University of Barisal

Project Report

COURSE TITLE: ***Computer Graphics Lab.***

COURSE CODE: ***CSE-4110.***

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TOPIC: *3D Animated Car.*

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SUBMITTED TO:

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1. Introduction:

This is a simple project on 3D animated car with some other necessary object like roads, signal light, 3D house, trees, clouds, background building etc. allocated with it. This project is created by openGL GLUT project in codeblocks IDE. Different methods are performed in order to make it more applied and efficient. We apply all methods like Translation, Rotation, Scaling, Animation, CameraView and appropriate color for all object in this project to make it more aesthetic. From this very project we were able to achieve various knowledge in computer graphics and also in logical coding. Moreover we also gained an experience of group work, team coordination.

2. Scratch Design:

Firstly, we draw a scratch of a car and other object like road, trees, house, clouds, signal light etc. to have a clear concept of this project scenario. Then we select some object which can be convert to 3D object and also we can add animation or other keyboard control method like signal light control, translation of an object, rotation and scaling of an object etc. Here is the demo scratch design to our 3D animated car project:

3. Working Procedure for developing the project:

First, we open a new GLUT project in codeblocks and add some header files for openGL project. Initially we take a fixed window size for our project working space. Then we create our project all object to their corresponding function. All user-defined functions of this project are describe in below:

1. Field.
2. Road.
3. Background Building.
4. 3D house.
5. Signal light.
6. Tree.
7. Cloud.
8. Car.
9. Display.
10. Special Function.
11. Keyboard Function.
12. Timer Function.

4. Description of all those function:

1. **Field:** We create a green field space where on the field we will create all others object. We simply used ‘glColor3f’ and ‘GL_QUADS’ for field function.
2. **Road:** On the field we create a black road with two yellow steps at the both sides on the roads and at the middle we put some white color das like the real word road we see. Here also we used that function of openGL which is used in field method.
3. **Background Building:** Building are looks like real building with windows and doors. We use red block to make building bricks.

4. **3D house:** We create some rectangle and triangle to build a house by using 'GL_QUADS' and 'GL_TRIANGLES'. Also use 'glutSolidSphere' for door lock object. This house is 3D, so we apply translation and scaling on this object.

5. **Signal Light:** It is located by the side on the road and there are three light for controlling car action. 'Red' light is used for stop the car and 'Green' light is used to moving the car. This two special feature will be controlled by keyboard keys.

6. **Tree:** We create one tree that looks like real world tree and use appropriate color for root and leaves of this tree. Than we copy this tree and put other three places to look our project more attractive.

7. **Cloud:** White cloud are created by 'glutSolidSphere' function and we use two clouds in the sky to look our project more dynamic. Those cloud will fly automatically and we also control those cloud to shift left right position.

8. **Car:** This is the most important function of our whole project. We use 'GL_POLYGON' function to shape a side of that car. Then we create all left, right, top, bottom side of the car to make it 3D. We also add car windows and wheels of the car. We uses two color on the wheels to make it real. This 3D car can run on the road and could be control by signal lights.

9. **Display:** when all the necessary object are created, then we call them all in a function to display it. We use 'Push Pop matrix' to make all function perform perfectly. We also add some variable to perform animation and other methods.

10. **Special Function:** Special function are used to perform special function keys. We use all of the special keys in our project. F1, F2, F3, F4, F5, F6 are used for camera view changes in X-axis, Y-axis and Z-axis. Others function i.e. F7, F8, F9, F10, F11, F12 are used for car rotation to see all side of view of the car from all axis. There are also 'left', 'right' arrow keys to control cloud flying in the sky and moves it left or right by those keys.

