Visvesvaraya Technological University, Belagavi – 590010

COMPUTER GRAPHICS MINI PROJECT REPORT
ON
ENVIRONMENTAL POLLUTION

Submitted by

Chandini R	4SO20CS032
Deena Marina Dsouza	4SO20CS037

Under the guidance of

Ms Anusha S
(Assistant Professor, CSE Department)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ST JOSEPH ENGINEERING COLLEGE
Vamanjoor, Mangaluru -575028, Karnataka

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ABSTRACT

Environmental Pollution is a project that aims to raise awareness about environmental pollution by utilizing the OpenGL GLUT library to create a visually immersive and interactive simulation. By harnessing OpenGL's advanced graphics rendering capabilities and GLUT's windowing and input functionalities, the project presents a comprehensive depiction of environmental pollution scenarios.

The simulation includes elements such as flowing river, smoke-emitting buildings, overflowing dustbins, hazardous waste, and human activities like tree cutting and improper waste disposal. These realistic and detailed scenes enable users to develop a deeper understanding of the detrimental impacts of pollution on our environment. The interactive nature of the project, made possible by the OpenGL GLUT library, allows users to explore and interact, enhancing their engagement and learning experience. Furthermore, the cross-platform compatibility of GLUT ensures that the project can reach a wider audience. By leveraging the combined power of OpenGL's graphics rendering and GLUT's interactivity, this project effectively communicates the urgency of addressing environmental pollution and encourages individuals to adopt responsible practices for preserving our natural resources.

ACKNOWLEDGEMENT

We dedicate this page to acknowledge and thank those responsible for the shaping of the project. Without their guidance and help, the experience while constructing the dissertation would not have been so smooth and efficient.

We sincerely thank **Ms Anusha S, Assistant Professor**, Department of Computer Science and Engineering for her guidance and valuable suggestions which helped us to complete the project.

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CHAPTER 1: INTRODUCTION

1.1. Introduction

Computer graphics is a field that focuses on creating and manipulating visual content using computers. It plays a significant role in various industries, including gaming, animation, virtual reality, and simulation. To facilitate the development of visually compelling graphics applications, OpenGL (Open Graphics Library) has emerged as a powerful and widely-used programming interface. OpenGL provides a set of functions for rendering 2D and 3D graphics, allowing developers to harness the full potential of modern graphics hardware. Alongside OpenGL, the GLUT (OpenGL Utility Toolkit) library provides a collection of utility functions for creating windows, handling input, and managing other aspects of the graphical user interface.

Environmental pollution is a pressing global concern that has adverse effects on ecosystems, human health, and the overall well-being of the planet. To raise awareness about this critical issue, we have undertaken a project to create a visually engaging simulation of environmental pollution using the OpenGL GLUT library. The project aims to showcase various sources of pollution, such as industrial emissions, car exhaust, improper waste disposal, and deforestation, in a virtual environment. By leveraging the capabilities of OpenGL and GLUT, we can create realistic graphics and dynamic visual effects to depict the harmful consequences of pollution.

Through this project, we hope to highlight the importance of environmental conservation and the need for sustainable practices. By utilizing OpenGL and GLUT, we can create an immersive experience that allows users to witness the detrimental impact of pollution firsthand. The realistic rendering capabilities of OpenGL enable us to simulate scenarios like flowing rivers, smoking buildings, polluted water bodies, and the destruction of natural habitats. Ultimately, this project serves as a visual tool to educate and inspire individuals to take action towards protecting our environment.

1.2. Problem Statement

Environmental pollution has become a pressing global issue with severe implications for human health, ecosystems, and the overall well-being of our planet. Addressing this problem requires effective communication and raising awareness among individuals from diverse backgrounds. Visual representation through computer graphics offers a unique opportunity to convey complex environmental concepts in an engaging and informative manner.

The problem statement for this project is to develop a computer graphics simulation that visually depicts different types of environmental pollution and its sources. By creating an interactive and immersive environment, we aim to provide users with a firsthand experience of the detrimental effects of pollution and increase awareness about the need for sustainable practices.

1.3. Objectives

- The purpose of this project is to leverage the power of computer graphics and OpenGL with GLUT to develop an engaging and informative simulation on environmental pollution.
- To create a realistic and visually appealing graphical representation of pollution sources and their effects on the environment.
- To raise awareness and educate users about the importance of environmental sustainability and responsible practices.
- Through this project, we seek to encourage individuals to take action towards environmental conservation.

