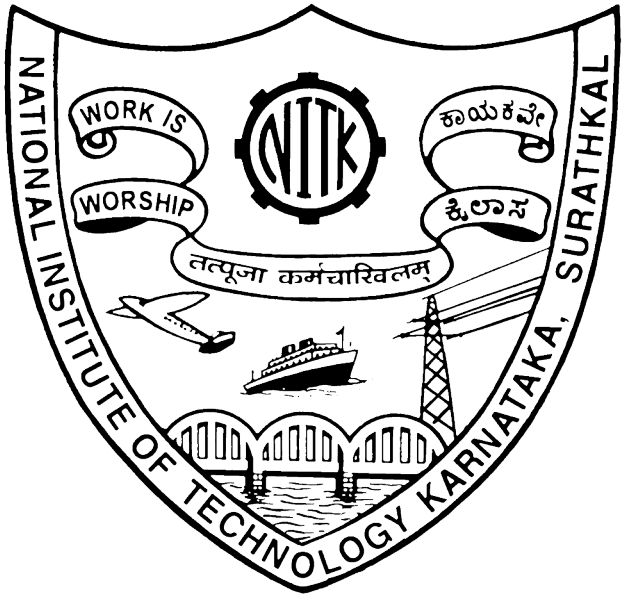
CG MINI PROJECT

Course Code: IT251



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Contents:

Certificate:

This is to certify that the following students:

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Of 2017 Year Computer Graphics Course in Informaton Technology
Department have successfully completed their B.Tech mini project work entitled
"**Computer Graphics Mini Project**" on **Coin Collecting Game**
In the partial fulfillment of the requirement for the elective IT251 Computer Graphics as prescribed by the Department of Information Technology,National Institue of Technology, Surathkal.

Synopsis:

OpenGL is a very important open source library for programmers who wish to work with graphics. OpenGL can work with 2D and 3D images. OpenGL helps to get a virtual view of real world objects and also helps in visualization of objects.
Coin Collecting Game is an OpenGL based 2D game. It consists of a player in an environment where Coins (coloured circles) are falling from sky. If the player collides with any of the Coins then Score of player increased by 1. The player's score is the no. of Coins collected by him/her.

This game highlights various concepts such as

- Collision-Detection Algorithm
- Keyboard input Effect in all the Menu
- Double Buffer to achieve flicker-free animation. (60 FPS)
- All Basic OpenGL function has been used

Problem Statement:

"Coin Collecting game in OpenGL using C++"

Introduction:

In the project “COIN COLLECTING 2D GAME”, the project is programmed using c/c++ . the project involves the player and coins on which basis game is built. In this game there will be one player. USER is the player of the game. This program contains Functions to collect the ball.
This project includes the multiple windows, menus and submenus using which color of the player & coins, screen color, coin size will be changed. These all actions are assigned to keyboard.
User-interface is provided by means of Keyboard. By using arrow keys player can be moved. By using keyboard user can handle menu and submenu.

Computer Graphics :

Graphics provides one of the most natural means of communicating within a computer, since our highly developed 2D and 3D pattern-recognition abilities allow us to perceive and process pictorial data rapidly and effectively. Interactive computer graphics is the most important means of producing pictures since the invention of photography and television. It has the added advantage that, with the computer, we can make pictures not only of concrete real world objects but also of abstract, synthetic objects, such as mathematical surfaces and of data that have no inherent geometry, such as survey results.
Computer graphics started with the display of data on hardcopy plotters and cathode ray tube screens soon after the introduction of computers themselves. It has grown to include the creation, storage, and manipulation of models and images of objects. These models come from a diverse and expanding set of fields, and include physical, mathematical, engineering, architectural, and even conceptual structures, natural phenomena, and so on. Computer graphics today is largely interactive. The user controls the contents, structure, and appearance of the objects and of their displayed images by using input devices, such as keyboard, mouse, or touch-screen.

Due to close relationships between the input devices and the display, the handling of such devices is included in the study of computer graphics. The advantages of the interactive graphics are many in number. Graphics provides one of the most natural means of communicating with a computer, since our highly developed 2D and 3D patter-recognition abilities allow us to perceive and process data rapidly and efficiently. In many design, implementation, and construction processes today, the information pictures can give is virtually indispensable. Scientific visualization became an important field in the 1980s when the scientists and engineers realized that they could not interpret the prodigious quantities of data produced in supercomputer runs without summarizing the data and highlighting trends and phenomena in various kinds of graphical representations.

OpenGL Interface:

OpenGL is an application program interface (API) offering various functions to implement primitives, models and images. This offers functions to create and manipulate render lighting, coloring, viewing the models. OpenGL offers different coordinate system and frames. OpenGL offers translation, rotation and scaling of objects.
Most of our applications will be designed to access OpenGL directly through functions in three libraries. They are:

1. Main GL: Library has names that begin with the letter gl and are stored in a library usually referred to as GL.

2. OpenGL Utility Library (GLU): This library uses only GL functions but contains code for creating common objects and simplifying viewing.

3. **OpenGL Utility Toolkit (GLUT):** This provides the minimum functionality that should be accepted in any modern windowing system.

OpenGL Overview:

- OpenGL(Open Graphics Library) is the interface between a graphic program and graphics hardware. ***It is streamlined*.** In other words, it provides low-level functionality. For example, all objects are built from points, lines and convex polygons. Higher level objects like cubes are implemented as six four-sided polygons.

- OpenGL supports features like 3-dimensions, lighting, anti-aliasing, shadows, textures, depth effects, etc.
- ***It is a state machine*.** At any moment during the execution of a program there is a current model transformation
- ***It is a rendering pipeline*.** The rendering pipeline consists of the following steps:
    - Defines objects mathematically.
    - Arranges objects in space relative to a viewpoint.
    - Calculates the color of the objects.

Objective:

The aim of this project is to develop a graphics package which supports basic operations which include building a 2D GAME using Open GL. The package must also has a user-friendly interface. The objective of developing this model was to design and apply the skills we learnt in class.

Methodology:

To implement the above “2D Game” ,the following methodology needs to be followed :

- The game consists four cpp file: declaration.cpp, drawing.cpp,move.cpp and main.cpp..
- Specifying the Application and various components of the Architecture.
- First including the all header file related to project in Declaration file.
- Declaration of player and coins related structure.
- Declaration of the function to draw Rectangle, Colored Circle, Line, Quads etc.
- Drawing the player and coins using structure and declared shape’s function. And decide the initial position of all player and coins.
- Applying the movement function on player and coins.
- Collision detection between player-coins, player-walls, coins-walls. After detecting collision update the parameter accordingly.
- Showing the menus, submenus and score on windows screen.

System Specification:

HARDWARE REQUIREMENTS :

- Keyboard

SOFTWARE REQUIREMENTS :

- Programming language – C/C++ using OpenGL
- Operating system – Windows operating system
- Compiler – GCC Compiler
- Graphics library – GL/glut.h

FUNCTIONAL REQUIREMENTS :

- **OpenGL APIs:**
  If we want to have a control on the flow of program and if we want to interact with the window system then we use OpenGL API'S. Vertices are represented in the same manner internally, whether they are specified as two-dimensional or three-dimensional entities, everything that we do are here will be equally valid in three dimensions. Although OpenGL is easy to learn, compared with other APIs, it is nevertheless powerful. It supports the simple three dimensional programs and also supports the advanced rendering techniques.

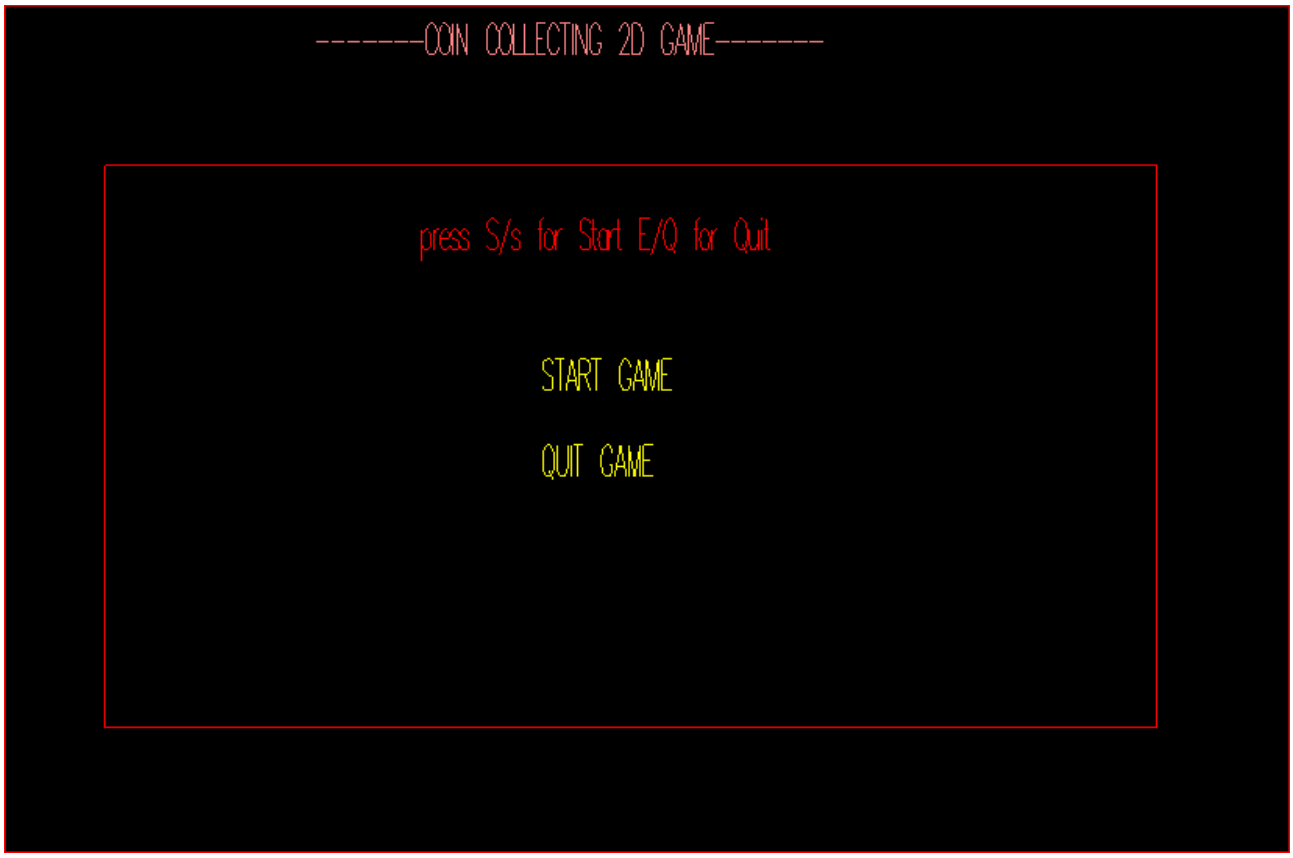
- **GL/glut.h :**
  We use a readily available library called the OpenGL Utility Toolkit (GLUT), which provides the minimum functionality that should be expected in any modern windowing system.
  The application program uses only GLUT functions and can be recompiled with the GLUT library for other window system. OpenGL makes a heavy use of
  macros to increase code readability and avoid the use of magic numbers. In most implementation, one of the include line.

