Asteroid.cs

using System.Collections;

using System.Collections.Generic;

using UnityEngine;

/// Represents an asteroid in the game. Handles spawning, movement, collision detection, and destruction.

public class Asteroid : MonoBehaviour

{

    public GameObject asteroidObject, spaceshipPrefab, AsteroidFragment, bulletPrefab;

    private Vector3 spawnPoint;

    private bool ignoreCollisions = true;

    // Start - called before the first frame update

    void Start()

    {

        //Set tag to Asteroid

        asteroidObject.tag = "Asteroid";

        //Set the asteroid's position at a random position near the edges of the screen

        if (Random.Range(0, 2) == 0)

        {

            //Spawn on top or bottom

            if (Random.Range(0, 2) == 0)

            {

                //Spawn on top

                spawnPoint = new Vector3(Random.Range(-30f, 30f), 0, 30);

            }

            else

            {

                //Spawn on bottom

                spawnPoint = new Vector3(Random.Range(-30f, 30f), 0, -30);

            }

        }

        else

        {

            //Spawn on left or right

            if (Random.Range(0, 2) == 0)

            {

                //Spawn on left

                spawnPoint = new Vector3(-30, 0, Random.Range(-30f, 30f));

            }

            else

            {

                //Spawn on right

                spawnPoint = new Vector3(30, 0, Random.Range(-30f, 30f));

            }

        }

        //Set the asteroid's position

        asteroidObject.transform.position = spawnPoint;

        //Move the asteroid in a random direction

        asteroidObject.GetComponent<Rigidbody>().AddForce(new Vector3(Random.Range(-700f, 700f), 0, Random.Range(-700f, 700f)));

        //Rotate the asteroid in a random direction

        asteroidObject.GetComponent<Rigidbody>().AddTorque(new Vector3(Random.Range(-500f, 500f), Random.Range(-500f, 500f), Random.Range(-500f, 500f)));

        //This is a method that disables collisions for a tenth of a second at spawn in, in order to prevent not valid collisions

        Invoke("DisableCollisionIgnore", 0.1f);

    }

    void DisableCollisionIgnore()

    {

        //Disabling collision ignore boolean

        ignoreCollisions = false;

    }

    /\*Each time an asteroid collides with something, spawn a few of the tiny asteroid prefabs at the point of

impact. They should be destroyed shortly afterwards. \*/

    void SpawnCollisionDebris(Vector3 *collisionPoint*, float *multiplier*)

    {

        //Spawn 3 small asteroids at the point of collision

        for (int i = 0; i < 3 \* *multiplier*; i++)

        {

            GameObject smallAsteroid = GameObject.Instantiate(AsteroidFragment);

            //Setting position to the collision point with some variance and scaling it down

            smallAsteroid.transform.position = new Vector3(

*collisionPoint*.x + Random.Range(-0.5f, 0.5f),

*collisionPoint*.y + Random.Range(-0.5f, 0.5f),

*collisionPoint*.z + Random.Range(-0.5f, 0.5f)

            );

            smallAsteroid.transform.localScale = new Vector3(0.01f, 0.01f, 0.01f);

            //Adding a random force and torque to the small asteroids

            smallAsteroid.GetComponent<Rigidbody>().AddForce(new Vector3(Random.Range(-100f, 100f), 0, Random.Range(-100f, 100f)));

            smallAsteroid.GetComponent<Rigidbody>().AddTorque(new Vector3(Random.Range(-100f, 100f), Random.Range(-100f, 100f), Random.Range(-100f, 100f)));

        }

    }

    void SpawnSmallerAsteroids(Vector3 *collisionPoint*)

    {

        //Spawn between 3-4 small asteroids at the point of collision

        Debug.Log("SpawnSmallerAsteroids called");

        for (int i = 0; i < Random.Range(3, 5); i++)

        {

            GameObject asteroid = Instantiate(Resources.Load("Asteroid", typeof(GameObject))) as GameObject;

            //Setting position to the collision point and scaling it down

            asteroid.transform.position = *collisionPoint*;

            asteroid.transform.localScale = new Vector3(Random.Range(0.01f, 0.06f), Random.Range(0.01f, 0.06f), Random.Range(0.01f, 0.06f));

            //Adding a random force and torque to the small asteroids

            asteroid.GetComponent<Rigidbody>().AddForce(new Vector3(Random.Range(-100f, 100f), 0, Random.Range(-100f, 100f)));

            asteroid.GetComponent<Rigidbody>().AddTorque(new Vector3(Random.Range(-100f, 100f), Random.Range(-100f, 100f), Random.Range(-100f, 100f)));

