

Blender Education in Computer Graphics on UTB

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ABSTRACT: *We have Department of information technology on our Faculty of technology UTB in Zlin. Already second year proceed education study bases of computer graphics at here. The structure of education is three hours practice weekly at present. Substance of these hours are composed from raster and vector programs for computer graphics. The students can understand the principles of 2D and 3D graphics with these programs. We use the open-source program Blender (see www.blender.org) by the education 3D graphics and demonstration of models creation.*

Blender is the open source software for 3D modeling, animation, rendering, post-production, interactive creation and playback. Available is for Windows, Linux, Irix, Sun Solaris, FreeBSD or Mac OS X. This paper will describe the basic possibilities of model creation demonstrated on functional sample, that is used directly at education.

1 INTRODUCTION

Blender is a suite of tools enabling the creation of and replay of linear and real-time, interactive 3D content. It offers full functionality for modeling, rendering, animation, post-production, game creation and playback with the singular benefits of crossplatform operability and a download file size of less than 2.2 MB. Aimed at media professionals and individual creative users, Blender can be used to create commercials and other broadcast quality linear content, while the incorporation of a real-time 3D engine allows for the creation of 3D interactive content for stand-alone playback or integration in a web browser.

Originally developed by the company 'Not a Number' (NaN), Blender now is continued as 'Free Software', with the sources available under GNU GPL. The latest version of Blender can be download from the homepage at www.blender.org. The binary distributions comes in 6 basic flavours: Windows, Linux, MacOSX, FreeBSD, Irix and Solaris. Now is the latest version 2.32 and in this version are these most important news: internal ray tracing, area lights, soft shadow, improved bumpmapping, textures actually deforms renderer geometry, YafRay support (external rendering engine), mesh beveling and Python pulldown menus for import or export.

2 BLENDER ENVIRONMENT AND RENDERING

When we start Blender, we will probably get a screen with two windows in it (see Figure 1). In the window at the bottom we see a lot of buttons while the window on top is almost empty because we haven't started modelling any object yet. In the menu bar below this upper window is the menu "View". In this tells we can change our view (at the beginning is the top view). To get to a front or side view we can just go to this button and change it. The switching between views can be change also with numerical keys on keyboard or with using the mouse. For modelling it is inevitable that we know how our objects look like in these different views. Therefore we can split (click right mouse button on edge of the modelling window) this big window into more windows, each of them displaying a different view.

We can insert the objects with hit Space and select menu Add. Blender supplies several different objects (meshes, curves, surfaces, meta objects) and each we can more edit and change. For example we insert in the scene floor. With the mouse button over the top view hit Space key and a menu pops up, press Add --> Mesh --> Plane. The plane will position itself centered around the red-white cursor. Whenever we add a new object like this into Blender the object will always position itself where the cursor is. This way we can already define where a new object will be added to our scene. We simply move the red-white cursor to the desired place by a left click on the mouse.

The plane is there now in edit mode (switching between normal and edit mode is with the key Tab), which means that we can edit every single point. For now we want to increase the size of the whole plane

and as edit mode isn't necessary for this action we leave it by pressing tab (you could of course scale it in this mode but it is just more convenient the other way). The plane is still selected (it is highlighted in pink). Press S now and move the mouse away from the plane. We will see that it becomes bigger. If we have reached the desired size press the left mouse button to make the change effective.