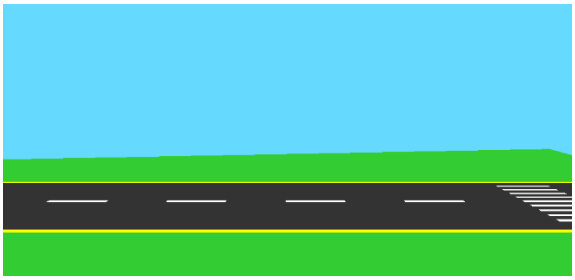
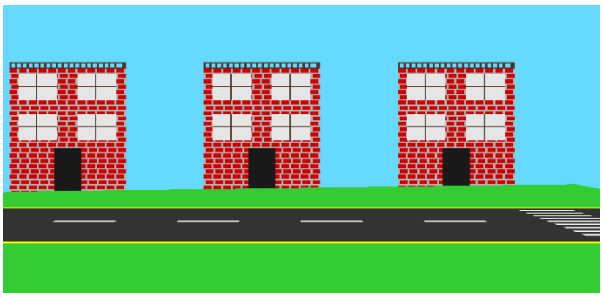
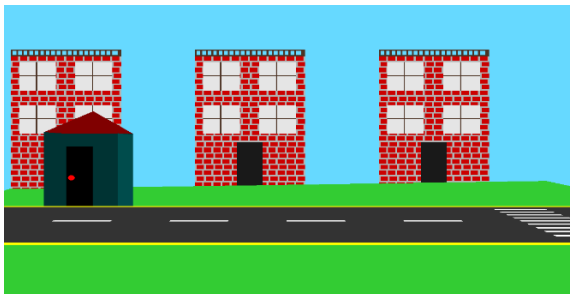
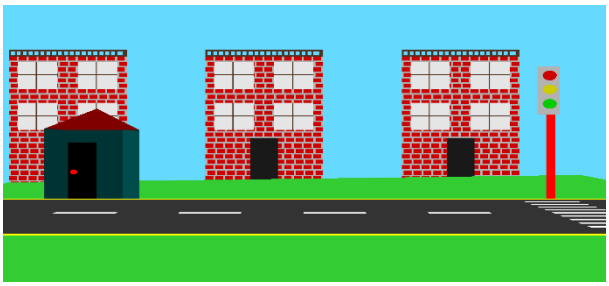
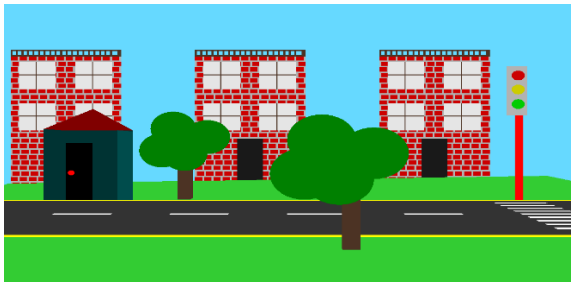
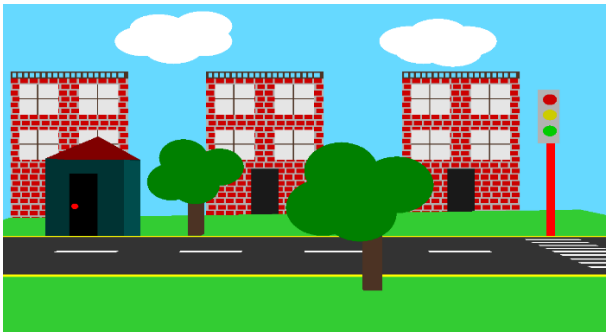
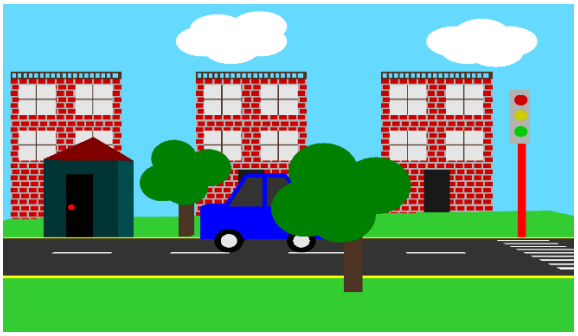
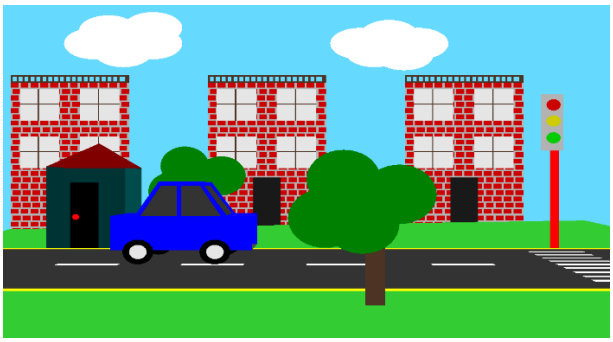
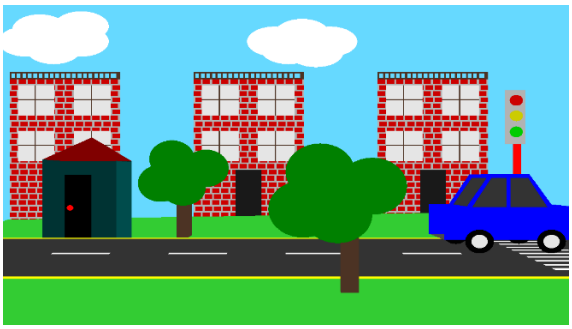
11. **Keyboard Function:** Keyboard function are handle car moving, 3D house translation and scaling to all three axes. 'R' or 'r' both are used to show red light to signal light and 'g' or 'G' are used to show green light on signal. Both upper case and lower case characters can be used in keyboard function. 3D housing translation and scaling also be controlled by pressing keys. All this features are contains in keyboard function.