Works done:

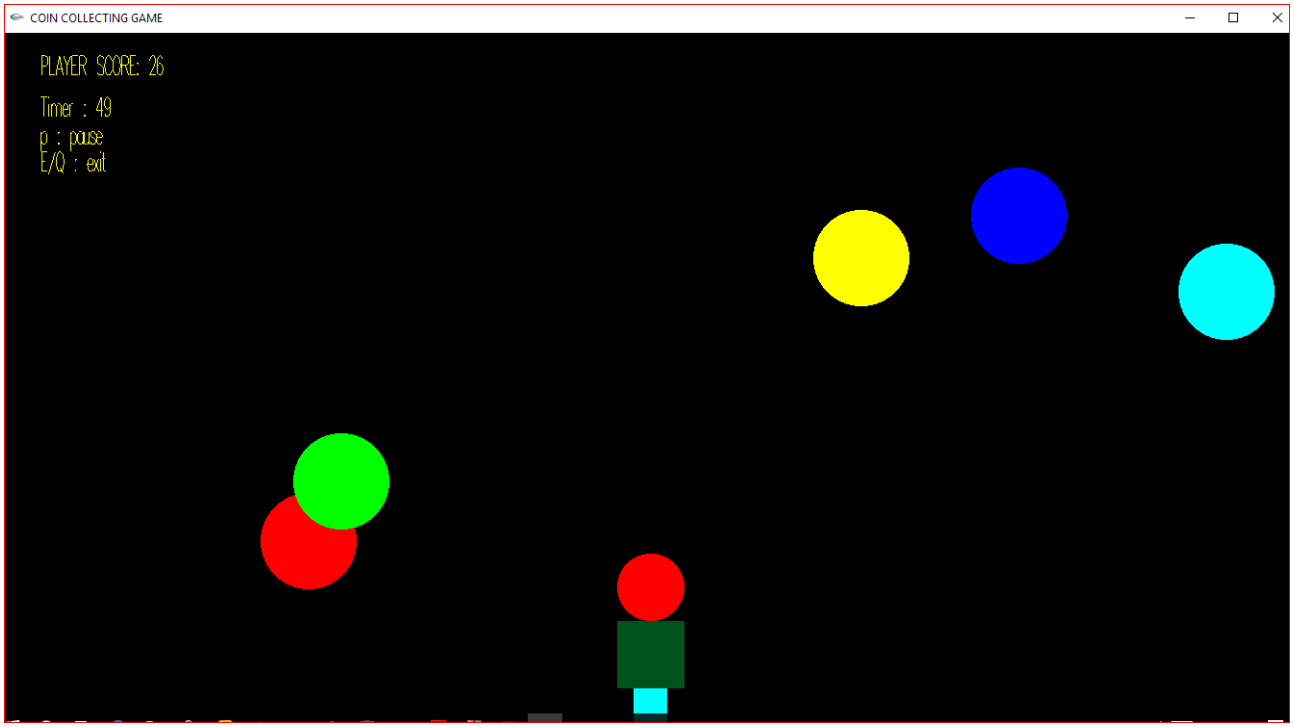
In ‘coin collecting game 2D game’ different state are created which defines the Game-state.