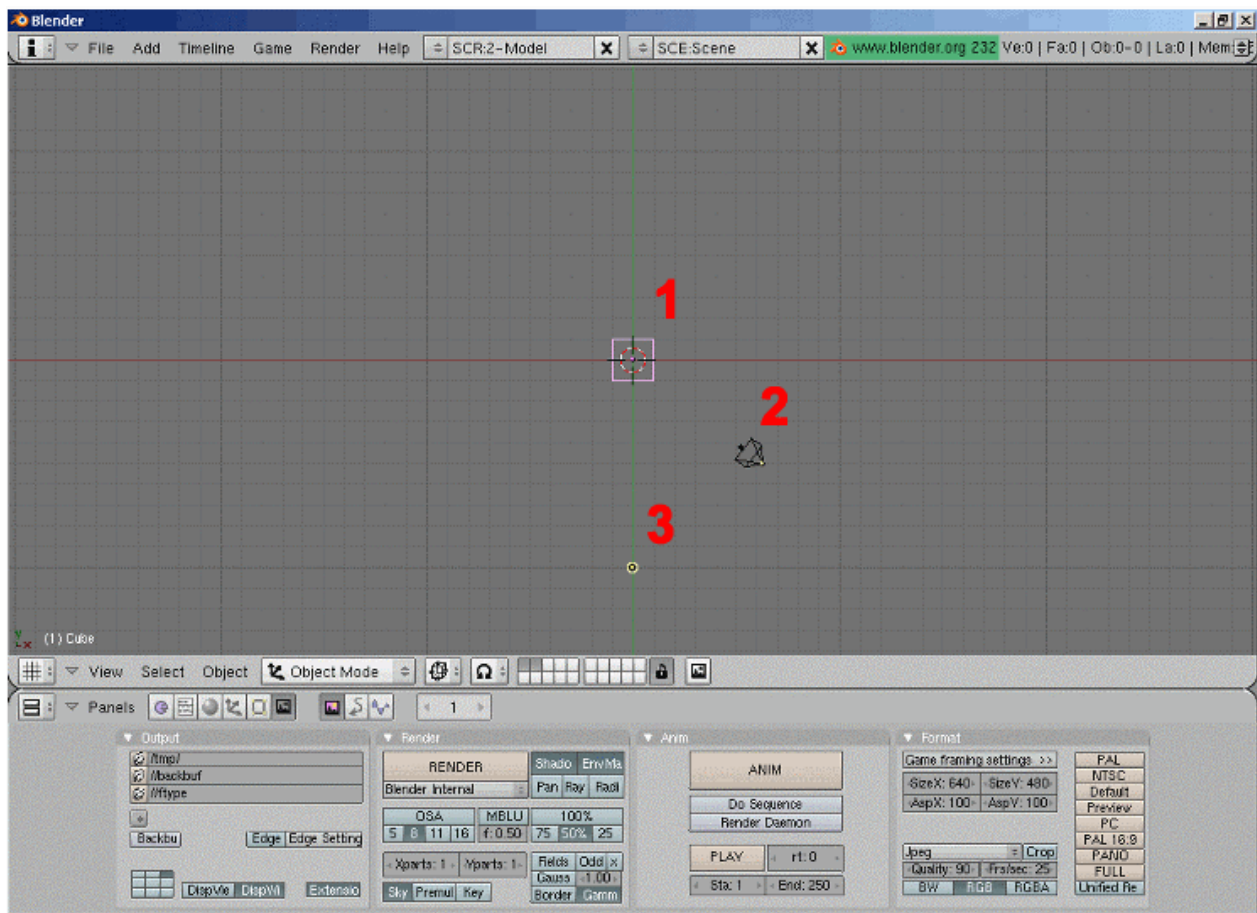


Figure 1 – The Blender environment
(1 - object in the scene, 2 – camera, 3 – light source)

If we haven't deleted the camera (the object that looks a bit like a triangle) accidentally it will already be there (position 2 in the Figure 1). Otherwise in front view hit Space, Add-->Camera and place it (click g to move the camera) where we can see it in the picture.

Light is very important as it can create very different moods and atmospheres and also is responsible for our shadows. Now we use kind of a standard three-light setting: Put the mouse over the front view and hit Space, Add --> Lamp. Click on the lamp button (the button with the bulb). You can see that there are 5 different types of lights available in Blender. By default the light is set to lamp. We can click on it. Then go back to our modelling window and rotate (key R) and move (key G) the light to the required position. We can also play a bit around with the brightness of the light by changing their energy level (just change the value of the energy slider in the lamp menu).

Now that we have our default scene complete it's a good idea to make a render to see how your scene looks like: Go to the Display Button (the button with the picture on it or press F10) and change the size of the picture. I usually prefer Size X:640 and Size Y: 480 while working. It is big enough so that we can see the details of my models clearly enough but the rendering time isn't too long. If we want your models to make shadows make sure that the shadows button is pressed. We can also select the rendering option under the Render button (Blender internal, Blender engine and YafRay). Now for seeing the stage we can either press the RENDER button or press F12. A new window opens and displays our stage. To get it to the background press F11 (while keeping the cursor over the render window). If you hit this button again the image reappears without being rendered again.

3 EXAMPLE FROM EDUCATION – THE COLUMN

Run the Blender and split the modelling window to the two separate windows. In first window set the front view. The second set to the top view. In the top view we insert two circles, the second have a bigger radius. Switch the circles to the edit mode with key Tab (Figure 2). In circles select every other two nearby points and delete edges between them with key Del. The result is shown in Figure 3.

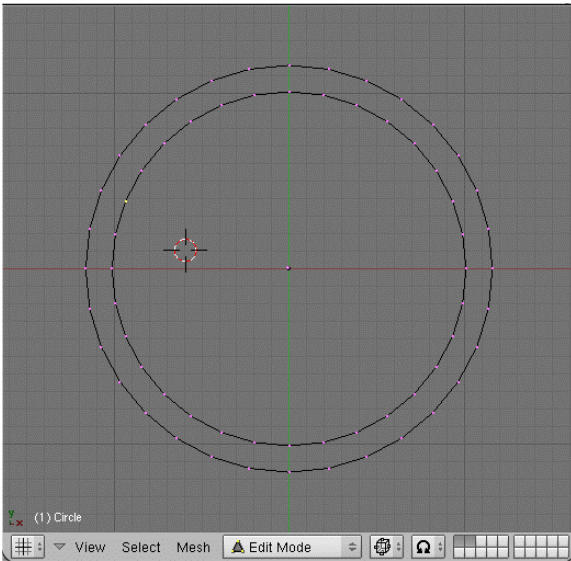


Figure 2 – Two circles in edit mode

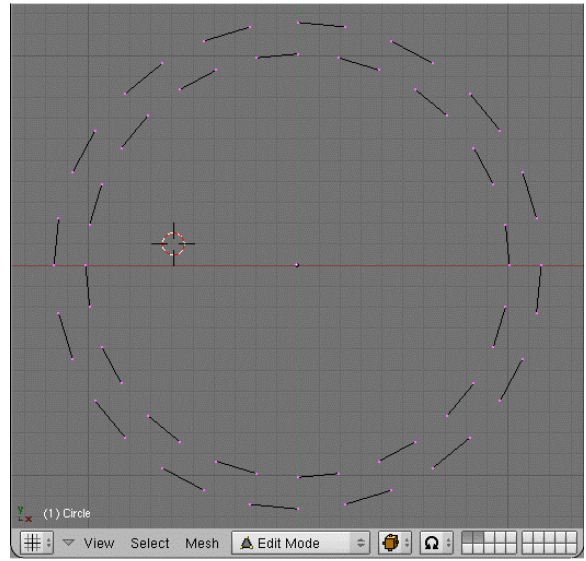


Figure 3 – Deleted segments of circles

Between both circles create the edges (key F) by the Figure 4. Now switch to the front view and in the edit mode select all of the vertices (key A). Then press key E to extrude it into the top. The real view of the body column is shown in the figure 5.

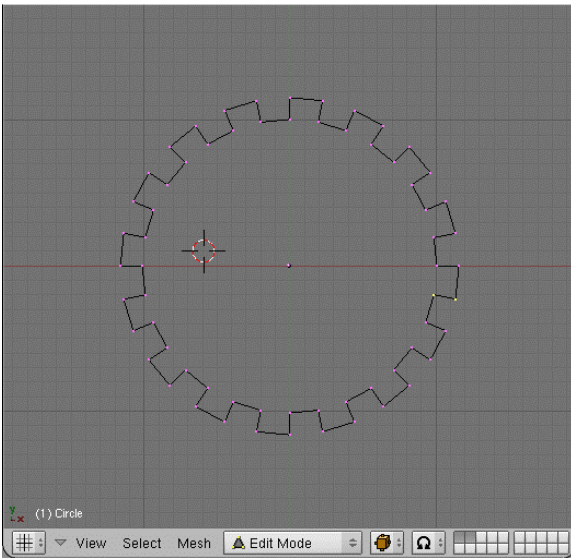


Figure 4 – Joined two circles

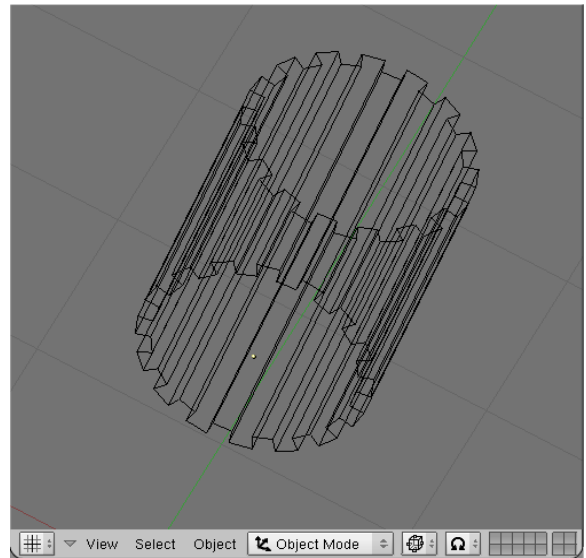


Figure 5 – The real view of body column

It's the time to the creating bottom of the column. In the top view we added a plane. Then we switch this plane to the edit mode and select all vertices. Now we press key E (extrude) in the front view to stretch the plane to the box object. After this we press key E and S to switch width of bottom. Click with the left mouse button and press key E again. With this way we create the small box placed on the top of the beginning box. The same way we create one more box. Front view in normal mode (press key Tab) of the complete column bottom is shown in the Figure 6. Now we copy the bottom to the top and rotate it. press Shift+D to copy of selected object. We move with mouse cursor and place the copy to the top. Press key R to rotate it over the 180 degree. The final column we can see in the Figure 7.

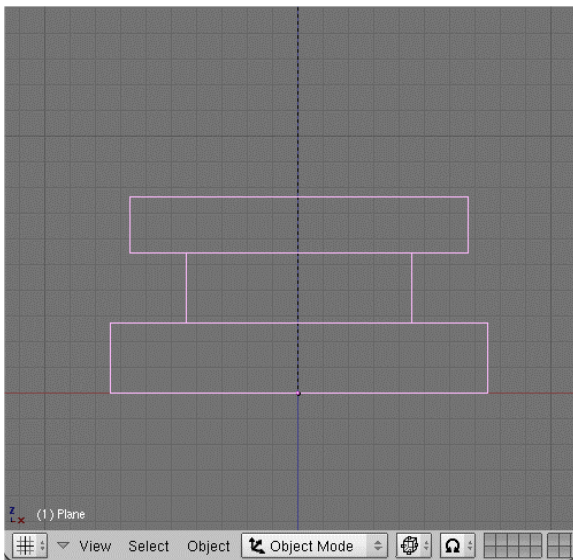


Figure 6 – Front view of the bottom column

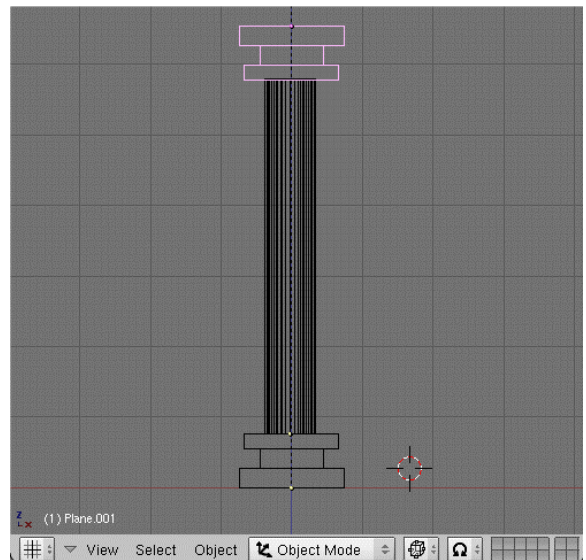


Figure 7 – The column – wireframe view

Next we give our column a yellow color. Select the material button (the one with a red sphere) in the header of the window below with all those different buttons. Then click on the white button and press "ADD NEW" to add a new material. Now suddenly the window doesn't look so empty anymore. We can see the sliders with RGB (to the left). Move the R slider to 0, G to 1 and B to 1 (with the left mouse button) to give the floor a yellow color. The material option is shown in the Figure 8.

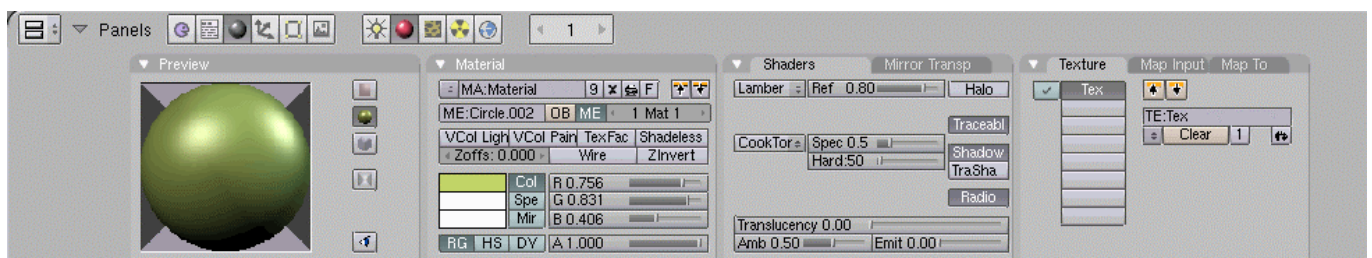


Figure 8 – Options in the material menu

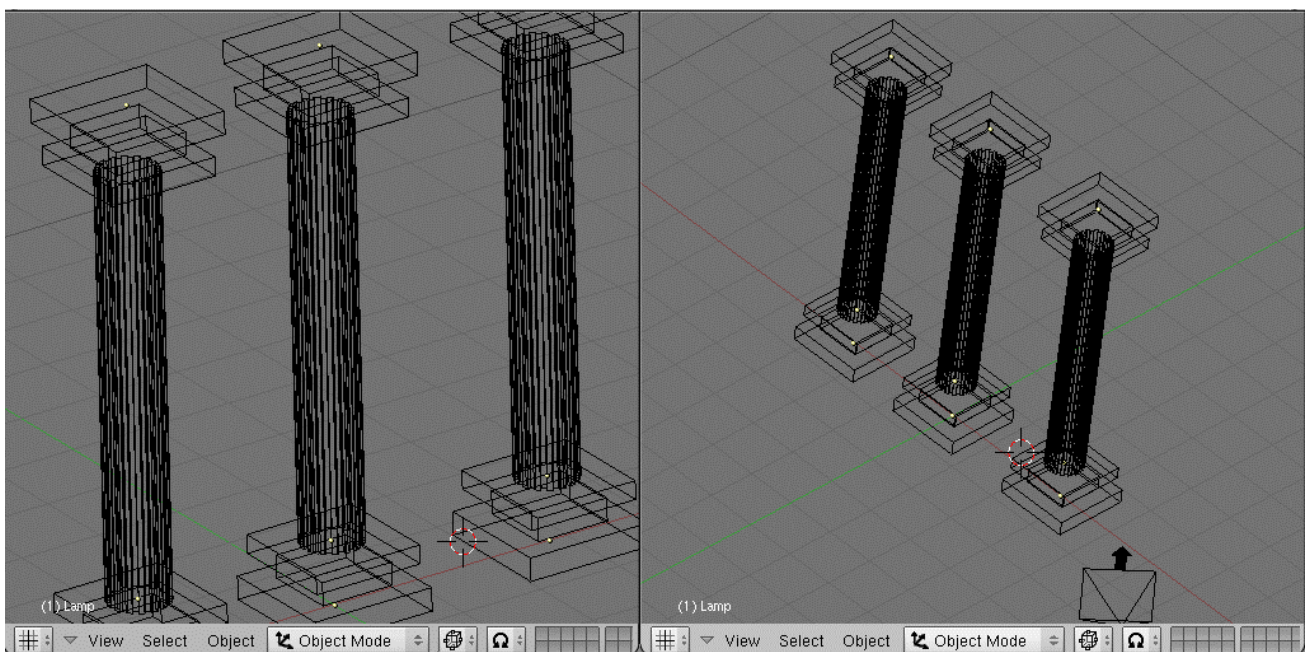


Figure 9 – The wireframe views of the columns

Lastly we create copies of the columns. Select all of the parts (click left mouse button with pressed Shift key) and then press Shift + D key. Move the mouse cursor left and place the copy. Now we create one more to the right from original column. The wire frame results we see in the Figure 9. The rendered scene (key F12) is shown in the Figure 10.