CHAPTER 2: SOFTWARE REQUIREMENTS SPECIFICATIONS

2.1. Hardware Requirements

- Processor – Intel core i3 or higher
- Processor Speed –2.5GHz or above
- Hard Disk - 10GB (approx.)
- RAM –2GB or above
- Monitor – Minimum resolution of 1280 x 720 pixels

2.2. Software Requirements

- Programming Language: C/C++
- Library: OpenGL
- IDE: Codeblocks
- Operating System: Windows

CHAPTER 3: IMPLEMENTATION

- Environmental pollution is a captivating project developed using the OpenGL GLUT framework in the CodeBlocks IDE.
- The project showcases a vibrant and dynamic environment with various elements interacting seamlessly. Initially the background is initialized using init() function.
- There are two display functions, display1() function is used to display the project details and display() function is used to render the scene. For switching from initial window to the actual scene keys() function is used which takes keyboard input from the user and switches to the scene.
- As you explore the scene, you will encounter a picturesque river gracefully flowing, while nearby buildings emit wisps of smoke, adding a touch of realism to the atmosphere. The smoke is drawn using the circle function and movement is added using glTranslatef() function.
- To highlight the pressing issue of pollution, overflowing dustbins can be seen scattered throughout the surroundings, symbolizing the negligence towards waste management. Dustbin implemented using polygon function and waste implemented using circle function.
- Furthermore, the project sheds light on the detrimental effects of hazardous waste, portraying its presence within the environment.
- Using timer function, a thought-provoking scene unfolds asa man callously discarding waste into the pristine water, emphasizing the need for responsible behavior. The man is drawn using polygon and circle functions.
- Once again using timer function, after some time one more man appears who is attempting to cut down the tree, serving as a poignant reminder of the importance of preserving our natural resources.
- Along with all these animations, text messages are also being displayed for the better understanding of the user using glutBitmapCharacter() function.