12. **Timer Function:** Timer function are used for object animation. We want to animated car and cloud. So Timer function are used for those two animation and variable are used to control proper animation of that object. 'glutPostRedisplay()' and 'glutTimerFunc(20, CarAnimation, 0)' function are used for car animation. Here this timer function will be called in every 20 millisecond to looks a car moving.

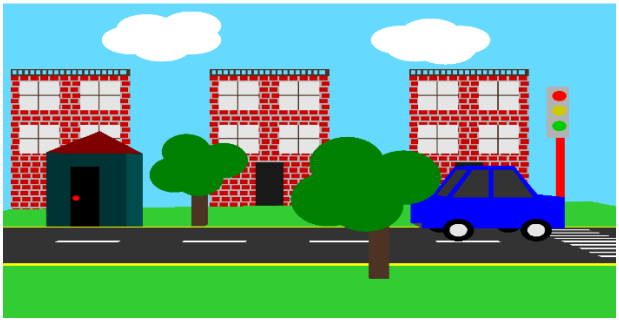
5. All Controlling keys:

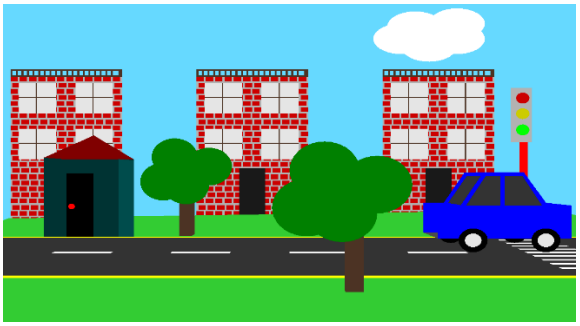
Feature	Axis/ Mode	Keys	Working
Signal Light	**Green light**	**'g' or 'G'**	Running Car
	Red light	**'r' or 'R'**	Stop the car on zebra crossing
Camera View	**X**- axis	**F1, F2**	Left or right side view of X-axis
	Y- axis	**F3, F4**	Left or right side view of Y-axis
	Z- axis	**F5, F6**	Left or right side view of Z-axis
Car Rotation	**X**- axis	**F7, F8**	Left or right side rotation of X-axis
	Y- axis	**F9, F10**	Left or right side rotation of Y-axis
	Z- axis	**F11, F12**	Left or right side rotation of Z-axis
House Translation	**X**- axis	**'a', 'A' or 'z', 'Z'**	Left or right side translation of X-axis
	Y- axis	**'s', 'S' or 'x', 'X'**	Left or right side translation of Y-axis
	Z- axis	**'d', 'D' or 'c', 'C'**	Left or right side translation of Z-axis
House Scaling	**X**- axis	**'h', 'H' or 'b', 'B'**	Left or right side scaling of X-axis
	Y- axis	**'j', 'J' or 'n', 'N'**	Left or right side scaling of Y-axis
	Z- axis	**'k', 'K' or 'm', 'M'**	Left or right side scaling of Z-axis

6. Some Snapshot of our project:

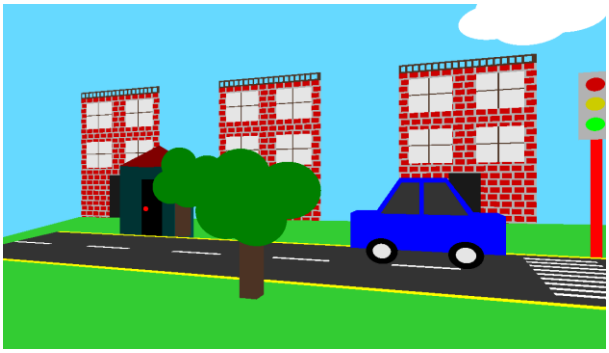











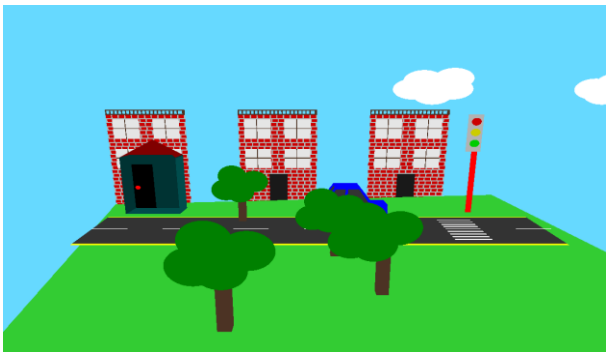
Signal Light Control:

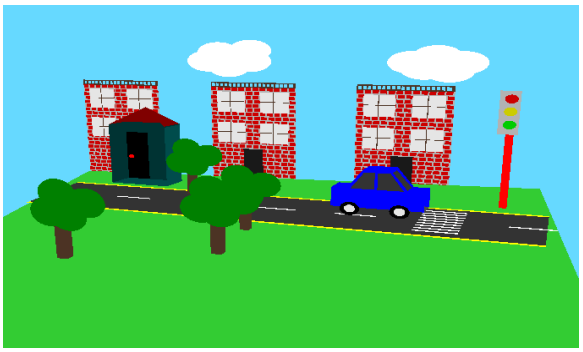




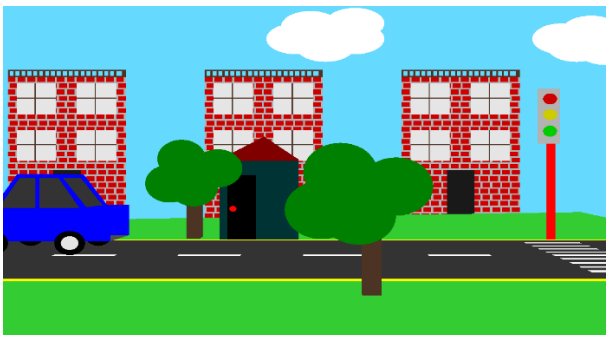
Camera View from different Axis:

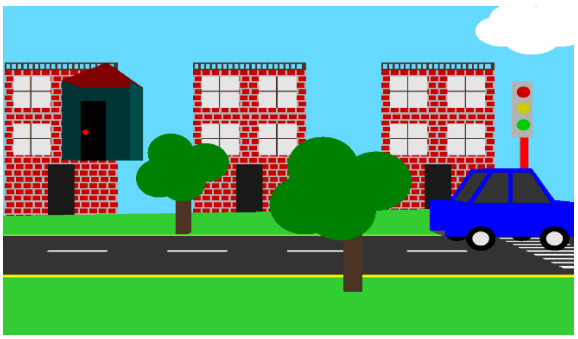




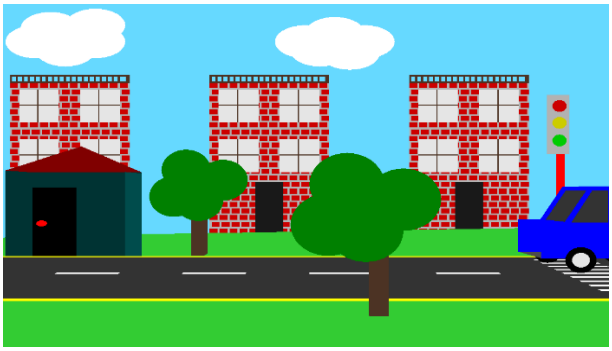


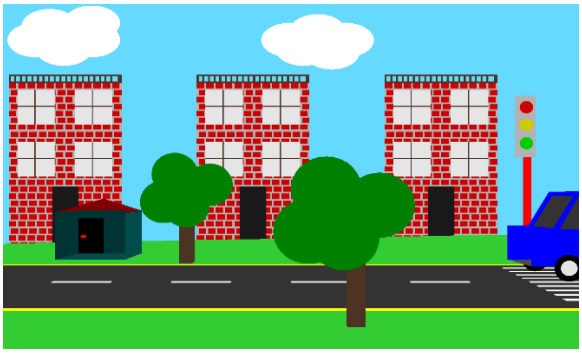
3D House Translation:

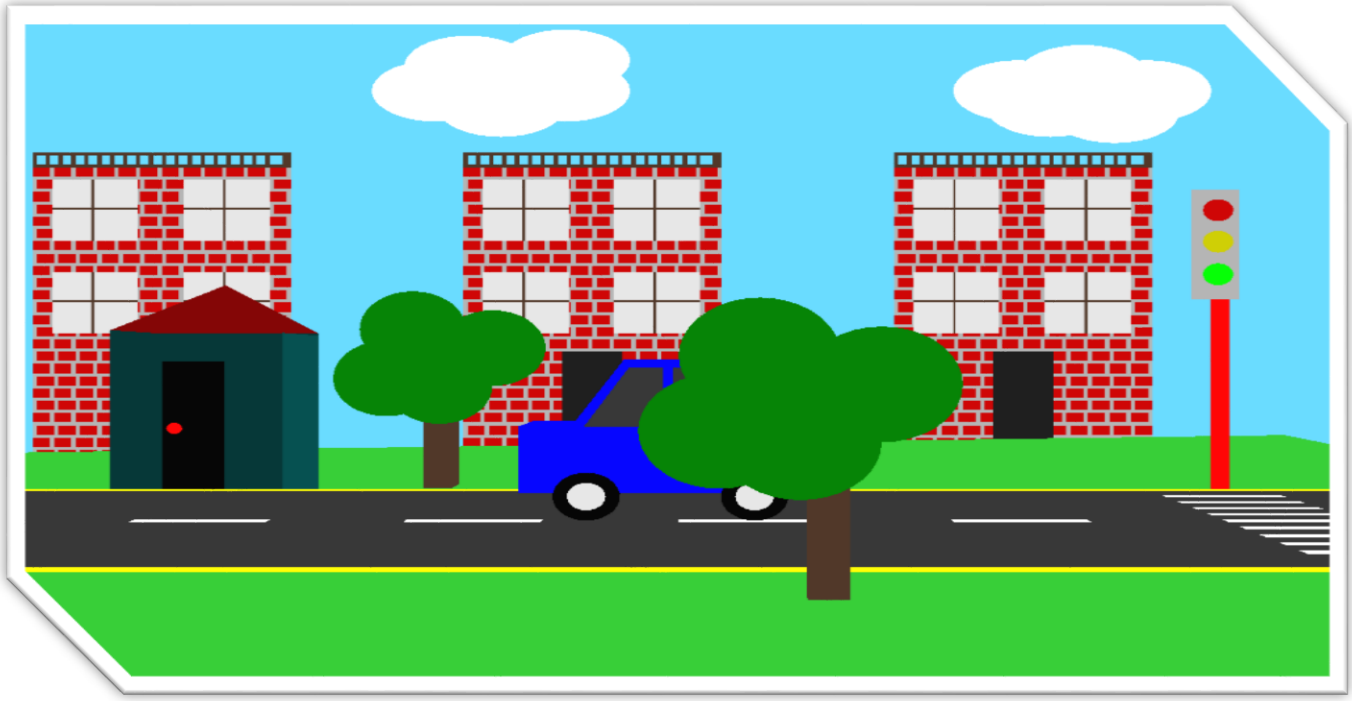




3D House Scaling:







☺ Those are some snapshot of our project while it was developed step by step.

7. Conclusion:

This ‘3D animated car’ project is one of the sample project on Computer Graphics. Though many difficulties were faced during the project as well as many errors occurred, we became succeed to compile and run the program. To had tried our best to include each and every basic features of graphics in our projects. We aimed it to be an interfacing application to the real world that means our project must not be a project for any examination but also applicable for real world scenario. From this very project we were able to achieve various knowledge in computer graphics and also in logical coding. We also gained an experience of group work, team coordination. We learned how team work is very much important in engineering field.

8. References:

www.openGL.org

www.google.com

Rubric:

Course Outcome		Notes	Marks
CO1: Demonstrate the concept of computer graphics and ability to use the computer graphics technology.			25 marks
Overall program structure: - Free from error		5 marks	
OpenGL Function: - Apply functions of keyboard handling a. Rotation b. Translation c. Scaling } X, Y, and Z Direction -Apply functions of texture/color mapping		15 marks 5 marks	
CO2: Construct 2D and 3D graphics by implementing concepts of computer graphics and computer graphics programming.			25 marks
Object: -All required objects are provided		10 marks	
Texture Mapping: - Apply functions of texture/color mapping for appropriate color		5 marks	
Camera / Lighting: -Appropriate technique is implemented and suitable with the environment		10 marks	
CO3: Respond to instruction by listening actively and give feedback			25 Marks
-Camera moving -Animation -Answer the questions regarding basic of computer graphics		10 marks 10 marks 5 marks	
CO4: Work together effectively to achieve the same goal by building a good relationship and interaction among team members.			25 Marks
Student 1 Name: Foysal Mahmud **ID:** 14CSE028	Objects (% of contribution) =	5 Marks	
	Camera (% of contribution) =	5 Marks	
	Animation (% of contribution) =	5 Marks	
	Report (% of contribution) =	10 Marks	
Student 2 Name: Taslima Akter **ID:** 14CSE004	Objects (% of contribution) =	5 Marks	
	Camera (% of contribution) =	5 Marks	
	Animation (% of contribution) =	5 Marks	
	Report (% of contribution) =	10 Marks	