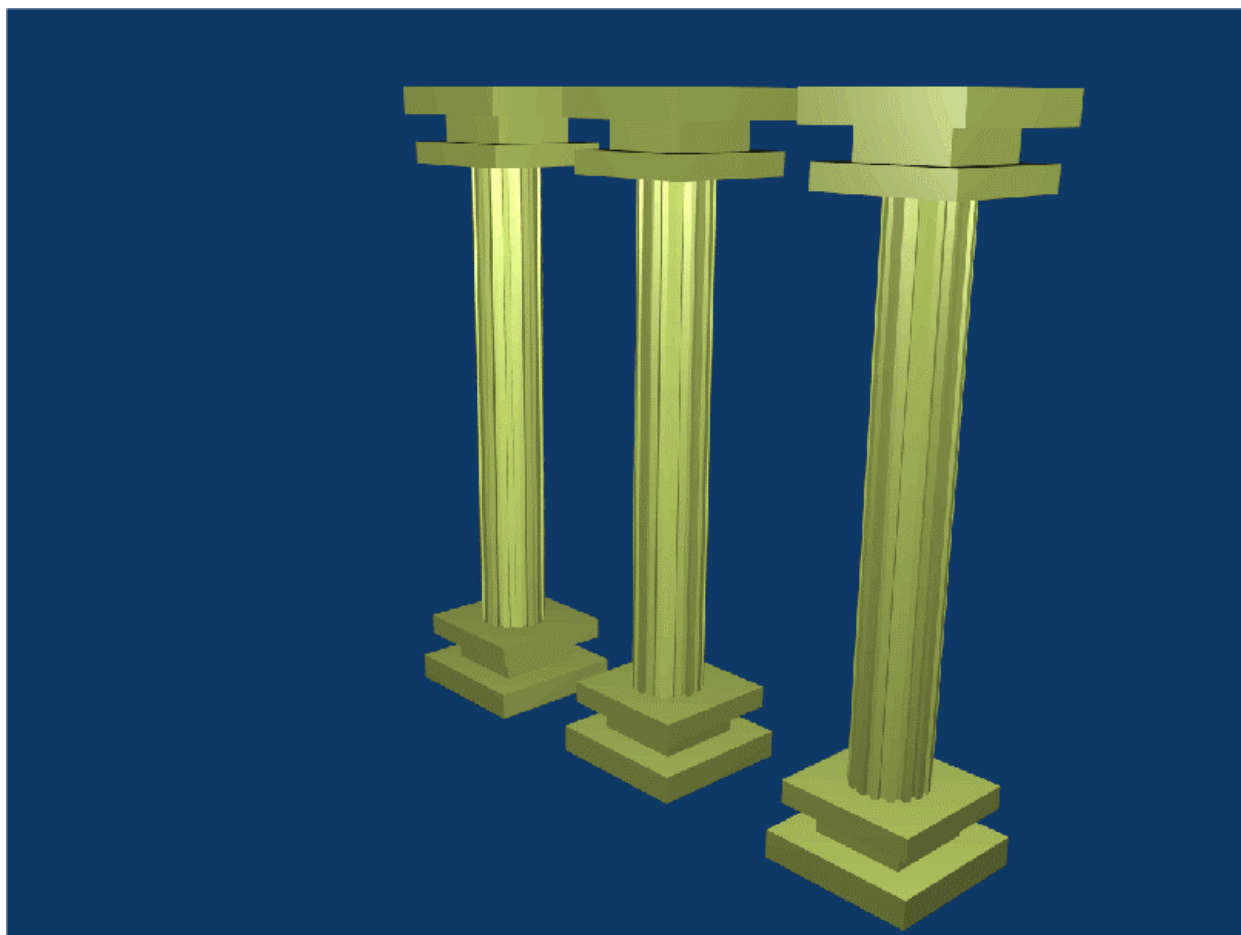


Figure 10 – The rendered scene with three columns

4 CONCLUSION

Blender is the open source software for 3D modeling, animation, rendering, post-production, interactive creation and playback. This program is available for Windows, Linux, Irix, Sun Solaris, FreeBSD or Mac OS X. His duration development is more than 10 years. The published example is only short sample of large possibilities.

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