Computer Graphics Lab Assignment #1 – Readme file

Introduction:

This assignment was made by building parameterized object primitives. The Scene graph is a 3 dimensional model. Sig Library is used in this assignment. Different classes and functions of the library were used such as GsModel class.

In order to meet requirement 1 and 2 of the assignment, different functions were made for gears that are of different sizes. Most of the functions are receiving 3 parameters, i.e. the radius (r1, r2) and the thickness (d) of the gear. Translation function of the GsMat class has been used to specify the center point for each gear. The number of teeth of each gear has been decided according to the respective angles between the edges of the triangle of that gear. To meet requirement 3, I have added gears that are of different shapes so that the animated scene graph can form an interesting motion (option 1). Refer the result section of this document. All gears are placed on different Z-axis. For rotating the gears, getrans() and setrans() functions have been used.

In shape 1, 'set()' function is used to assign values to vertices by incrementing the angle. 'Push()' function has been called to create triangle's between assigned vertices. In shape 2, triangles were placed linearly forming an array of triangles.

Machine Specification on which this assignment was made and code testing was done:

Processor	Intel i3 - 3217U CPU @ 1.80GHz (8GB RAM)
Graphic card details	Internal Intel® HD Graphics 4000

Evaluation Table:

Processor	Number of Triangles / Scene size	FPS	Running time (sec)
Intel i3	852	29.54	0.1932093
Intel i5	852	29.89	0.1296544
Intel i7	852	29.62	0.0963151

Code Structure:

Lines	Description
0 - 9	Header files
11 - 24	WsViewer Constructor
26-37	add_ui function
39-54	add _model function
56 - 695	Different functions for making gears
697 - 891	build_scene function
894- 1042	run_animation function
1044 - 1073	show_normals function
1075 - 1088	handle_keyboard function
1090 - 1099	uievent function

Running time taken by gears when they rotate individually VS running time of whole scene:

Function/Gears	Number of Triangle's	Running time (Sec)
Only Gear A	96	0.07119755
Only Gear B	50	0.07017455
Only Gear C	194	0.06970933
Only Gear D	96	0.07044978
Only Gear E	48	0.06867344
Only Gear F	192	0.06574255
Only Gear G	28	0.07208888
Only Gear H	116	0.17155555
Only Gear I	32	0.17476666
All gears	852	0.19320935
Whole Scene graph	1000 (Approx)	0.19195344
Build Scence	852	0.15443333
My Viewer	852	0.1930713

It was concluded that the running time was more when all the gears were animated together as compared to when they were animated individually.

Result: