

THREE DIMESNIONAL REPRESENTATION AND GAME DEVELOPING IN OPENGL

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Abstract: The work contains a research on visualization of objects in three dimensions using graphical library OpenGL. In order to go deeply it was constructed a game named "Tetris 3D". Using the principles of the known game, it was extended to one more dimension. The language that was used is C++.

Key words: OpenGL, Tetris, game development, 3-D matrix, 3-dimension representation, class method.

1. Introduction

Nowadays visual interpretation of objects at the computer is a well developed branched. In 1992 as a response to DirectX appeared OpenGL, a powerfull tool used till now for CAD, virtual reality, scientific visualization, information visualization, flight simulation, and video games [1].

2. General view

In order to research the features of OpenGL was developed the game "Tetris 3D". The objects are the same as in the original game only extended to 3D. The whole action take place in a rectangular parallelepiped carcass of dimensions 7x7x18 units. Objects are falling on the 7x7 platform while you can move them right/left, up/down on O_{xy} plane and also rotate them along O_z and O_x plane. User also have the control over the camera, so you have the opportunity to see the entire action from any angle. Different screens are displayed on fig. 1 and fig. 2.

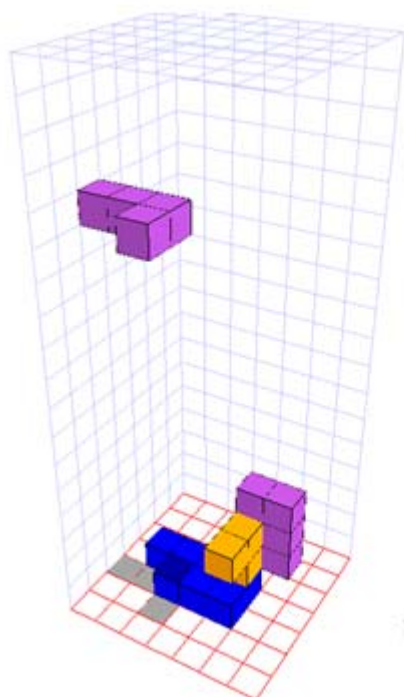


fig. 1

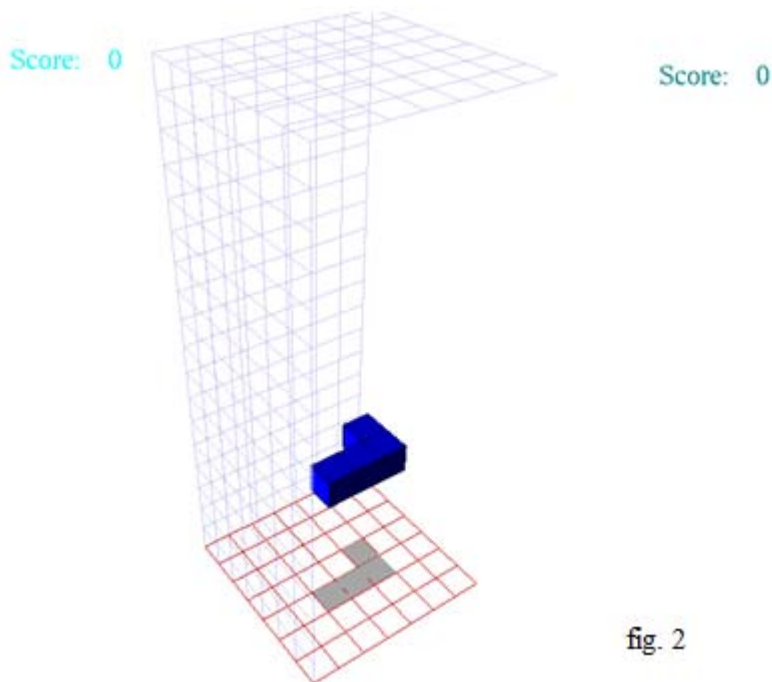


fig. 2

3. Functionality

Drawing objects the game was pretty simple. It was only drawn the carcass of the game and one cube. But for creating objects and moving them was used translation function implemented in OpenGL. Even rotation was done using translation for each cube. The hard part was to write the code that would allow to control the animation. OpenGL functions are combined with a 3 dimensional matrix, and objects that are

drawn in game corresponds to a coordinate in matrix. In such way a full control of objects is granted. For example if the object has to move to the left. Then it's called a method that check if the object will not leave the border of the game or if another object is already there. In case if it returns TRUE then the falling figure changes the coordinate in the matrix and the translation is done. In general there are 5 methods for moving objects and 2 for rotating them. One function is responsible for falling of objects, and it runs automatically, but the rest of them are called by the user when a correspondent key is pressed. The knowledge for developing the game I took from OpenGL tutorials and the C++ tutorials [2 - 4].

4. Features

Because the rendering of the game in 3 dimensions can confuse the user about position of object in space, was implemented the shadow of objects. In that way the position will be more precise. Also for entertainment was added the score. The goal in this game is to make one row of platform. When you rich it the platform disappears and you gain 20 points to score.

5. Opportunities

In a commercial application, the drawing of objects is done in a high level software like Blender (a cross platform application) or Mac/Windows appi. "3D-Max". The drawn objects can be exported in terms of code for different languages. Manipulating it, helps to create a real animation for android application for example, that is widely used nowadays.

6. Conclusion

OpenGL is a high level graphical language that gives the opportunity not only for game developing but also for researching using advanced graphical rendering objects. The most difficult part in research was to write the engine of the game that is actually created from rules that were implemented in order to obtain the control over the objects.

7. Bibliography

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