**Logo

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**Course Title :** Computer Graphics

**Course Code :** CSE420

**Section :** (02)

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**Project Report**

**Project Name: 3D Movable Cube**

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**Contents:**

► Project Description

► Description of each function

► Implementation

► Code

► Output

► Conclusion

**Project Description:**

►In this project, we are going to create a spinning 3D cube by using OpenGL library. At the initial stage, the cube will stay at the center of our window. Then we will rotate the cube by controlling the arrow keys of our keyboard. When we rotate the cube using the arrow keys of the keyboard, we will see all the six sides of this cube one by one.

We use C++ language with OpenGL library to implement our project. Open Graphics Library (OpenGL) is a cross-language (language independent), cross-platform (platform-independent) API for rendering 2D and 3d Vector Graphics.

**Description of each function:**

A screenshot of a computer

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►In this part, we initialized our required screen.



►We created a windowed mode window and its OpenGL context.

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►We initialized all keys and then call all the keys.



►Make the window's context current.



►Specifies the part of the window to which OpenGL will draw (in pixels), convert from normalized to pixels.



►The projection matrix defines the camera’s properties that view the objects in the world coordinate frame. Here you typically set the zoom factor, aspect ratio, and the near and far clipping planes.



►Replace the current matrix with the identity matrix and starts us a fresh because matrix transforms such as glOrpho and glRotate cumulate, basically puts us at (0, 0, 0)



►Essentially set coordinate system.



►(Default matrix mode) model view matrix defines how your objects are transformed (meaning translation, rotation, and scaling) in your world.

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►Loop until the user closes the window.

Text

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►Render OpenGL here



►Swap front and back buffers



►Poll for and process events

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►Actions are GLFW\_PRESS, GLFW\_RELEASE or GLFW\_REPEAT

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►The front face of the cube

Text

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►The back face of the cube

Text

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►The left face of the cube

Text

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►The right face of the cube

A screenshot of a computer

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►The top face of the cube

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►The down face of the cube

**Implementation:**

►For implementing our project, we are using the OpenGL library. First of all, we created a window screen with OpenGL context for drawing our cube. Our screen width was 640px and height was 480px. Then we define the projection matrix. The projection matrix defines the camera’s properties that view the objects in the world coordinate frame. In this part, we set the aspect ratio and the near and far clipping planes. After that, we make cubes front, back, left, right, upper, and lower sides. Then we make it a movable cube by using our keyboards with all four arrow keys. By using these 4 keys we can see all the sides of this cube in a single window, and it will be like a movable cube.

**Code:**

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Text

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Text

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Graphical user interface, text

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Graphical user interface

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Text

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**Output:**

►Some of the random output screenshots given below-

Shape

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Chart

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Shape

Description automatically generated

Shape

Description automatically generated

**Conclusion:**

►We found designing and developing this 3D Movable Cube a very interesting and learning experience. It helped us to learn about computer graphics, design of Graphical User Interfaces, interface to the user, user interaction handling, and screen management. Hope we will develop more updated projects like this project.