- Start Menu
- Game Mode
- Pause
- Game Over

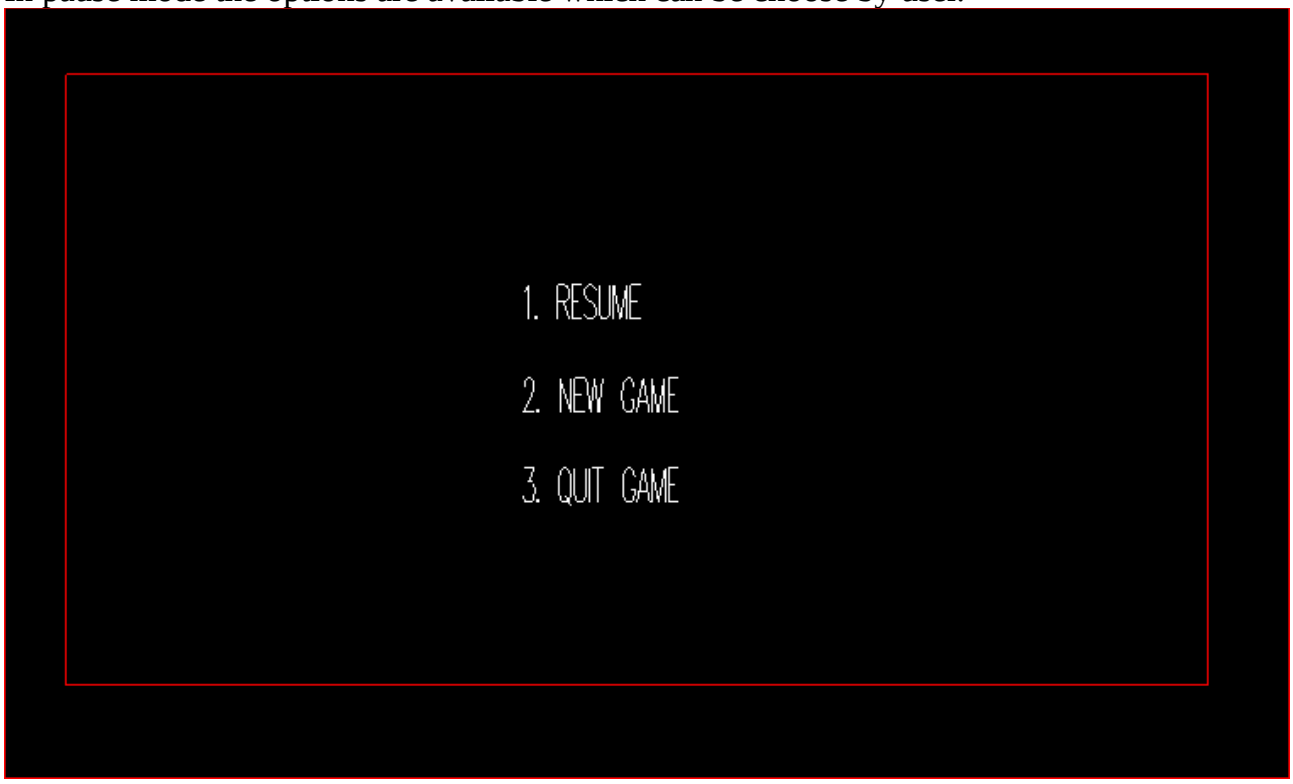
- **<u>Start Menu:</u>**
  This is the first screen of the game. In this state user can play or exit the game using keyboard.



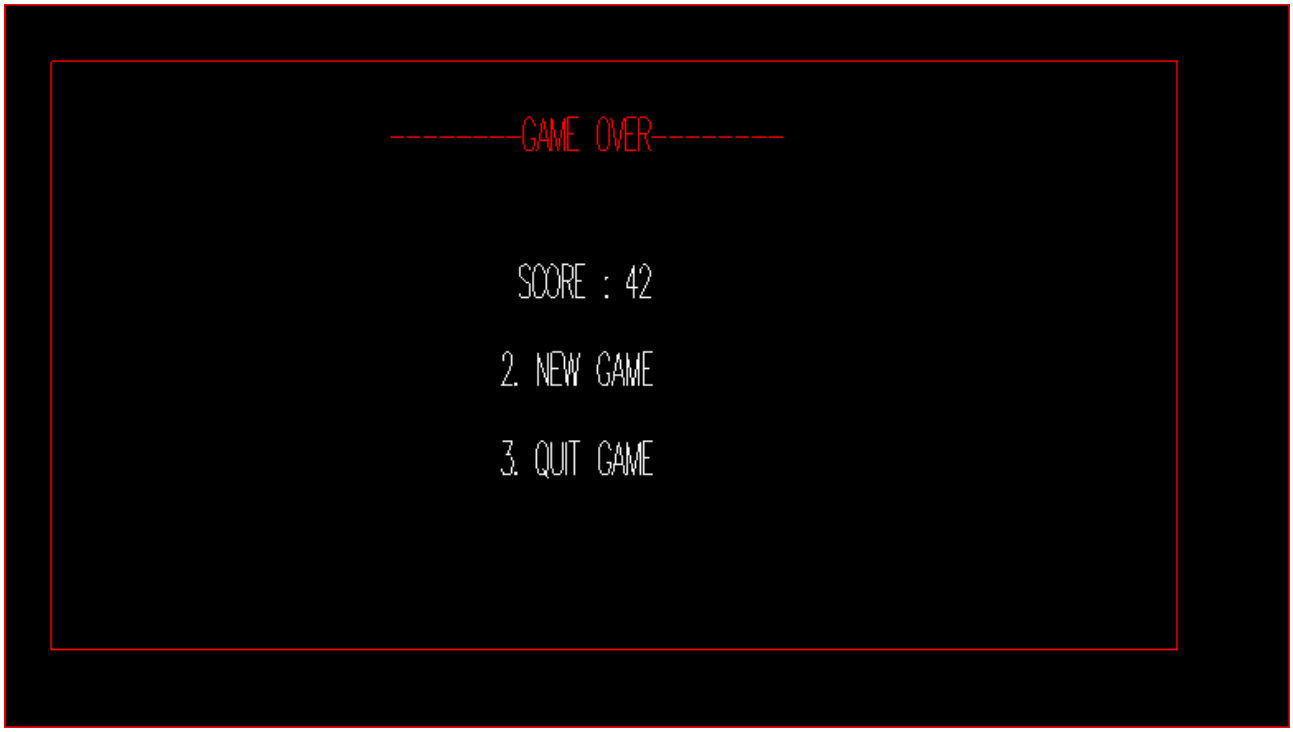
- **<u>Play Mode</u>:**
  In this state user can play the game using keyboard. User can handle the movement of player using arrows key.



<u>Pause Mode:</u>
In pause mode the options are available which can be choose by user.



Game Over:
This is game over state. In this state final score are showed and new game and quit option are available.



Future Works:

In future this project can be enhanced by adding few more options i,e menus in game. Using this we can design a 3D game which contains cube instead of single window and multiple number of Sphere (balls) instead of circle which are randomly moving and all faces of cube is considered as wall.

- Level Extension
- Improve Graphical Representation
- Introduce new game features
- Introduce new environment and scenes

Result and discussion:

- Even though we had no prior knowledge of how to proceed with this project, we put our ideas and creativity at work and succeeded in completing this project.
- It was quite a learning experience and made us familiar as to how open gl and c++ works together.
- This project also helped us create an interest in the field of animations.
- The whole group played an active part of the discussion while making the project.
- A lot of discussion was done in the group before finally deciding on this project.
- As a result, now we have a game which has solely been made by us.

Conclusion:

The project was started with modest aim with no prior experience in any programming projects as this, but ended up in learning many things, fine tuning the programming skills and getting into the real world of software development with an exposure to corporate environment. During the development of any software of significant utility, we are forced with the tradeoff between speed of execution and amount of memory consumed. This is simple interactive application. It is extremely user friendly and has the features, which makes simple graphics project. It has an open source and no security features has been included. The user is free to alter the code for feature enhancement. Checking and verification of all possible types of the functions are taken care. Care was taken to avoid bugs. Bugs may be reported to creator as the need.

Reference:

1. EDWARD ANGEL

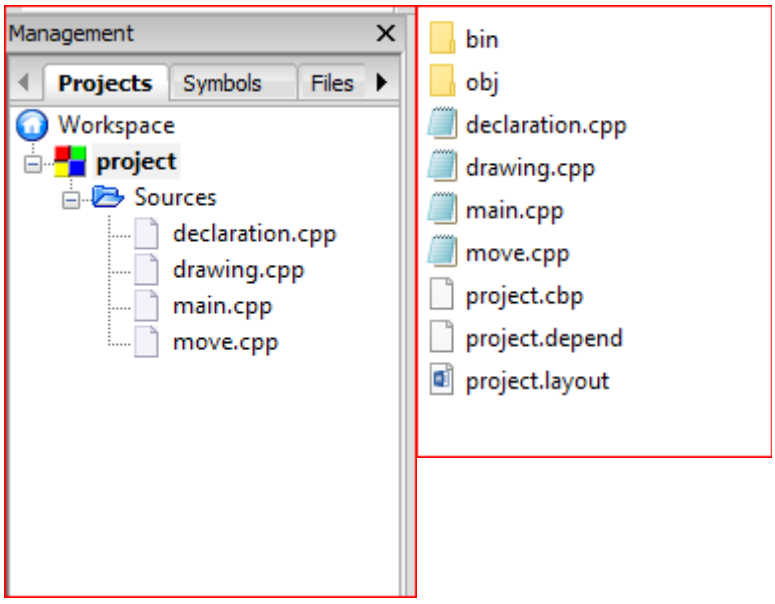
- Interactive Computer Graphics, 5th edition, universities of New Mexico.
- OpenGL Programming Guide by Addison-Wesley.
- Interactive Computer Graphics by Edward angel

2. **Websites for Reference**

- www.opengl.org/resources/code/samples/redbook.
- www.wikipedia.org
- www.cs.unm.edu/~angel

Appendix(Code):

Code:



Appendix a:

Declaration.cpp file:
In this file Some function and variable are defined which is used in another function**.** In it all required header file are included.

