Report On Project
(Computer Graphics)

Section-B

Group-A

Project- Animated Moving Objects

Submitted by:

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Introduction:
We have done a simple yet detail oriented project based on a village where basically three routes are shown and how objects move around the different routes , our project has some unique features such as different time of the day we can switch sceneries and thus bring a new light to a place and to see how different elements can be implemented to display different object movement. We have designed houses, trees,boats, cars,windmills,birds,clouds,stars and many other elements in our project inorder to make this project the best one we could think of. We wanted to make everything as realistic as possible too and so when the stars shines above in the night sky it does has a reflection on the water system below and When it's the afternoon time, we can see a plane flying through the sky too, each one of the frame can be interpreted as an art in itself.

Problem Statement:
In this course we learned how to make objects move in different ways. Such as,**"How to make an object rotate around its own axis?"** As when designing the cars wheels and the windmills, we had to take this matter into consideration and design as our course instructor has taught us and take some of the ideas as reference too. We also had other questions like,**"How to make the cars and boats go in both directions?"** We also went above and beyond to search on the internet about this to get help and as of the last couple of days we had finished with the project by addressing each one of the problems properly. We also had a question such as,**"Do we need 3d modeling of any objects?"**. But later on we had decided for this project to be a two-dimensional project and for all the objects to be two-dimensional as we had a lot of elements and environments to implement in this course.problems like,**"What is the way to make the project easier for the end user?"** We had not implemented any visible button on the project but when one presses different keys, different environments and times of the day will pop up and the user can easily change scenes with just the press of a button.

Objective of the project:
We are doing a project named 'Moving Objects'. The main objective of the project differed as we could not come to any definite conclusion at first as two of us had the idea to make a digital village but we also wanted to work with movement of objects and animating them while working with different environments as well. Thus we decided to make this project while working with so many elements to decide which one would be the best for everyone.

Description of the Scenery:
When one first runs the project, they are introduced with a wonderful morning view of a digital village where the user can see the sky blue sky above where clouds can be seen along with the morning sun and on the distance a little house with a tree and a windmill which is rotating on its axis can be seen, while birds are also flying on an angle to show they can go however they like. Under that, small boats and a big boat can be seen on the water going in different directions and below there are two houses with four trees in the middle and under that there is a street with cars going in different directions while avoiding hitting each other.

By pressing the Key **“D”** on the keyboard, we can see that day time easily changes the sky color to bright yellow to show the sunlight and nothing else changes on the scenery except this one thing.
When we press **“E”**, we can see that the sky color changed again to a light red to show how the evening is, and the sun begins to set on the far left side of the screen and a plane can be seen flying off on the sky too which is a new element we wanted to work with even though it has simple movement.
By pressing **“N”** we can change the scenery into night mode and suddenly the sky will turn pitch dark with the beautiful moon in all It's glory shining and the jewel-like stars along with it. We have also implemented the reflection of the sky in the water which makes this scenery even more beautiful.
Another thing to note here is that from any scenery the end user wants to view at any time if they wanna go back to the morning view, they just have to click **“M”** and they will be back to the morning view.

Technologies used in this project:
Projection:
Projection is the mapping or transformation of the object in view plane or the displayed surface. We have used parallel projection in this project as it can show the object like we can see through the telescope and as it can give an accurate view of an object.There are two types of parallel projection,the first one is Orthographic and the second one is Oblique. We have used front orthographic projection in this project to better display what we wanted to show to the end user.
Translation:
Translation is the movement of objects without any deformity . Every point is translated by the same amount. When the straight line is translated it will be drawn using endpoints. For translating a polygon, each vertex of the polygon is converted to a new position. Similarly, curved objects are translated. In order to change the position of the circle or ellipse its center coordinates are transformed, then the object is drawn using new coordinates.
Bezier Curves:
Bezier curves are constructed as a sequence of cubic segments, rather than linear ones. But whereas Hermite interpolating polynomials are constructed in terms of derivatives at endpoints, bezier curves use a construction due to Sergei Bernstein, in which the interpolating polynomials depend on certain control points.All of the objects in this projects including the trees, clouds, houses and the boats were drawn using the Bezier Curves. The reason we have used these curves is that they are very efficient to construct since a simple recursion process means that the basic arithmetic operation needed to build the points along one is just divided by two.

List of Functions:
glClearColor() ;
glColor3f() ;
glPointSize();
glBegin(GL_QUADS);
glDisable(GL_LIGHTING);
glEnd();
glColor3ub();
glVertex2f();

glPushMatrix();
glTranslatef();
glPopMatrix();
glBegin(GL_LINE_LOOP);
glBegin(GL_POLYGON);
glEnd();
glBegin(GL_TRIANGLES);
glBegin(GL_LINES);
glFlush();
glutPostRedisplay();
glutDisplayFunc(morning);
glutDisplayFunc(day);
glutDisplayFunc(evening);
glutDisplayFunc(night);
glutTimerFunc();
glutIdleFunc(Idle);
glutInit(&argc, argv);
glutInitWindowSize();
glutCreateWindow();
glutInit(&argc, argv);
glutDisplayFunc();
glutKeyboardFunc();
glutTimerFunc();
glutKeyboardFunc(handleKeypress);
glutMainLoop();

Conclusion:
We had built this project in order to get an in depth example of how we can implement what we learned in this course. So far we had used various techniques that helped us along the way including websites that had vast information and code examples that helped us with the process of doing this project. It is not complex but elaborate how the scenery looks and works alongside the different times of the day and how the objects move around and make every scene prettier than the last one. All the features of this project are implemented to show how a village consisting of a highway and a water system and an open sky would look like in different times of the day even though our main objective which is to show the movement of various objects is also fulfilled.