VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELAGAVI

Mini Project Report on

"Archery Game"

Submitted in the partial fulfillment for the requirements of Computer Graphics & Visualization Laboratory of 6th semester CSE requirement in the form of the Mini Project work

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2021-2022

BMS INSTITUTE OF TECHNOLOGY &MANAGEMENT

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CERTIFICATE

This is to certify that the Project work entitled **"ARCHERY GAME"** is a bonafide work carried out by **P. Vamshi (1BY19CS097), Paidi Venkata Revanth Datta (1BY19CS098)** and **Palash Kumar Singh (1BY19CS099)** in partial fulfillment for *Mini Project* during the year 2021-2022. It is hereby certified that this project covers the concepts of *Computer Graphics & Visualization*. It is also certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in this report.

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PROGRAM SPECIFIC OUTCOMES

1. Analyse the problem and identify computing requirements appropriate to its solution.
2. Apply design and development principles in the construction of software systems of varying complexity.

ACKNOWLEDGEMENT

We are happy to present this project after completing it successfully. This project would not have been possible without the guidance, assistance and suggestions of many individuals.

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ABSTRACT

"ARCHERY GAME" is a 2D game. The game is created using OpenGL where the player tries to shoot the blocks/target. The objective of the game is to hit all the target/blocks and complete the game by shooting down all the targets then he wins the game. If he is not able to hit all the targets, he loses the game.

OpenGL is the abbreviation for Open Graphics Library. It is a software interface for graphics hardware. This interface consists of several hundred functions that allow you, a graphics programmer, to specify the objects and operations needed to produce high-quality color images of two-dimensional and three-dimensional objects. Many of these functions are actually simple variations of each other, so in reality there are about 120 substantially different functions. The main purpose of OpenGL is to render two-dimensional and three-dimensional objects into the frame buffer. These objects are defined as sequences of vertices (that define geometric objects) or pixels (that define images). OpenGL performs several processes on this data to convert it to pixels to form the final desired image in the frame buffer.

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CHAPTER 1

INTRODUCTION

Brief introduction to the project including the idea behind it is explained in this chapter.

1.1 Brief Introduction

SGI released the **OpenGL** standard in the 1980s, developing software that could function with a wide range of graphics hardware was a real challenge. Software developers wrote custom interfaces and drivers for each piece of hardware. This was expensive and resulted in much duplication of effort.

SGI considered that the Iris GL API itself wasn't suitable for opening due to licensing and patent issues. Also, the Iris GL had API functions that were not relevant to 3D graphics. For example, it included a windowing, keyboard and mouse API, in part because it was developed before the X Window System and Sun's NEWS systems were developed.

In addition, SGI had a large number of software customers; by changing to the OpenGL API they planned to keep their customers locked onto SGI (and IBM) hardware for a few years while market support for OpenGL matured. Meanwhile, SGI would continue to try to maintain their customers tied to SGI hardware by developing the advanced and proprietary Iris Inventor and Iris Performer programming APIs.

The following diagram illustrates how OpenGL processes data. As shown, commands enter from the left and proceed through a processing pipeline. Some commands specify geometric objects to be drawn, and others control how the objects are handled during various processing stages.

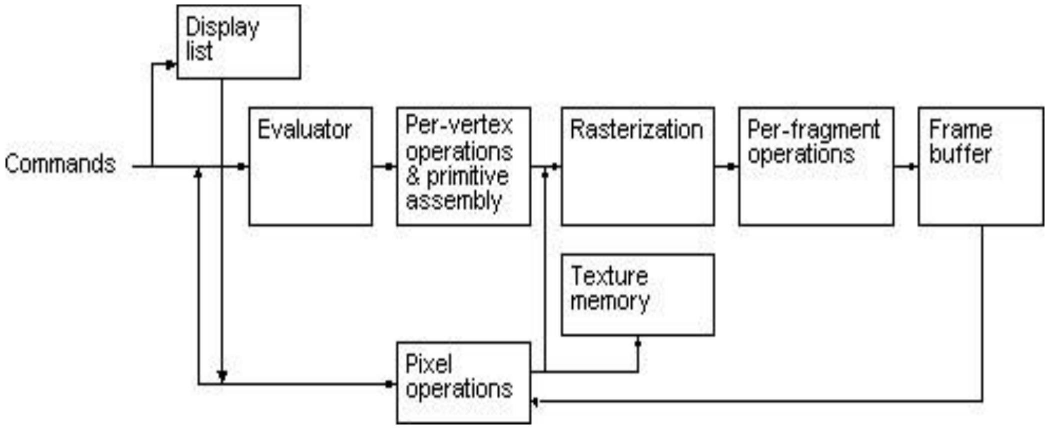


Fig: 1.4 OpenGL Block Diagram

1.2 Motivation

The Motivation of this project are summarized below:

- To develop a Open GL software called “PERPLEXITIY”.
- To build the environment for the player to improve his quick accuracy.
- To progress the Agility of the player by the game.
- To hit all the target/blocks and complete the game by shooting down all the targets then he wins the game else he loses the game.

1.3 Scope

- Archery Game can be converted into 3D game. Human Perspective View can be Implemented.
- It can be made a multiplayer game.
- Even more Realistic Graphics can be implemented.

1.4 Problem Statement

Our program must:

- □ Generate a new random Blocks/Targets each time the program is run.
- □ Select a speed of the Arrow to be shot and also the vertical moment of Arrow. .
- □ Allow the user to use the keys to play the game. The player should not get infinite Arrows. Move a character to indicate where the player current is.

1.5 Proposed System

This project is a demonstration of "**Archery Game**". We have taken the help of built in functions present in the header file. To provide functionality to our project we have written sub functions. These functions provide us the efficient way to design the project. In this chapter we are describing the functionality of our project using these functions.

Keyboard interactions are provided where, when a Enter button is pressed, menu displays and we can select options from menu displayed. The Project which we have done uses OpenGL functions and is implemented using C. Our Project is to demonstrate **ARCHERY GAME**. User can perform operations using keyboard.

Some Keyboard Instructions are:

- ○ Firstly, after compiling we get a Home Page.
- ○ Then we click the Enter button to display the Main window here we get three options in which user has to specify his choices:
  - □ New Game: To start the new game.
  - □ Instructions: It Guides the user how to play the game.
  - □ Exit: Quits the Game.

- As the player clicks 1 i.e. To open the new game.
- Now in game the player uses the arrow key to complete the game.
- Regardless of a win or lose the player is redirected to pop up page, where again he has to specify the choice.

1.6 Limitations

- There is only one map in the game. Basically fixed blocks at fixed locations.
- There is no multiplayer option.
- No Hard levels in the game.

CHAPTER 2

LITERATURE SURVEY

- ✓ **https://ieeexplore.ieee.org/abstract/document/7272964**

  In this paper, the quest for the archery game is performed over the search space of perfect archery using an approach of search-based procedural content generation. Perfect maze construction is rather random with little to no control of the final product. We propose a search-based framework based on attributes or metrics of a constructed maze to provide a foundation for evaluation functions (fitness functions).

- ✓ **https://ieeexplore.ieee.org/document/9234216**

  Game level design is one of the most important element of developing an enjoyable video game. Besides, game with difficult and dynamic level can make players more exciting. This paper presents a new method of generating a video game level using a genetic algorithm. The proposed method is called gene pool integrates learning. This method implemented in feature selection so that this method is general enough to be used for multiple different types of games. This paper uses some training data to scan good patterns and store all of them in a gene pool.

- ✓ https://ieeexplore.ieee.org/abstract/document/7272964

  In the field of a procedural content generation, search-based procedural content generation looks for the best content for a game over a search space (defined by the generation parameters) by comparing scores rewarded by an evaluation function. The best content is the content with the highest score.

  Search-based procedural content generation results in a good content in general, but it is hard to design an evaluation function if our desired property for a content includes the subjective preference such as the "fun" factor of a content. The word "fun" is subjective and has a different meaning for each person. For example, in the case of a maze, some like a maze with many decisions, and others like one with lots of turns.

Thus, defining one specific evaluation function for a subjective factor is not a trivial task.

- ✓ https://ieeexplore.ieee.org/document/9234216

Furthermore, the genetic algorithm is used to find the combination of patterns that can produce the best result. The gene pool also records the quality of each gene so it can learn the pattern which most commonly found in multiple levels. For testing, this research develops a custom game with complicated rules that are hard to represent by a simple 2D array compared to the previously attempted work. The result of this research shows that the method can generate many complicated levels at once. Overall, levels generated using this method on average requires almost 3 times more steps to solve than the dataset.

Today, many game has been developed and distributed in marketplace. Besides, many game also has many genres for gameplay such as educational game [1], action game [2], survival game [3], puzzle game, and other genre game [4]. In addition, its game has been developed not only using conventional but also using modern technology such as virtual reality [5], augmented reality [6], artificial intelligent [7], and natural language processing [8]. Also, one important element must be implemented on the game is level generation which can make game more interesting.

CHAPTER 3

SYSTEM REQUIREMENTS

3.1 SOFTWARE REQUIREMENTS

1. **Operating System**: Microsoft Windows XP, Microsoft Windows 7 and above.An operating system (OS) is the program that, after being initially loaded into the computer by a boot program, manages all of the other application programs in a computer. The application programs make use of the operating system by making requests for services through a defined application program interface (API). In addition, users can interact directly with the operating system through a user interface, such as a command-line interface (CLI) or a graphical UI (GUI)
2. **Code Blocks installed.**

   Code::Blocks is a free, open-source cross-platform IDE that supports multiple compilers including GCC, Clang and Visual C++. It is developed in C++ using wxWidgets as the GUI toolkit. Using a plugin architecture, its capabilities and features are defined by the provided plugins. Currently, Code::Blocks is oriented towards C, C++, and Fortran. It has a custom build system and optional Make support.
3. **Compiler used**: VC++ 6.0 compiler: Microsoft Visual C++ (MSVC) is a compiler for the C, C++ and C++/CX programming languages by Microsoft. MSVC is proprietary software; it was originally a standalone product but later became a part of Visual Studio and made available in both trialware and freeware forms. Maze Game 6th Sem, Dept of CSE, BMSIT&M 8 2021-2022
4. **Language used:** Visual C++

5. **Free Glut** Software FreeGLUT is an open-source alternative to the OpenGL Utility Toolkit (GLUT) library. GLUT (and hence FreeGLUT) allows the user to create and manage windows containing OpenGL contexts on a wide range of platforms and also read the mouse, keyboard and joystick functions. FreeGLUT is intended to be a full replacement for GLUT, and has only a few differences.

3.2 HARDWARE REQUIREMENTS

1. Processor: Intel Core^{TM}Core i3-32 bit
2. Processor Speed: 2.9 GHz
3. RAM Size: 8GB DDR3
4. Graphics-2GB
5. Cache Memory -2MB

CHAPTER 4

SYSTEM ANALYSIS

4.1 INITIALIZATION

- Initialize to interact with the Windows.
- Initialize the display mode that is double buffer and RGB colour system.
- Initialize window position and window size. Initialize and create the window to display the output.

4.2 DISPLAY

- Introduction page of “ARCHERY GAME”.
- Menus are created and depending on the value returned by menus.
- Suitable operations are performed.
- The operations performed are New Game, Instructions, Quit.

4.3 FLOW CHART

When we run the program, home window appears. On clicking ‘Enter’ button Main window is opened. In main window list of options like New Game, Instructions & Quit appears. By selecting any of these options we can perform the specified operation in the game.

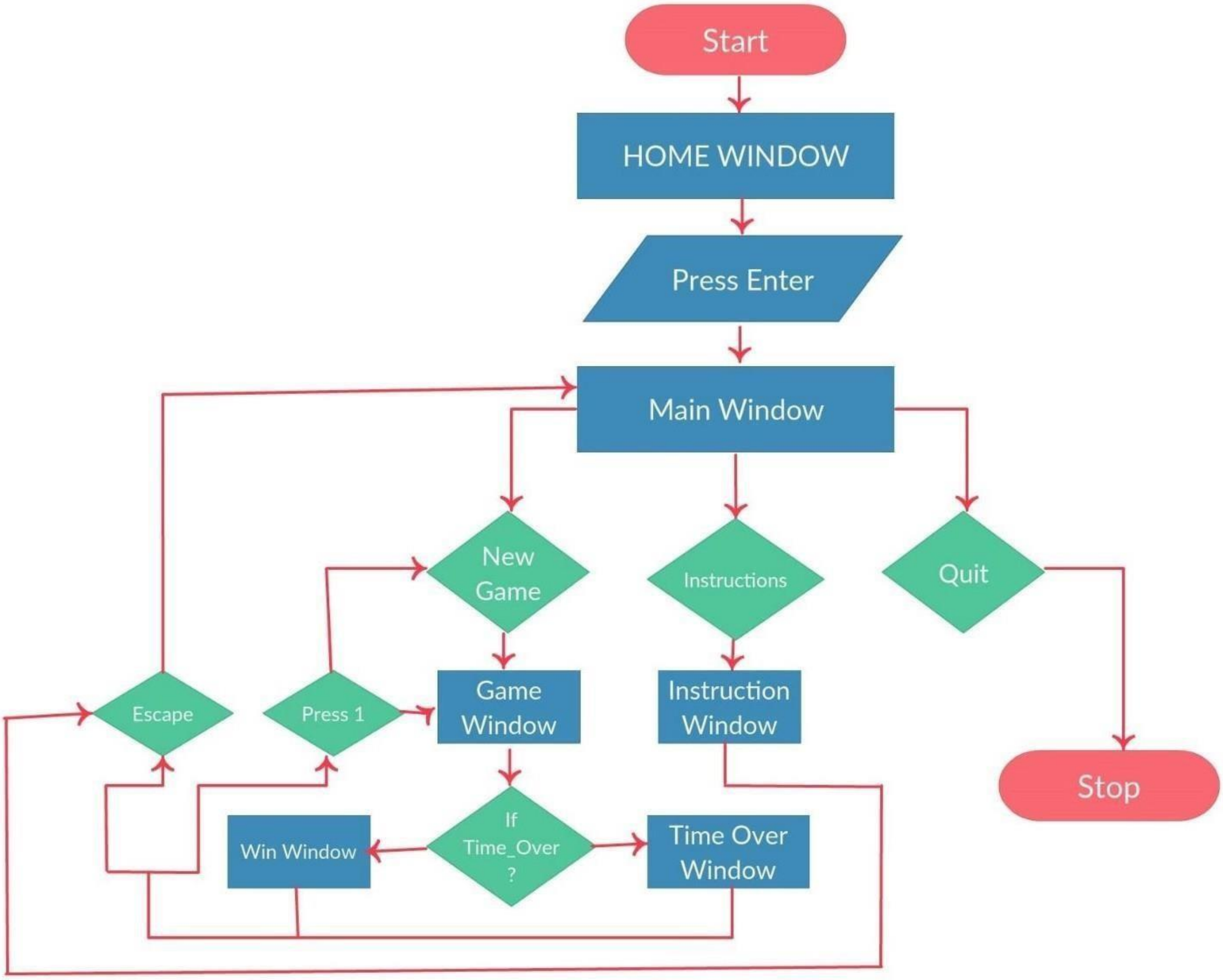


Fig: 3.3 Flow Chart

CHAPTER 5

SYSTEM IMPLEMENTATION

5.1 STRUCTURE

- ✓ void output(int x,int y,char *string);
- ✓ void draw_string(int x,int y,char *string);
- ✓ void frontscreen(void);
- ✓ void winscreen();
- ✓ void startscreen();
- ✓ void instructions();
- ✓ void idle();   void wall();
- ✓ void specialkey(int key,int x,int y);
- ✓ void display();
- ✓ void keyboard(unsigned char key,int x,int y);
- ✓ void myinit();
- ✓ void myreshape(int w,int h);
- ✓ int main(int argc,char** argv);

5.2 ANALYSIS

FUNCTIONS

A function is a block of code that has a name and it has a property that it is reusable that is it can be executed from as many different points in a c program as required.

The partial code of various function that have been used in the program are:

5.2.1 myinit

```
void myinit()
{
glMatrixMode (GL_PROJECTION);
glLoadIdentity ();
glPointSize(18.0);
 glMatrixMode(GL_MODELVIEW);
 glClearColor(0.0,0.0,0.0,0.0);
}
```

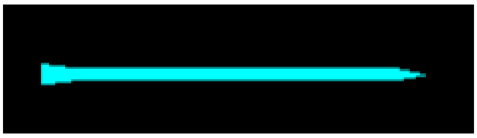
This function is used to initialize the graphics window.GlMatrixMode(GL_PROJECTION), glLoadIdentity() are used to project the output on to the graphics window.

5.2.2 DISPLAY

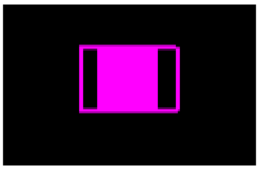
```
void disp()
{
glClear(GL_COLOR_BUFFER_BIT|GL_DEPTH_BUFFER_BIT);
glLoadIdentity();
//glColor3f(1,1,0);
//bitmap_output(150,450,"BLOCKSHOOTING",GLUT_BITMAP_TIMES_ROMAN_24);
counting();

// Drawing of arrow
glColor3f(0,1,1);
glBegin(GL_LINES);
glVertex2d(x,y);
glVertex2d(x+100,y);
glEnd();
glLineWidth(2);
glBegin(GL_LINES);
glVertex2d(x,y+2);
glVertex2d(x+100,y+2);
glEnd();
glBegin(GL_LINES);
glVertex2d(x,y-2);
glVertex2d(x+100,y-2);
glEnd();
glBegin(GL_TRIANGLES);
glVertex2d(x+100,y+3);
glVertex2d(x+110,y);
glVertex2d(x+100,y-3);
glEnd();
glBegin(GL_QUADS);
glVertex2d(x,y+3);
glVertex2d(x,y-3);
glVertex2d(x-10,y-5);
glVertex2d(x-10,y+5);
glEnd();
draw_target(); // Drawing of target
glFlush();
glutSwapBuffers();
}
```

- ARCHERY game is single player game where the player hits the target. The target is a block with hole in center & the player should hit the target. There are 15 arrows, 10 blocks.
- The arrow is made of three parts tip, shaft and nock. The block is covered by an elastic material which breaks when the tip of the arrow hits it exactly at the center. We have arrow count shown on the screen.
- The player should aim the first arrow with lot of concentration as the speed is max initially and decreases as each arrow vanishes. We have used right button of the mouse to help the user know about the instructions.
- The target can be hit by arrow by pressing ‘r’ key on the keyboard. If the user wishes to quit or exit from the game he can use the key ‘q’ on the keyboard.
- Once the player begins the game the arrow starts moving to hit the target by following the given instruction. As the arrow is heading to the target and finally reaches the end of the screen the arrow count increases indication the no of arrows already used. Once the arrow count becomes 15 the game ends. If the player has hit all the targets then he wins the game, otherwise loses it.
- The display of arrow is shown below:



The target is shown below:



ALGORITHM:

Step 1: Initialize the graphics windows and its size using GLUT functions.

Step 2: Register the keyboard and display call backs in main function.

Step 3: Game contains of 10 Blocks and 15 Arrows.

Step 4: Arrows starts moving upwards as soon as we enter the output screen.

Step 5: When the arrow starts moving the key ‘r’ is pressed, which moves towards right in order to hit the block.

Step 6: If the key ‘r’ is pressed at the correct position it hit the block or else it fails to hit the block.

Step 7: If the player fails to hit the ‘10’ blocks using ‘15’ arrows then it will display a message as “no arrows game over you lost”.

Step 8: else

Step 9: Congratulation you won.

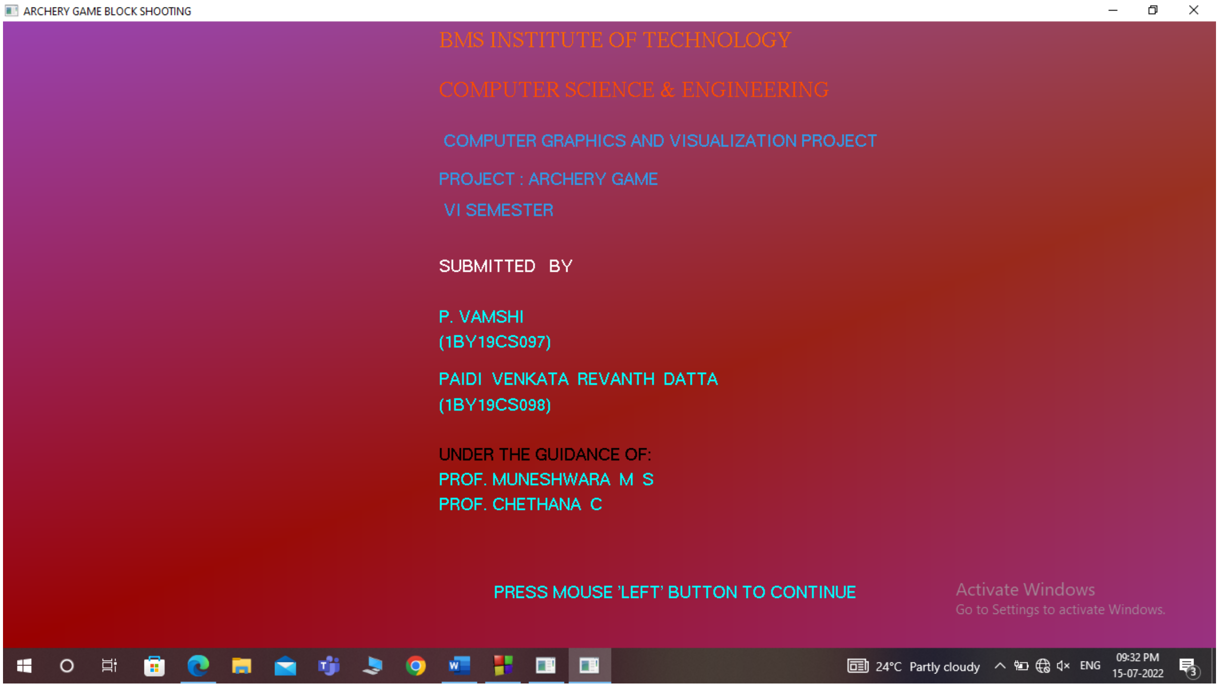
Step 10: By pressing a key ‘q’ the player can quit/exit the game at any point of the stage.

CHAPTER 6

INTERPRETATION OF RESULTS

6.1 SNAPSHOTS

6.1.1 After Running the Program



ARCHERY GAME BLOCK SHOOTING

BMS INSTITUTE OF TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING

COMPUTER GRAPHICS AND VISUALIZATION PROJECT

PROJECT : ARCHERY GAME

VI SEMESTER

SUBMITTED BY

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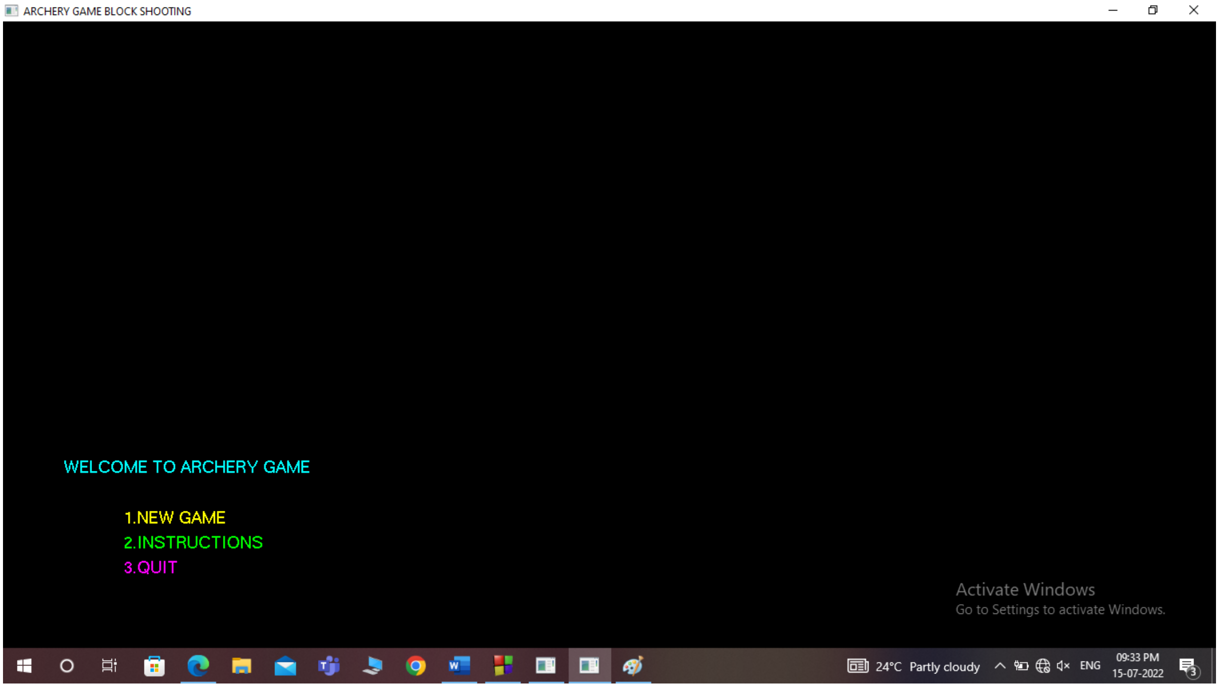
UNDER THE GUIDANCE OF:
PROF. MUNESHWARA M S
PROF. CHETHANA C

PRESS MOUSE 'LEFT' BUTTON TO CONTINUE

Activate Windows
Go to Settings to activate Windows.
24°C Partly cloudy
ENG
09:32 PM
15-07-2022

The above snapshot shows the screen displayed when the program gets Executed.

6.1.2 Game Menu

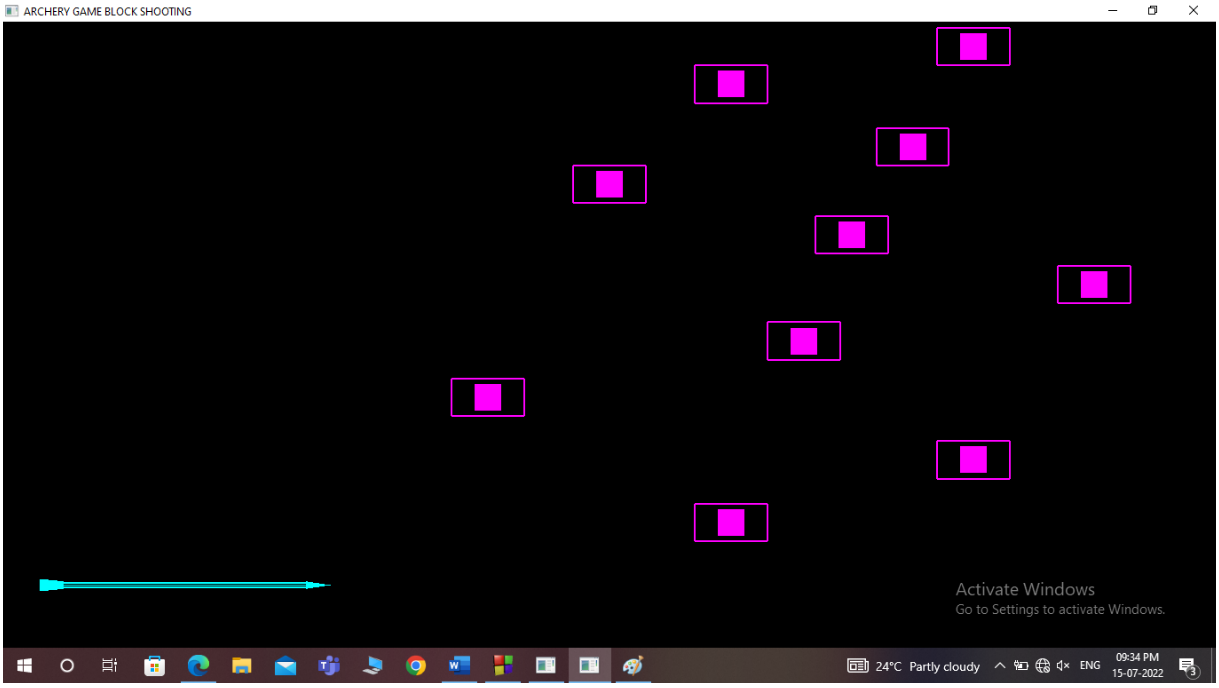

ARCHERY GAME BLOCK SHOOTING
Activate Windows
Go to Settings to activate Windows.
24°C Partly cloudy
ENG
09:33 PM
15-07-2022