//header file

```
#include <time.h>
#include <windows.h>
#include <iostream>
#include<math.h>
#ifdef __APPLE__
#include <GLUT/glut.h>
#else
#include <GL/glut.h>
#endif
#include <stdlib.h>
#include <string.h>
#include <stdio.h>
#define PI 3.14
int gameTime=60;
//different  gameState of game
int menu=1,play=2,pause=3,over=4,gameexit=5;
GLfloat headRadius=35;                          //player head radius
GLfloat coinRadius=50;                          //coin radius
char str [100];
int game_state=menu;                            //store the game state
float c1Speed=6,c2Speed=8,c3Speed=10,c4Speed=12,c5Speed=13;//Speed of  Five balls
float ttime;                                    //store time passes
int t=0;                                        //storing previous time
int i=0,j=0,k=0,l=0,m=0;                        // use to set random position
int score=0;                                    //store score
int w=1350,h=720;                               //World Size
//double Yspeed=10.0f;                          //speed of Coins
double Xspeed=60.0f;                            //speed of player
//float y=0;
struct Cir
{
   float Xc,Yc,radius;
};
struct Rect
{
   float left,right,top,bottom;
};
//structer of player
struct Pl
{

   Pl()
   {
     head={0.5*w,0.20*h,headRadius};
   }
  struct Cir head;
  struct Rect body;//={625,725,100,50};
  struct Rect leg;
```

```
};
struct Cir c1={75,720,coinRadius}; //first ball
struct Cir c2={300,720,coinRadius}; //second balls
struct Cir c3={550,720,coinRadius}; //third balls
struct Cir c4={800,720,coinRadius}; //second balls
struct Cir c5={1250,720,coinRadius}; //third balls
struct Pl player;
struct Rect wall={0,w,h,0};
//timer function
void Timer(int value)
{
   c1.Yc-=c1Speed;
   c2.Yc-=c2Speed;
   c3.Yc-=c3Speed;
   c4.Yc-=c4Speed;
   c5.Yc-=c5Speed;

   glutPostRedisplay();
   glutTimerFunc(16,Timer,0);
   ttime+=0.016;
}
//check Collision between coin and player
 int coin_player(struct Cir c)
 {
     float d1=(c.Xc-player.head.Xc);
     float d2=(c.Yc-player.head.Yc);
     float d=sqrt(d1*d1+d2*d2);
     if(d<=c.radius+player.head.radius)
        return 1;
     return 0;
 }
//Check collision between Coins and balls
int coin_wall(struct Cir c)
{
   if(c.Yc<=wall.bottom)
      return 1;
   return 0;
}
//Fuction to Draw Text
void drawText(char *string,int x,int y)
{
   char *c;
   c=string;
   glPushMatrix();
   glTranslatef(x,y,0);
   glScalef(.1,.2,.1);
   for(int i=0;c[i]!='\0';i++)
   {
```

```
        glutStrokeCharacter(GLUT_STROKE_ROMAN,c[i]);
    }
    glPopMatrix();
}
//function to draw FilledCircle
void filledcircle(GLfloat x,GLfloat y,GLfloat r)
{
    glBegin(GL_TRIANGLE_FAN);
    glVertex2f(x,y);
    int seg=1000;
    for(int i=0;i<=seg;i++)
    {
        double angle=i*2*3.14/seg;
        glVertex2f(x+r*cos(angle),y+r*sin(angle));
    }
    glEnd();
}
//Function to Draw Circle
void Circle(GLfloat x, GLfloat y, GLfloat radius){
        int i;
        int lineAmount = 100; //# of triangles used to draw circle

        //GLfloat radius = 0.8f; //radius
        GLfloat twicePi = 2.0f * PI;

        glBegin(GL_LINE_LOOP);
                for(i = 0; i <= lineAmount;i++) {
                        glVertex2f(
                            x + (radius * cos(i *  twicePi / lineAmount)),
                            y + (radius* sin(i * twicePi / lineAmount))
                        );
                }
        glEnd();
}
//function to draw Line
void line(GLfloat x1,GLfloat y1,GLfloat x2,GLfloat y2)
{
    glBegin(GL_LINES);
    glVertex3f(x1,y1,0.0);
    glVertex3f(x2,y2,0.0);
    glEnd();
}
//function to draw rectangle
void rectang(GLfloat x1,GLfloat x2,GLfloat y1,GLfloat y2)
{
    glBegin(GL_QUADS);
    glVertex2f(x1,y1);
    glVertex2f(x1,y2);
```

```
    glVertex2f(x2,y2);
    glVertex2f(x2,y1);
    glEnd();
}
//display startMenu
void startMenu()
{
    glClear(GL_COLOR_BUFFER_BIT);
    glMatrixMode(GL_MODELVIEW);
    glLoadIdentity();
    glPushMatrix();
    glLoadIdentity();
    glColor3f(0,0,0);
    glBegin(GL_QUADS);
    glVertex2f(0,0);
    glVertex2f(w,0);
    glVertex2f(w,h);
    glVertex2f(0,h);
    glEnd();
    glPopMatrix();
    glPushMatrix();
    glColor3f(1,0,0);
    int wx=w/4;
    int hy=h/4;
    line(wx,3*hy,3*wx,3*hy);
    line(wx,hy,3*wx,hy);
    line(wx,3*hy,wx,hy);
    line(3*wx,hy,3*wx,3*hy);
    glPopMatrix();
    char str[100];
    glColor3f(1,.5,.5);
    sprintf(str,"-------COIN COLLECTING 2D GAME-------");
    drawText(str,1.4*wx,3.4*hy);
    glColor3f(1,0,0);
    sprintf(str,"press S/s for Start E/Q for Quit");
    drawText(str,1.6*wx,2.7*hy);
    glColor3f(1,1,0);
    sprintf(str," START GAME");
    drawText(str,1.8*wx,2.2*hy);
    sprintf(str," QUIT GAME");
    drawText(str,1.8*wx,1.9*hy);
    glutSwapBuffers();

}
// display pauseMenu
void pauseMenu()
{
    glClear(GL_COLOR_BUFFER_BIT);
```

```
    glMatrixMode(GL_MODELVIEW);
    glLoadIdentity();
    glPushMatrix();
    glLoadIdentity();
    glColor3f(0,0,0);
    glBegin(GL_QUADS);
    glVertex2f(0,0);
    glVertex2f(w,0);
    glVertex2f(w,h);
    glVertex2f(0,h);
    glEnd();
    glPopMatrix();
    glPushMatrix();
    glColor3f(1,0,0);
    int wx=w/4;
    int hy=h/4;
    line(wx,3*hy,3*wx,3*hy);
    line(wx,hy,3*wx,hy);
    line(wx,3*hy,wx,hy);
    line(3*wx,hy,3*wx,3*hy);
    glPopMatrix();
    char str[100];
    glColor3f(1,0,0);
    //sprintf(str,"press /s for Start E/e for Quit");
    //drawText(str,635,500);
    glColor3f(1,1,1);
    sprintf(str,"1. RESUME");
    drawText(str,1.8*wx,2.2*hy);
    sprintf(str,"2. NEW GAME");
    drawText(str,1.8*wx,1.9*hy);
    sprintf(str,"3. QUIT GAME");
    drawText(str,1.8*wx,1.6*hy);
    glutSwapBuffers();

}
//display gameoverMenu
void gameoverMenu()
{
    glClear(GL_COLOR_BUFFER_BIT);
    glMatrixMode(GL_MODELVIEW);
    glLoadIdentity();
    glPushMatrix();
    glLoadIdentity();
    glColor3f(0,0,0);
    glBegin(GL_QUADS);
    glVertex2f(0,0);
    glVertex2f(w,0);
    glVertex2f(w,h);
```

```
    glVertex2f(0,h);
    glEnd();
    glPopMatrix();
    glPushMatrix();
    glColor3f(1,0,0);
    int wx=w/4;
    int hy=h/4;
    line(wx,3*hy,3*wx,3*hy);
    line(wx,hy,3*wx,hy);
    line(wx,3*hy,wx,hy);
    line(3*wx,hy,3*wx,3*hy);
    glPopMatrix();
    char str[100];
    glColor3f(1,0,0);
    sprintf(str,"--------GAME OVER--------");
    drawText(str,1.6*wx,2.7*hy);
    glColor3f(1,1,1);
    sprintf(str," SCORE : %d",score);
    drawText(str,1.8*wx,2.2*hy);
    sprintf(str,"2. NEW GAME");
    drawText(str,1.8*wx,1.9*hy);
    sprintf(str,"3. QUIT GAME");
    drawText(str,1.8*wx,1.6*hy);
    glutSwapBuffers();
}
```