        }

    }

    /\*Method for calling SpawnCollisionDebris on collisions \*/

    void OnCollisionEnter(Collision *collision*)

    {

        if (ignoreCollisions)

        {

            return;

        }

        Debug.Log("Collision object is: " + *collision*.gameObject.tag);

        switch (*collision*.gameObject.tag)

        {

            case "Bullet":

                //Calling SpawnCollisionDebris with the point of collision

                SpawnCollisionDebris(*collision*.contacts[0].point, 3F);

                //Destroying the bullet

                Destroy(*collision*.gameObject);

                //Destroying the asteroid

                Destroy(asteroidObject);

                if (asteroidObject.transform.localScale.x > 0.1f)

                {

                    SpawnCollisionDebris(*collision*.contacts[0].point, 1F); //extra debris for larger asteroids (also fun)

                    //Destroying the asteroid

                    SpawnSmallerAsteroids(*collision*.contacts[0].point);

                }

                else if (asteroidObject.transform.localScale.x > 0.05F)

                {

                    SpawnCollisionDebris(*collision*.contacts[0].point, 2F); //extra debris for larger asteroids (also fun)

                }

                break;

            case "SpaceShip":

                //Destroy & respawn spaceship handled in spaceship script - return

                break;

            case "Asteroid":

                SpawnCollisionDebris(*collision*.contacts[0].point, 1.5F);

                break;

            default:

                break;

        }

    }

}

Bullet.cs

using System.Collections;

using System.Collections.Generic;

using UnityEngine;

/// This class represents the behavior of a bullet in the game. It checks if the bullet is offscreen every 0.2 seconds and destroys it if so.

public class Bullet : MonoBehaviour

{

    public GameObject bullet;

    public GameObject spaceship;

    void Start()

    {

        //Check if bullet is offscreen every 0.2 seconds - destroy if so

        InvokeRepeating("DestroyIfOffScreen", 0.2f, 0.2f);

    }

    void DestroyIfOffScreen()

    {

        Vector3 pos = transform.position;

        Vector3 vel = GetComponent<Rigidbody>().velocity;

        //if offscreen, destroy bullet

        if ((pos.x > GameManager.screenTopRight.x && vel.x >= 0f)

        || (pos.x > GameManager.screenTopRight.x && vel.x >= 0f)

        || (pos.z < GameManager.screenBottomLeft.z && vel.z <= 0f)

        || (pos.z > GameManager.screenTopRight.z && vel.z >= 0f))

        {

            Destroy(bullet);

        }

    }

}

GameManager.cs

using System.Collections;

using System.Collections.Generic;

using UnityEngine;

public class GameManager : MonoBehaviour

{

    public GameObject asteroidPrefab, spaceshipPrefab;

    public static GameManager instance;

    public static Vector3 screenBottomLeft, screenTopRight;

    public static float screenWidth, screenHeight;

    public static int currentGameLevel;

    // Start is called before the first frame update

    void Start()

    {

        instance = this;

        //Set the current game level to 0

        currentGameLevel = 0;

        /\*Camera is positioned at 0,30,0

         \* Facing towards 0,0,0 with 0,0,1 as its 'up' axis \*/

        Camera.main.transform.position = new Vector3(0, 30, 0);

        Camera.main.transform.LookAt(new Vector3(0, 0, 0), new Vector3(0, 0, 1));

        StartNextLevel();

        //Create a new player spaceship

        CreatePlayerSpaceship();

    }

    void StartNextLevel()

    {

        //Increment the current game level

        currentGameLevel++;

        //Number of asteroids depends on game level

        int numberOfAsteroids = currentGameLevel \* 5;

        // find (slightly expanded) screen corners and size, in world coordinates

        // for ViewportToWorldPoint, the z value specified is in world units from the camera

        screenBottomLeft = Camera.main.ViewportToWorldPoint(new Vector3(-0.1f, -0.1f, 30f));

        screenTopRight = Camera.main.ViewportToWorldPoint(new Vector3(1.1f, 1.1f, 30f));

        screenWidth = screenTopRight.x - screenBottomLeft.x;

        screenHeight = screenTopRight.z - screenBottomLeft.z;

        Debug.Log("BottomLeft: " + screenBottomLeft);

        Debug.Log("TopRight: " + screenTopRight);

