Project Design 4

Asteroids

Problem Definition

Have a game that simulates what it would be like to have a spaceship and fly through the asteroid belt. The player will have to avoid the asteroids by shooting and dodging them.

Design Overview

Asteroids will be displayed in frames to show the movement of the game. The game will start with the spaceship in the center of the screen. The spaceship will be put on the screen from the draw\*() open gl as will all the other shapes. The spaceship will be able to rotate left and right by pressing the left and right keys. When the right key is pressed the rotation of the rectangle will increase in degrees. The left Arrow will decrease degrees. The spaceship’s rotation will accelerate the longer a key is held. This will be done by having a variable called acceleration which is getting increased each frame. When going right the degrees will increase per frame by the variable acceleration. There will also have to be a maximum to the acceleration speed. When the key is let go then the acceleration will be reset to 0. The ship will also be able to move forward. When pressing forward the ship will accelerate but even after the key is released the ship will keep moving forward and slowly decelerate to slow speed, a complete stop. The ship will only be able to move forward at the front of the ship so the dx and dy will have to be calculated by taking an angle in.

The spaceship will shoot bullets out of the center of the ship. This is done because the center of the spaceship will already be defined when it is drawn. The bullet will go at the angle the spaceship this will be the same angle the ship will use to move forward. Only 5 bullets can be in the play area at a time. There will be an array of bullets and every time a bullet is shot using the space bar an ammo vector will be pushed back. A if statement will check the vector size for if there is more than 5 if there isn’t then another bullet will be fired. Bullets will be destroyed when they reach a boundary of the game. When this occurs the ammo vector will poop back a location.

Asteroids will appear when all of the little asteroids of it have been destroyed. Asteroids will randomly appear from the x or y side of the screen this will be done by sending 1 and 2 as min and max into the random function every frame and it return 1 the asteroids will come from x and if its 2 the asteroids will come from y. Their speed and direction across the screen will be random. The asteroids will know if they are hit by the bullets by using the same min distance function from skeet. If it so happens you are actually good enough to shoot an asteroid the asteroid will be split into 4 different asteroids which will be done by destroying the original asteroid and start drawing 4 new ones and have their dx and dy be random different directions. If an asteroid hits the spaceship then the spaceship will be destroyed. After 30 frame the ship will regen on the center of the screen.

Output

|  |  |  |
| --- | --- | --- |
| Element | Image | Description |
| Sample game |  | Ship starts in the middle and the asteroids flying around. |
| Ship |  | Triangle that flies around. User controlled |
| Asteroid1 |  | This asteroid is easy to avoid pretty big and slow |
| Asteroids2 |  | This guy is medium sized and is faster |
| Asteroid3 |  | Smallest and Fastest |
| Collision |  | When bullet hits asteroid this is the result. Along with applause |
| Bullets |  | Up to five can be on screen at a time. Pretty much dots |

Input

|  |  |
| --- | --- |
| Input | Description |
| Up Arrow Key | Moves the ship forward |
| Left Arrow Key | Will rotate the ship to the left |
| Right Arrow Key | Will rotate the ship to the right |
| Space Bar | Will shoot bullets from the ship |

Errors

There will be no Errors that will be displayed all other input will be ignored.

Algorithms

Game Advance()

FOR All Object

IF Asteroids == Dead && Asteroid type == 1

Object PushBack NEW Object SET Asteroids type = 2

Object PushBack NEW Object SET Asteroids type = 2

Object PushBack NEW Object SET Asteroids type = 2

SET Asteroid type = 2

ELSE IF Asteroids == Dead && Asteroid type == 2

Object PushBack NEW Object SET Asteroids type = 3

Object PushBack NEW Object SET Asteroids type = 3

Object PushBack NEW Object SET Asteroids type = 3

SET Asteroid type = 2

ELSE IF Asteroids == Dead && Asteroid type == 3

Object PopBack

Object PopBack

Object PopBack

SET Asteroid type ==1

Advance Asteroid

IF(Bullet Alive)

Advance Bullet

Ship advance

Ship :: Move(left, right)

If (left)

Angle += 9

If (right)

Angle -= 9

IF (up)

IF (Dx < maxDx)

Dx += (up + angle) / 5

Dy += (up + angle) / 5

ELSE

Dx += maxDy

Dy += maxDy

ELSE

Dx -= (angle + 9) / 5

Dy -= (angle + 9) / 5

Asteroids :: Regenerate()

Side =Rand(1 or 2)

IF side == 1

x = xMin

y = rand(yMin …yMax)

dx = rand(3 …6)

dy = rand(- 4 …4)

ELSE

y = yMin

x = rand(xMin …xMax)

dy = rand(3 …6)

dx = rand(- 4 …4)

Files

There will be no files used in this game.

Errors

Internal errors will be the only errors in this game.

|  |  |  |
| --- | --- | --- |
| Name | Condition | Handle |
| More than 5 bullets | Ammo < 0 OR Ammo > 5 | Assert |
| Error accelerate | Accelerate > MAX | Assert |
| Min Distance | MinDist < 0 | Assert |