

COSC363 ASSIGNMENT1

The idea about my assignment is based on the mobile phone application which name after Clash Royale. I had played this game for over a year and I had enjoyed very much. So I decided to make this assignment as a simplified version of Clash Royale and adding some features to meet this assignment's requirement.

For the basic requirements, (2.1, 2.2) I have drew a King and his army. The robots in the army will always be performing the same action as one another to display that they are an army . (2.3) In addition, there are few other composite objects such as bridge, castle, cannon, etc. (2.5) There are two light source for the scene, specular, diffuse and ambient reflection has been applied on the objects. (2.6) For the function keys, up arrow will move the camera forward in the current direction, down arrow will move the camera backward in the current direction, left arrow and right arrow is turn left and turn right respectively. While the 'w' key is used to move the King to the right direction and 's' key is to move the King to the left direction. I have done a very interesting function which is firing the cannon, the cannon can only be fired whenever the King is close enough to the cannon, this is specified by the condition (robotMoveCounter >5 and <=5), and the King's direction will face towards the cannon every time the cannon is fired. (2.7) Several different textures has been applied on the scene, for example, bridge, river, and skybox.

```
void Keyboard(unsigned char key, int x, int y)
{
    if (robotMoveCounter >= -5 && robotMoveCounter < 5 && key == 'f'){
        glPushMatrix();
        if (angle == 90){
            angle = angle - 90;
        }
        else if (angle == 270){angle += 90;}
        fire = 1;
        option = 1;
        glPopMatrix();
        glutTimerFunc(20, myTimer, 0);
    }

    switch(key){
        case 'w':
        {
            angle = 90;
            robot_move++;
            robotMoveCounter++;
            break;
        }
        case 's':
        {
            angle = 270;
            robot_move--;
            robotMoveCounter--;
            break;
        }
    }
    glutPostRedisplay();
}
```

For the extra Features, I have done planar shadows, physics model, customer-build model, collision detection and skybox.

Planar shadow has been applied on the robot army.

When cannon ball is fired , it could show a physics model on the cannon ball, and the equation is “glTranslatef(37 + 100 * ball, 64 – 2 * ball * ball + 40 * ball, -1)”; the meaning behind this equation is the initial position of this cannon ball is set to (37, 64, -1). The cannon ball

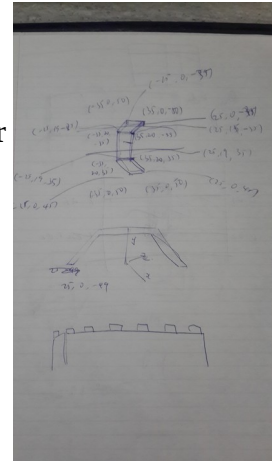
```
void cannonball(){
    glPushMatrix();
    glTranslatef(37 + 100 * ball, 64 -
        2 * ball * ball + 40 * ball, -1);
    glutSolidSphere(5, 36, 18);
    glPopMatrix();
}
```

will be launch after pushing the 'f' key and the King has to be close enough to the cannon. As the timer increases, the X-axis will also increase for every 100 unit per second, while the Y-axis will increase dramatically for the first few second and then go back down because it is a quadratic formula.

I have made the bridge as a customer-build model. It is not too complicated but it took me about 2 hours to construct. I have attached my original hand-writing. It is a bit messy since few modification were made.

Collision detection – as I thought, this scene need to have a proper boundary, and I have created a collision detection for this. The camera cannot move outside of the skybox and also it cannot crossover the castle – residents live inside! However, you are able to see the troops are training inside of the castle as they are ready to defend their home town.

For the skybox, the hardest part is to find the right image. I have used a website to convert it into a tga format picture.



I would like to say that it is a very challenging assignment but at the same time enjoyable. I had quite a lot of challenges, I managed to solve most of them and I feel I could add more features into the assignment only if the due date have a few more days. So the major problems I had are 1) to find the right image for skybox. 2)figure out the right formula for cannon ball. 3) robot army shadow colour was wrong(special thanks for my tutor helped me out). 4) camera position problem during the fire cannon stage(special thanks for Prof. Mukundan giving me tips).

The keyboard control function and cannon ball function have been attached, just to make it more readable.

Reference:

<http://image.online-convert.com/convert-to-tga> //image converter to tga format

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<http://icloudpicture.com/tag/game-wallpaper-hd/page/3/> skybox image

<https://abstract.desktopnexus.com/wallpaper/938998/> skybox image