WELCOME TO ARCHERY GAME

1.NEW GAME
2.INSTRUCTIONS
3.QUIT

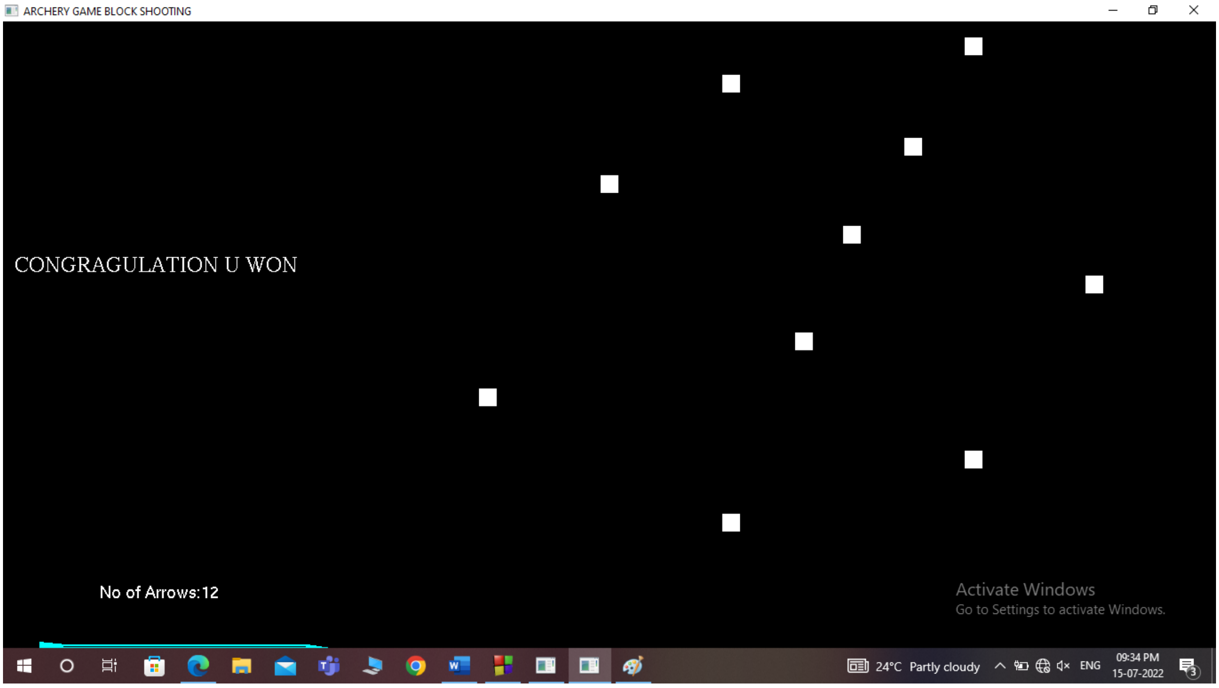
The above snapshot shows the Game Menu 1st one to start the game, 2nd option guides the player how to use the game & 3rd option Exits the game.

6.1.3 The Game


ARCHERY GAME BLOCK SHOOTING
Activate Windows
Go to Settings to activate Windows.
24°C Partly cloudy
ENG
09:34 PM
15-07-2022

The above snapshot shows green as a starting point and red as ending point and player uses the yellow block

6.1.4 Win



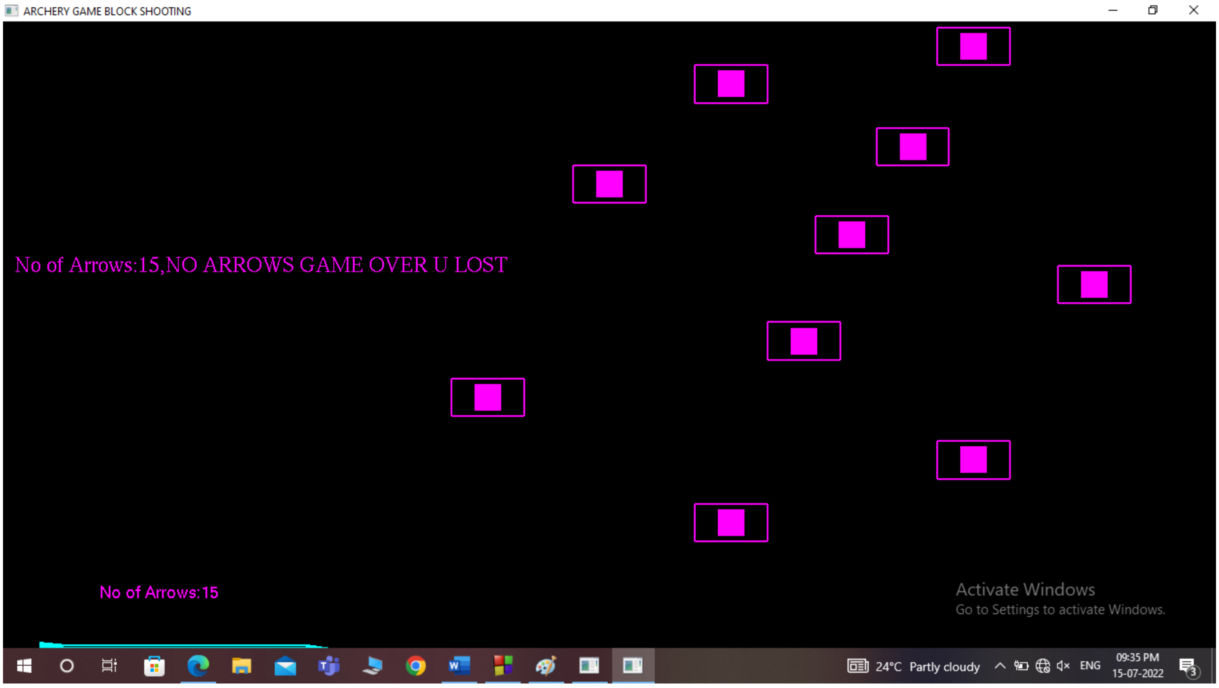
ARCHERY GAME BLOCK SHOOTING
Activate Windows
Go to Settings to activate Windows.
24°C Partly cloudy
ENG
09:34 PM
15-07-2022

CONGRAGULATION U WON

No of Arrows:12

The above snapshot shows the win screen as the player has finished the game within given arrows.

