TRIBHUWAN UNIVERSITY

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PULCHOWK CAMPUS

A

REPORT

ON

3D SIMULATION OF CLASSROOM

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Acknowledgment

We like to acknowledge the opportunity provided by the Department of Electronics and Computer engineering to extend our theoretical knowledge into practical understanding through this project.

An attempt at any level cannot be satisfactorily completed without the support and guidance of skilled people. We would like to express our deep gratitude to Dr. Basanta Joshi, as well as our lab supervisors Mr. Anil Verma and Mr. Suresh Pokharel for providing sufficient background knowledge and understanding of computer graphics and very useful critiques of the project.

We are also thankful to all our colleagues of BEX 2074 who have helped at some point in the project. We are always indebted to them for their kind support and constant encouragement and their enthusiasm to help us complete our project. Finally, we wish to thank our parents for their support throughout our studies and providing resource for the successful completion of this project.

Abstract

Computer Graphics is a sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content. Although the term often refers to the study of three-dimensional computer graphics, it also encompasses two-dimensional computer graphics and image processing.

The project of graphics is a 3D Classroom Simulation. The intention behind the consideration of this project is to learn how to develop realistic 3D objects using software in computer. Computer graphics is production of images on computers for use in any medium. Images used in the graphic design of printed material are frequently produced on computers, as are the still and moving images seen in comic stripes and animations. The realistic images viewed and manipulated in electronic games and computer simulations could not be created or supported without the enhanced capabilities of modern computer graphics

Open Graphics Library (OpenGL) is a cross-language, cross-platform application programming interface (API) for rendering 2D and 3D vector graphics. The API is typically used to interact with a graphics processing unit (GPU), to achieve hardware-accelerated rendering. The project was done on Visual Studio.

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1 Introduction

A classroom is a learning space, a room in which both children and adults learn. Classrooms are found in educational institutions of all kinds, ranging from preschools to universities. The layout, design and decor of the classroom has a significant effect upon the quality of the educational experience. In the design of a classroom, desk arrangements are essential to the decor and design of the classroom followed by seating arrangements for the students. Usually classroom desks are arranged in rows or columns.

A person can relate the simulated 3D classroom with the real-world classroom. Here we must have knowledge about Geometry, Animation, Rendering, Imaging which are the basic major subfield of computer graphics.

2 Objectives

Following were the objectives of this graphics project:

a) To understand the basic objectives and scope of computer graphics.
b) To be familiar with the basic major subfields of computer graphics.
c) To demonstrate the transformation of real-world objects into creative, conceptually appropriate design.
d) To understand transformation, viewing, illumination and other various concepts of graphics.

3 Application

Some applications of this project are listed as below:

- Understanding of the theory and mathematical concepts of computer graphics.
- Applicable as graphics environment in game development.

4 Methodology

For completing this project successfully, one should have the clear knowledge and understanding of computer graphics concepts and C++ programming language. Mainly, for a project like this, we should have the knowledge of OpenGL, which is a graphics API. There are many tutorials which are available in various platforms in internet which were very helpful for us to complete this project.

For the completion of this project we are went through the many books and articles written on computer graphics by different authors. We also discussed ideas with our classmates and we implemented the best ideas given by them also. We went through the various tutorial videos especially on using graphics in C++ on internet portal.

Our 3D Classroom Simulation is mainly focused on visualizing a general classroom. On making this project a grand one, we decided to divide this complete project work among our members so that no one will miss out in this knowledge gaining phase.

Firs task was writing the source code, then merging it wholly, debugging, finalizing the code and at last documenting the project.

5 Implementation

Headers

Class is defined in the header file. Each class consists of member function that draws the object in the screen.

Classes

Every object that is drawn in the classroom has its own class. The class in defined on the header file and the .cpp file consist of the function that draws the object on the screen.

Main

On the main file, functions for windows, scene rendering, key events, mouse movement, animation etc. are there. This file is responsible for all the simulation happening on the screen.

