the better optimization, as those objects in our worlds which are responsible for the interactivity (such as buttons, timers, movable, rotatable objects) have no corresponding in Maya. So the properties of these objects will be set in this editor. We also set the material and light source properties here. This is because the display software uses OpenGL instructions for drawing, and this is the most exact way to suit these properties to the OpenGL's shading technique.

One of the most basic interactions between the user and the environment, and the objects of the virtual world is the detecting of collisions and the physically realistic treating of collision responses. To solve this problem we use the technique of space partitioning. The binary tree structures needed for this technique are also created in our editor program as they have to build only once during the display.

One of the most important tasks of the display software is the recording of the user's actions. We can set the data to be stored, which depend on the examined phonemes. These can be: the user's movement, the path of walk, the exact time of reaching a control point, the time taken to notice an object, reaction time etc.

On the conference we would like to speak about the details of described problems and their solutions and our future plans. If facilities are provided we'll show our programs in action.