Drawing.cpp file:

This function draw Player and Coins using some shape function which is declared in declaration function.

```
//include declaration file
#include "declaration.cpp"
// drawing player
void drawman()
{
    glColor3f(1,0,0);              //set the color of Head
    float xc=player.head.Xc;       //set the center of head
    float yc=player.head.Yc;
    float r=player.head.radius;    // set the radius of head
    filledcircle(xc,yc,r);         //drawing head
    //set coordinate of player body
    player.body.left=xc-r;
    player.body.right=xc+r;
    player.body.top=yc-r;
    player.body.bottom=yc-3*r;
    glColor3f(0,0.3,0.1);          // set color of player body part
    rectang(player.body.left,player.body.right,player.body.top,player.body.bottom);
    // set leg part of body
    player.leg.left=xc-r/2;
```

```
    player.leg.right=xc+r/2;
    player.leg.top=yc-3*r;
    player.leg.bottom=yc-4*r;
    glColor3f(0,1,1);              // set leg color
    rectang(player.leg.left,player.leg.right,player.leg.top,player.leg.bottom);
}
// drawing different coins

void drawcoin1()
{
    glColor3f(1,0,0);
    filledcircle(c1.Xc,c1.Yc,c1.radius);
    glEnd();
}
void drawcoin2()
{
    glColor3f(0,1,0);
    filledcircle(c2.Xc,c2.Yc,c2.radius);

    glEnd();
}
void drawcoin3()
{
    glColor3f(0,0,1);
    filledcircle(c3.Xc,c3.Yc,c3.radius);

    glEnd();
}
void drawcoin4()
{

    glColor3f(1,1,0);
    filledcircle(c4.Xc,c4.Yc,c4.radius);
    glEnd();
}
void drawcoin5()
{
    glColor3f(0,1,1);
    filledcircle(c5.Xc,c5.Yc,c5.radius);

    glEnd();
}
```

