CG Assignment: 07 $\boxed{21118}$

Problem definition:
Write a C++ program to control a ball with arrow keys

Objectives
To learn to perform animation in openGL.

Outcomes
To implement arrow key controlled ball in C++ using openGL

Hardware requirements:

OS Name	windows10. Ubuntu 20.04 LTS.
System Type	64-bit System
Processor	Intel core i5 8th gen
System Manufacturer	Acer Inc.

Software Requirements:
Sublime text as code editor.
GCC version 10.1.0.
Ubuntu is on virtual machine.

Theory
glutInit(): Initializes GLUT, must be called before other GL/GLUT functions. It takes the same arguments as main() function.

glutCreateWindow(): Creates the window with given title

glutInitWindowSize(): Specify the initial window height & width.

glutInitWindowPosition(): Position the top-left corner of the initial window at the specified x & y. coordinates.

glutDisplayFunc(): registers the callback function (or even handler) for handling window-paint event. The openGL graphics system calls back this handler when it receives a window repaint request.

glutMainLoop(): Enters the ∞ processing loop so that the console waits till the opengl window is open.

glutKeyboardFunc(): Registers callback function for keyboard event.

glut SpecialFunc(): Registers callback handler for special key (such as arrow keys & function keys)

Algorithm

1> Start
2> initialize glut int the main method.
3> Specify display mode as GLUT_RGB & GLUT_DOUBLE
4> Create the window
5> Specify the display function as display
6> Specify the reshape function as reshape
7> Clear the color to black.
8> Specify the special functn to specfunc.
9> Specify the keyboard function to specfunc.
10> Stop

display()
1> Start
2> Clear the color buffer & depth buffer
3> load identity to reset all transformations.
4> Translate to z-coordinate at -30 & x & y to x2 & y2.
5> Draw the ball with radius 3.
6> Swap buffers
7> Stop

reshape()
1> start
2> Create viewport with the initial width & height
3> Change matrix mode to GL_PROJECTION

4) Create perspective with view angle 60, aspect ratio 1, near frustrum 2 & far frustrum.
5) Change matrix mode to GL-MODELVIEW
6) Stop

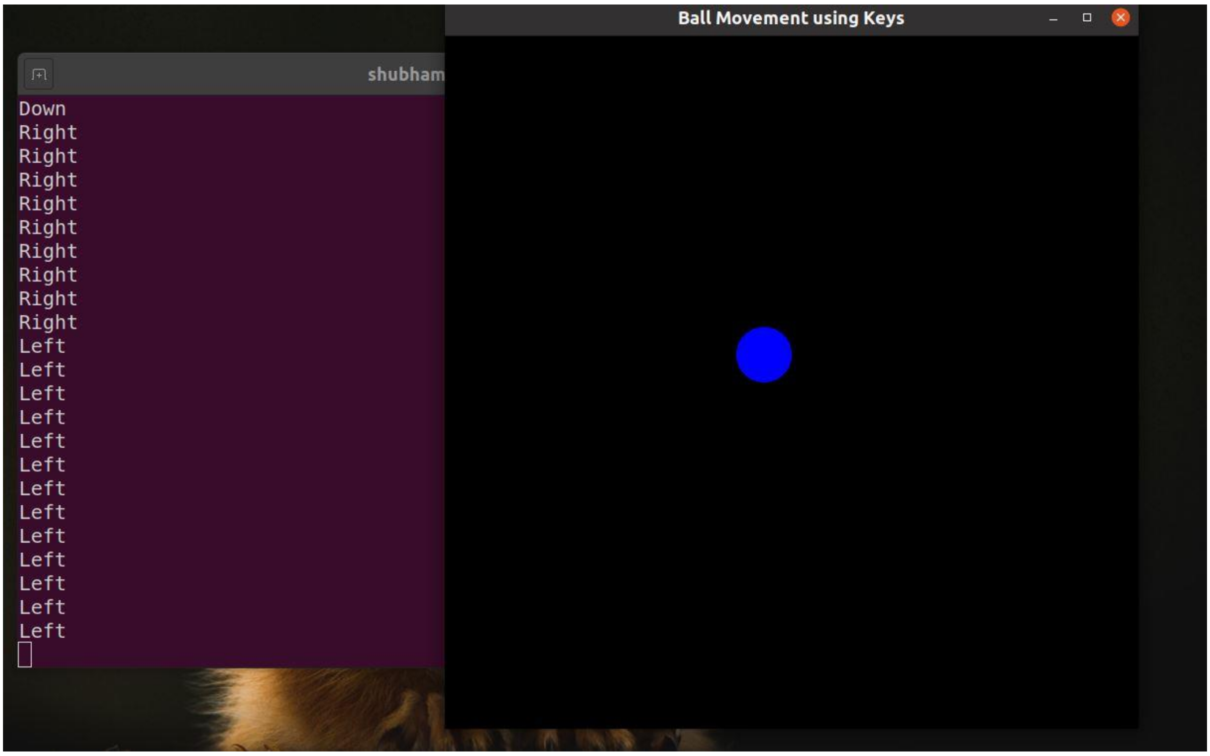
init()
1> Start
2> Clear color to black.
3> Stop

keyfunc()
1> Start
2> If UP is pressed, move upwards
3) If DOWN is pressed, move downwards
4) If LEFT is pressed, move leftwards
5) If RIGHT is pressed, move rightwards

Keyfun()
1> Start
2> If 'd' key pressed move in top right direction.
3) If 'a' key pressed, move in topleft direction.
4) If 'z' key pressed, move in bottom-left direction.
5) If 'x' key pressed, move in bottom-right direction.
6) Stop

Testcases

Testcase No	Test case description	Expected output	Actual o/p	Result
1	○ right arrow key pressed	○	○	~~Fail~~ Pass



```
Down
Right
Right
Right
Right
Right
Right
Right
Right
Right
Left
Left
Left
Left
Left
Left
Left
Left
Left
Left
Left
Left
Left
```

* Conclusion

Using function overloading keyfunc() function has been used to handle arrow key input as well as other key input. In this way, the concept of polymorphism has been applied. The sphere for the ball is drawn with 200 latitudes & 200 longitudes using glutSolidSphere() function.