6 Results

Various objects of the environment are as follows:

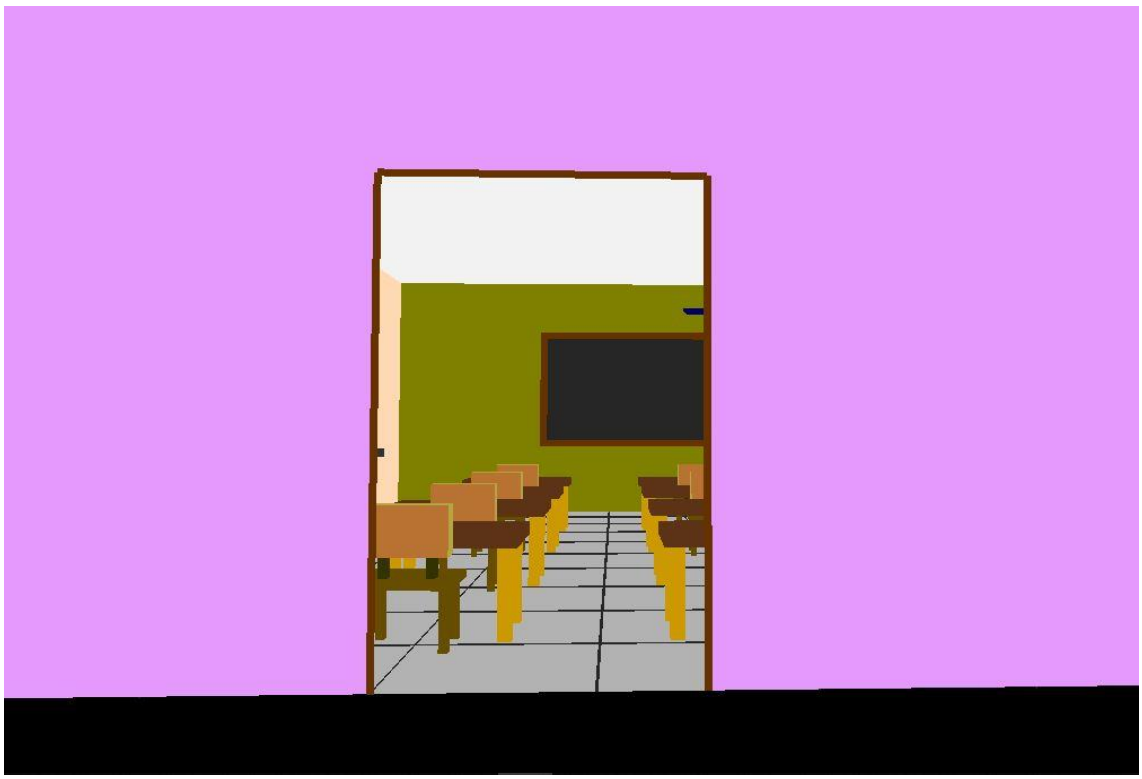

Figure 1: Door View

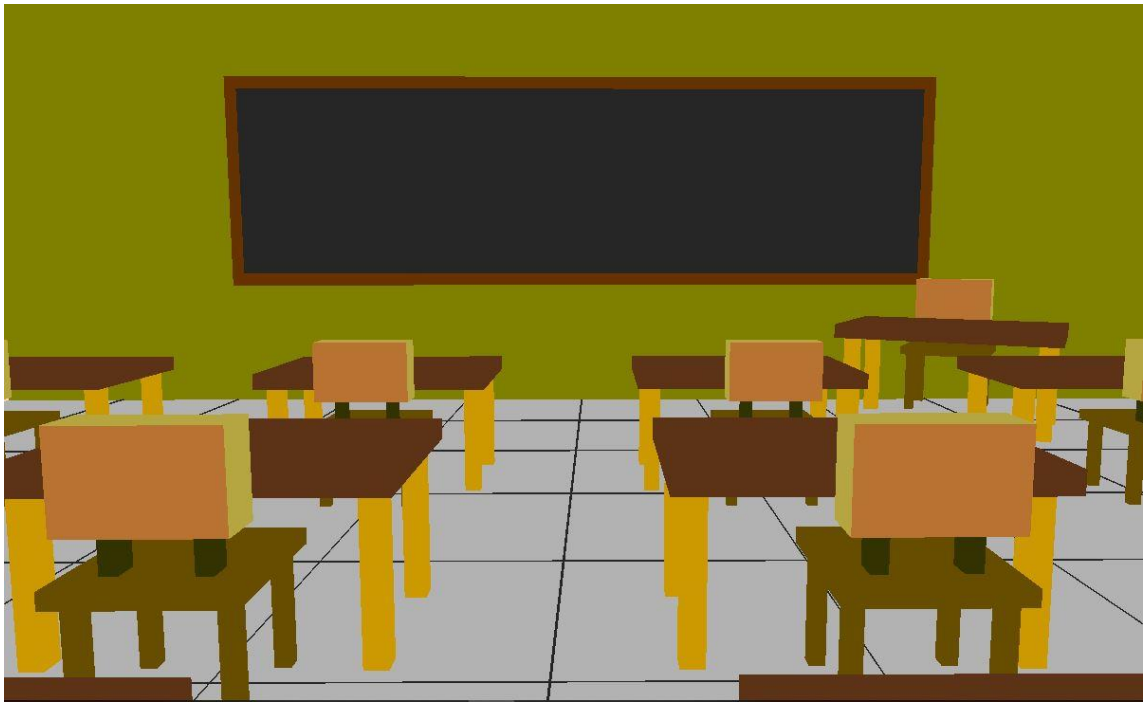

Figure 2: Board

Figure 3: Window

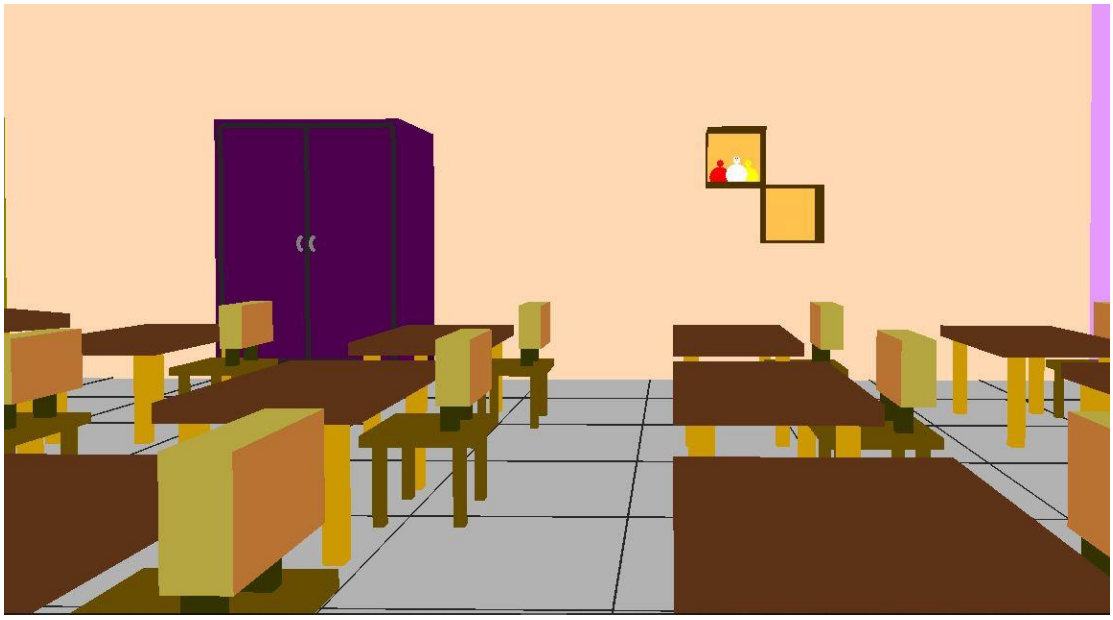

Figure 4: Cupboard

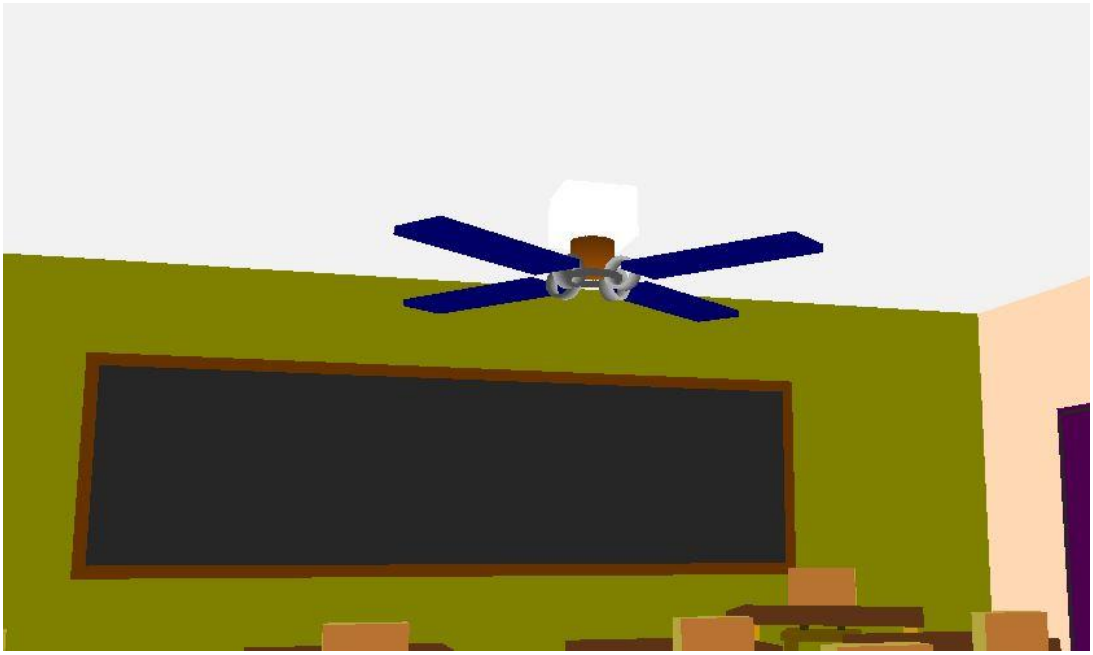

Figure 5: Fan

7 Problems Faced and Solutions

We had to cope with the following problems for the completion of the project:

- During the project, we as a team had difficulties while collaborating in coding stage as we were unfamiliar with the coding tools.
- Applying theoretical concepts in programming was challenging.

As the project went on, we got comfortable with the collaborating tools. We only learned the OpenGL as per required in the project rather than learning all the use of whole API.

As in every coding project, there was some compile, runtime or logical errors which we dealt throughout the project.

8 Limitations and Future Enhancements

Our project is not complete embodiment of all the graphics concepts. The project lacks lighting and illumination features.

It can be made more descriptive and realistic with textures so that the environment looks like real classroom.

9 Conclusion and Recommendations

Hence, with the completion of the project, a 3D environment of a classroom can be simulated. As a whole, project was a good learning experience and came face to face with practically applicable aspect of engineering which may guide us in developing professional projects in near future.

Meanwhile, it would provide a good basis for us, the programmers to work on big projects in near future. But most importantly, we got familiarized with concepts of computer graphics and its application in technological and game development industry.

10 References

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