6.1.5 Game Over (Lost!!)



ARCHERY GAME BLOCK SHOOTING

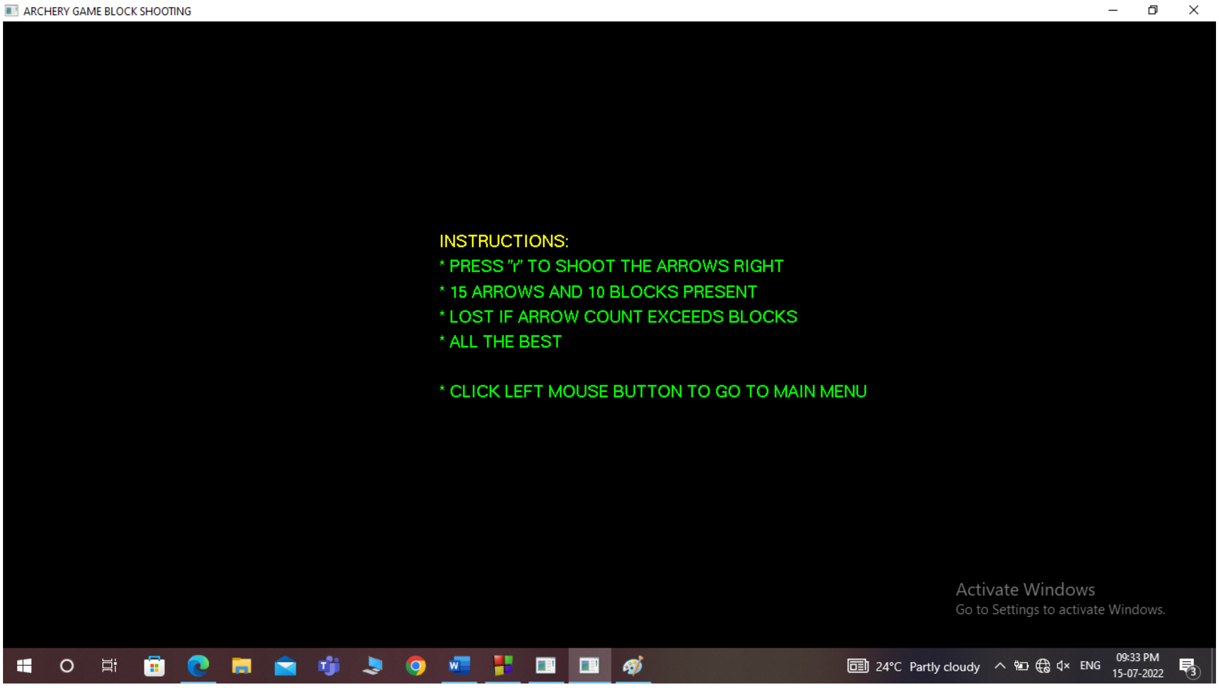
No of Arrows:15,NO ARROWS GAME OVER U LOST

No of Arrows:15

Activate Windows
Go to Settings to activate Windows.
24°C Partly cloudy
ENG
09:35 PM
15-07-2022

The above snapshot shows the lost screen as the player has not finished the game within given arrows.

6.1.6 Instructions


ARCHERY GAME BLOCK SHOOTING
Activate Windows
Go to Settings to activate Windows.
24°C Partly cloudy
ENG
09:33 PM
15-07-2022

```
INSTRUCTIONS:
* PRESS "r" TO SHOOT THE ARROWS RIGHT
* 15 ARROWS AND 10 BLOCKS PRESENT
* LOST IF ARROW COUNT EXCEEDS BLOCKS
* ALL THE BEST

* CLICK LEFT MOUSE BUTTON TO GO TO MAIN MENU
```

The above snapshot shows the instruction to the player , how he has to play game

CHAPTER 7

CONCLUSION

PERPLEXITY is designed and implemented using a graphics software system called OpenGL which has become a widely accepted standard for developing graphic application. Using OpenGL functions user can create geometrical objects and can use translation, rotation, scaling with respect to the co-ordinate system. The development of this project has enabled us to improve accuracy, problem solving skills while providing a fun and interactive experience to the player.

CHAPTER 8

FUTURE ENHANCEMENTS

- We can add more maps in the game.
- We can add multiplayer option.
- Different levels can be added.

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