CHAPTER 4: SCREENSHOTS

Fig:4.1 Initial display window showing project details

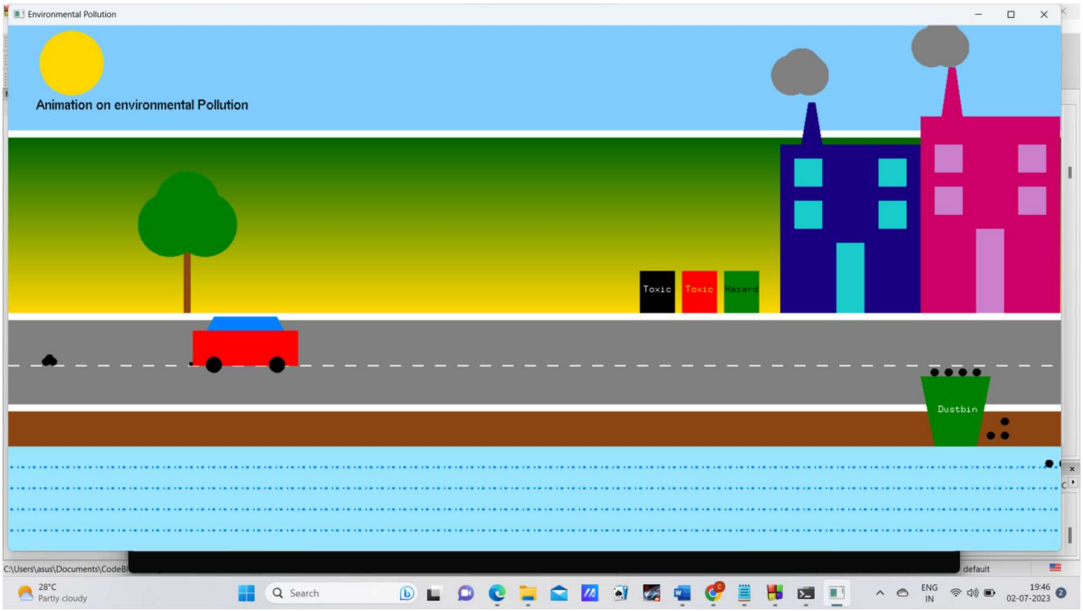

Fig:4.2 Window displayed after user pressed key 1

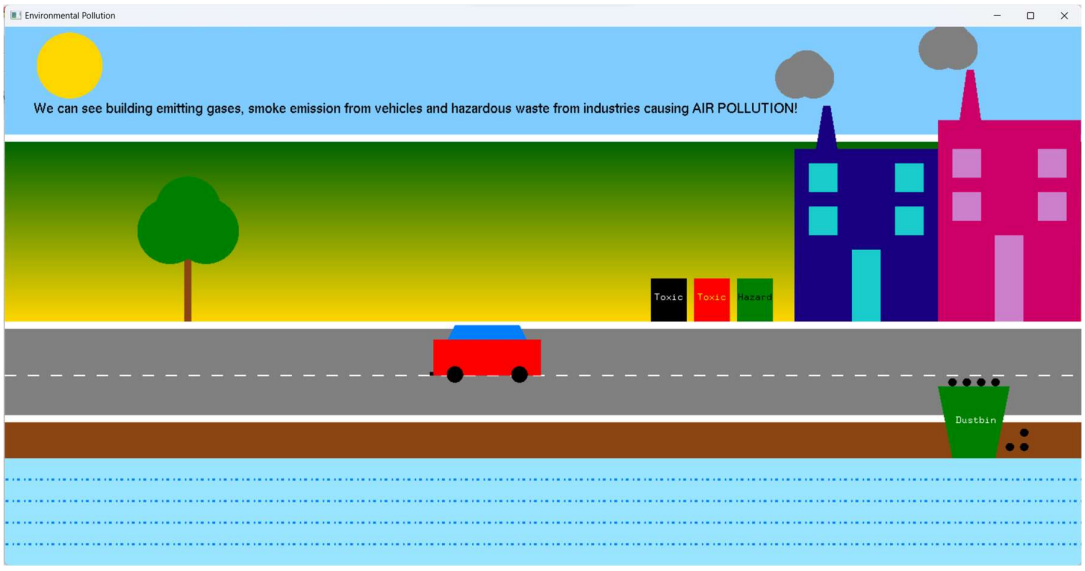

Fig:4.3 Display showing air pollution

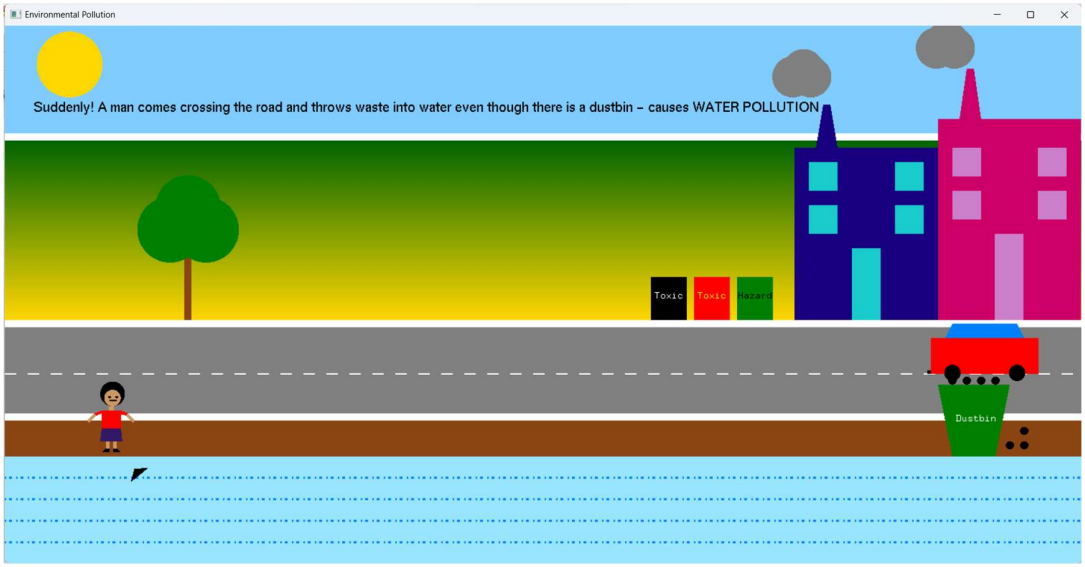

Fig:4.4 Man throwing waste into water

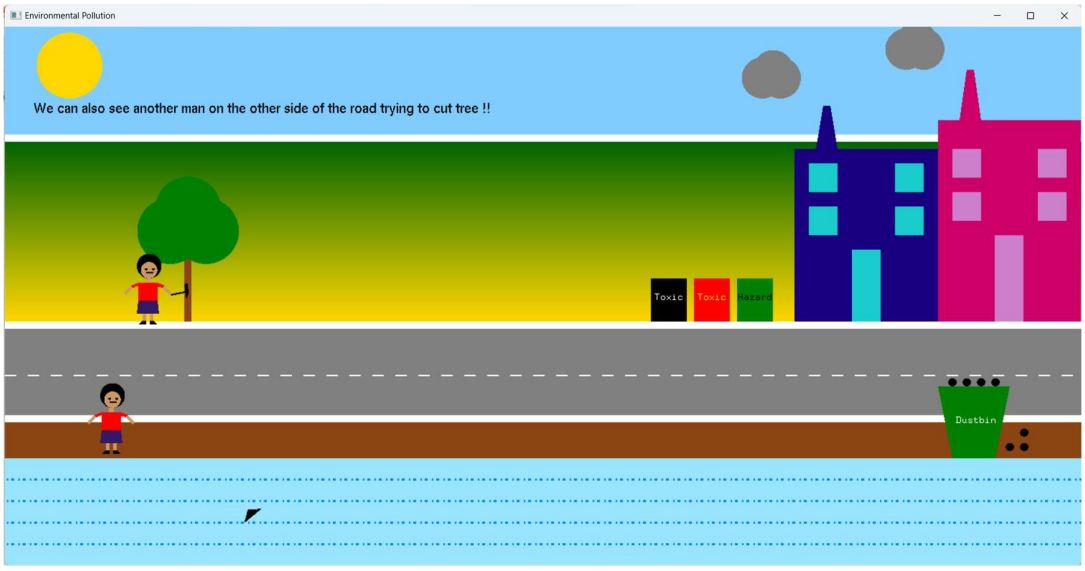

Fig:4.5 Another man trying to cut the tree

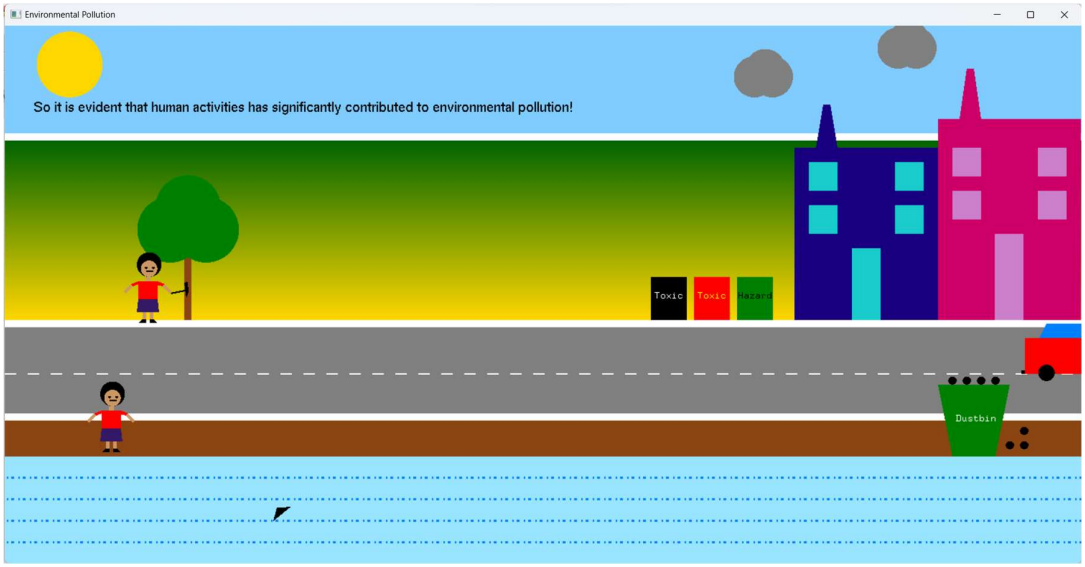

Fig:4.6 Text Message to user

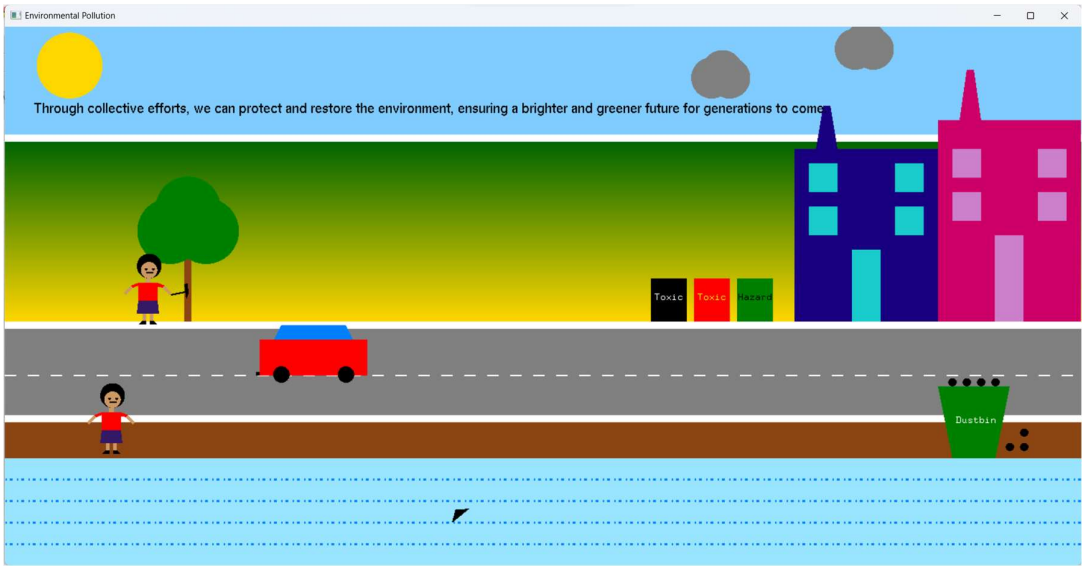

Fig:4.7 Text Message to user

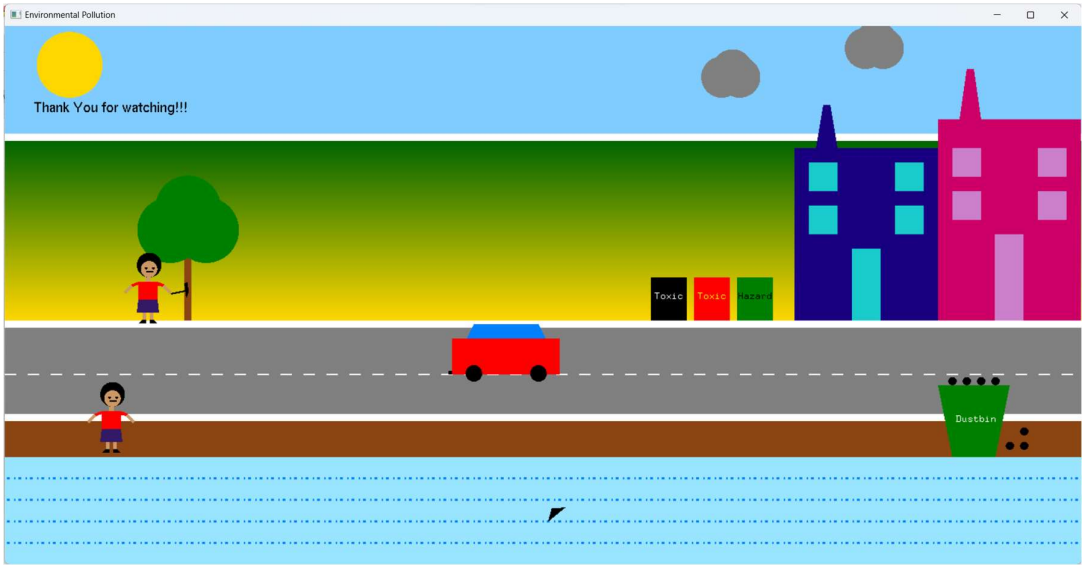

Fig:4.8 End of Animation

CHAPTER 5: CONCLUSION AND FUTURE WORK

5.1. Conclusion

This project presents a visually engaging and thought-provoking representation of environmental pollution. Through its depiction of a river flowing, buildings emitting smoke, overflowing dustbins, hazardous waste, and the reckless disposal of trash, the project successfully sheds light on critical issues plaguing our environment. By showcasing these scenarios, it aims to raise awareness and inspire action towards sustainable practices and the preservation of our natural resources.

In conclusion, the utilization of the OpenGL GLUT library played a crucial role in the success of this environmental pollution project. OpenGL, with its powerful graphics rendering capabilities and GLUT's windowing and input functionalities, provided the necessary tools to create an immersive and visually engaging experience for the users.

5.2. Future works

- Expanded Environmental Effects: To make the simulation more comprehensive, future iterations could include additional environmental effects such as changing weather patterns, seasonal variations, and natural disasters to showcase their impact on our surroundings.
- Interactive Elements: Implementing interactive elements would enhance user engagement. For example, users could be allowed to plant virtual trees, clean up litter, and make environmentally friendly choices within the simulation.
- Gamification Aspects: Introducing gamification elements like rewards and challenges would make the project more captivating, encouraging users to take positive environmental actions in their real lives.
- Real-time Data Integration: Integrating real-time environmental data into the simulation could offer an up-to-date view of the current state of various locations worldwide. This would allow users to witness the actual impact of pollution and human activities on the planet.

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