Move.cpp file:
This file handle all movement of player and coins and also check collision between player-coins, player-wall and coins-walls and perform some action after collision.

```
//include drawing cpp file
#include "drawing.cpp"
void backGround()
{
   glClearColor(0,0,0,0);
}
//Called when the window is resized
void reshape(int width, int height)
{
   w=(GLfloat)width;
   h=(GLfloat)height;
   glViewport(0, 0, w, h);
   glMatrixMode(GL_PROJECTION);
   glLoadIdentity();
   gluOrtho2D(0,w,0,h);
   glMatrixMode(GL_MODELVIEW);
   glLoadIdentity() ;
}

void drawScene()
{
   glMatrixMode(GL_MODELVIEW);
   glLoadIdentity();
   drawcoin1();
   drawcoin2();
   drawcoin3();
   drawcoin4();
   drawcoin5();
   //draw();
   glutSwapBuffers();
}
//check collision of coins from wall or player
void check_player_c1()
{
   if(coin_wall(c1))
   {

      c1.Yc=750;
      i=c1.radius+rand()%(int)(int)(w-2*c1.radius);
      c1.Xc=i;
      drawcoin2();
   }
   if(coin_player(c1))
   {
```

```
        c1.Yc=750;
        i=c1.radius+rand()%(int)(w-2*c1.radius);
        c1.Xc=i;
       drawcoin1();
        score++;
    }
}
void check_player_c2()
{
    if(coin_wall(c2))
    {

        c2.Yc=750;
        j=c2.radius+rand()%(int)(w-2*c2.radius);
        c2.Xc=j;
        drawcoin1();
    }
    if(coin_player(c2))
    {
        c2.Yc=750;
       j=c2.radius+rand()%(int)(w-2*c2.radius);
       c2.Xc=j;
        drawcoin2();
        score++;
    }
}
void check_player_c3()
{
    if(coin_wall(c3))
    {

        c3.Yc=750;
        k=c3.radius+rand()%(int)(w-2*c3.radius);
        c3.Xc=k;
        drawcoin4();
    }
    if(coin_player(c3))
    {
        c3.Yc=750;
        k=c3.radius+rand()%(int)(w-2*c3.radius);
        c3.Xc=k;
        drawcoin3();
        score++;
    }
}
void check_player_c4()
{
    if(coin_wall(c4))
```

```
    {

        c4.Yc=750;
        l=c4.radius+rand()%(int)(w-2*c4.radius);
        c4.Xc=l;
        drawcoin3();
    }
    if(coin_player(c4))
    {
        c4.Yc=750;
        l=c4.radius+rand()%(int)(w-2*c4.radius);
        c4.Xc=l;
       drawcoin4();
        score++;
    }
}
void check_player_c5()
{
    if(coin_wall(c5))
    {

        c5.Yc=750;
        m=c5.radius+rand()%(int)(w-2*c5.radius);
        c5.Xc=m;
        drawcoin5();
    }
    if(coin_player(c5))
    {
        c5.Yc=750;
        m=c5.radius+rand()%(int)(w-2*c5.radius);
        c5.Xc=m;
        drawcoin5();
        score++;
    }
}
//call all collision function to detect the collision
void checkCollision()
{
    check_player_c1();
    check_player_c2();
    check_player_c3();
    check_player_c4();
    check_player_c5();
}
// main display function
void display(void)
 {
    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);  //clear the buffer
```

```
    glLoadIdentity();
    if(game_state==menu)
    {
       score=0;
       ttime=0;
       startMenu();
    }
    if(game_state==play)
    {
       t=ttime;
       glPushMatrix();
       glLoadIdentity();
       glColor3f(1,1,0);
       sprintf(str,"PLAYER SCORE: %d",score);
       drawText(str,0.03*w,0.94*h);
       sprintf(str,"Timer : %d",(int )ttime);
       drawText(str,0.03*w,0.88*h);
       sprintf(str,"p : pause");
       drawText(str,0.03*w,0.84*h);
       sprintf(str,"E/Q : exit");
       drawText(str,0.03*w,0.80*h);
       glPopMatrix();
       drawman();
       drawScene();
       checkCollision();
    }
    if((int)ttime==gameTime)
    {
       ttime=0;    //reset the timepassed
       game_state=over;
    }
    if(game_state==pause)
    {
       ttime=t;         //pause the timer
       pauseMenu();
    }
    if(game_state==over)
    {
       gameoverMenu();
    }
    if(game_state==gameexit)
    {
       exit(0);
    }
    glFlush();
}
```

Main.cpp file:
This is main cpp file of the programme. In this file some key handling function are defined.

```
#include "move.cpp"
 void mainDisplay()
 {
     backGround();
     display();
 }
 //move player using keyboard
void key(int key,int x,int y)
{
 if(key==GLUT_KEY_RIGHT && player.head.Xc<(w-headRadius))
 {
       player.head.Xc += 0.26*Xspeed;
 }

   if(key==GLUT_KEY_LEFT && player.head.Xc>(headRadius))
   {
      player.head.Xc  -= 0.26*Xspeed;
   }
   glutPostRedisplay();
}
//Changing of gamestate using keyboard
void keyboard(unsigned char key,int x,int y)
{
   switch(key)
   {
      case 'S':
      case 's': if(game_state==menu){game_state=play;}
      break;
      case 'q':
      case 'Q':
      case 'E':
      case 'e': if(game_state==menu || game_state==play){game_state=gameexit;}
      break;
      case 'P':
      case 'p':if(game_state==play){game_state=pause;}
      break;
```

```
        case '1': if(game_state==pause){game_state=play;}
        break;
        case '2': if(game_state==pause || game_state==over){game_state=menu;}
        break;
        case '3': if(game_state==pause || game_state==over){game_state=gameexit;}
        break;
    }
}
int main(int argc, char *argv[])
{
    glutInit(&argc, argv);
    glutInitWindowSize(1350,720);
    glutInitWindowPosition(0,0);
    glutInitDisplayMode(GLUT_RGB | GLUT_DOUBLE);
    glutCreateWindow("COIN COLLECTING GAME");
    glutDisplayFunc(mainDisplay);
    glutIdleFunc(display);
    glutReshapeFunc(reshape);
    glutTimerFunc(16,Timer,0);
    glutKeyboardFunc(keyboard);
    glutSpecialFunc(key);
    glutMainLoop();

    return EXIT_SUCCESS;
}
```

THANK YOU