        Debug.Log("Width: " + screenWidth);

        Debug.Log("Height: " + screenHeight);

        //instantiate a set of asteroids towards the edges of the visible screen using a for loop

        for (int i = 0; i < numberOfAsteroids; i++)

        {

            GameObject go = Instantiate(instance.asteroidPrefab) as GameObject;

            //GameObject asteroid = GameObject.Instantiate(asteroidPrefab);

            float x, z;

            if (Random.Range(0f, 1f) < 0.5f)

                x = screenBottomLeft.x + Random.Range(0f, 0.15f) \* screenWidth; // near the left edge

            else

                x = screenTopRight.x - Random.Range(0f, 0.15f) \* screenWidth; // near the right edge

            if (Random.Range(0f, 1f) < 0.5f)

                z = screenBottomLeft.z + Random.Range(0f, 0.15f) \* screenHeight; // near the bottom edge

            else

                z = screenTopRight.z - Random.Range(0f, 0.15f) \* screenHeight; // near the top edge

            go.transform.position = new Vector3(x, 0f, z);

            //scale the asteroid to a random size between 0.2 and 0.35

            go.transform.localScale = new Vector3(Random.Range(0.1f, 0.17f), Random.Range(0.1f, 0.17f), Random.Range(0.1f, 0.17f));

        }

    }

    private static void CreatePlayerSpaceship()

    {

        // instantiate the player's spaceship

        GameObject go = Instantiate(instance.spaceshipPrefab);

        go.transform.position = Vector3.zero;

        go.transform.localScale = new Vector3(0.2f, 0.2f, 0.2f);

    }

}

Spaceship.cs

using System.Collections;

using System.Collections.Generic;

using UnityEngine;

/// <summary>

/// Spaceship class that controls the spaceship movement, shooting, and collision detection.

/// </summary>

public class Spaceship : MonoBehaviour

{

    public GameObject spaceship;

    public GameObject bullet;

    public static int bulletCount = 0;

    // Start is called before the first frame update

    void Start()

    {

        //Wrap spaceship to other side of screen, check every 0.2 seconds. 5 times a second

        InvokeRepeating("CheckIfOffScreen", 0.2f, 0.2f);

        InvokeRepeating("ResetBulletCount", 1f, 1f);

    }

    // Update is called once per frame

    void Update()

    {

        /\*apply a physics force to accelerate the spaceship forward if the Up arrow is held, or

        rotate it left/right if the Left/Right arrows are held.\*/

        //Checking if the Up arrow is held, if so check if within velocity limit, if so add force

        if (Input.GetKey(KeyCode.UpArrow) && GetComponent<Rigidbody>().velocity.magnitude < 14)

        {

            GetComponent<Rigidbody>().AddForce(transform.up \* 7);

        }

        if (Input.GetKey(KeyCode.LeftArrow))

        {

            GetComponent<Rigidbody>().AddTorque(transform.forward \* -4);

        }

        if (Input.GetKey(KeyCode.RightArrow))

        {

            GetComponent<Rigidbody>().AddTorque(transform.forward \* 4);

        }

        //Fire bullet if spacebar is pressed - spawn at front of spaceship

        //Position should be positioned and rotated appropriately, with rigidbody given an appropriate velocity

        //Limit of 4 bullets fired per second spaceship.

        if (Input.GetKeyDown(KeyCode.Space) && bulletCount < 4)

        {

            GameObject bullet = Instantiate(Resources.Load("Bullet", typeof(GameObject))) as GameObject;

            bullet.transform.position = spaceship.transform.position + spaceship.transform.up \* 1.5f;

            bullet.transform.rotation = spaceship.transform.rotation;

            bullet.GetComponent<Rigidbody>().velocity = spaceship.transform.up \* 20;

            bulletCount++;

        }

    }

    void ResetBulletCount()

    {

        bulletCount = 0;

    }

/// <summary>

/// Detects collision with an asteroid and destroys the spaceship. A new spaceship is spawned in the center of the screen.

/// </summary>

/// <param name="*col*"></param>

    void OnCollisionEnter(Collision *col*) {

        if (*col*.gameObject.tag == "Asteroid") {

            Destroy(gameObject.transform.parent.gameObject);

            Debug.Log("Spaceship destroyed");

            //Spawn a new spaceship in the center of the screen

            GameObject spaceship = Instantiate(Resources.Load("Spaceship", typeof(GameObject))) as GameObject;

            spaceship.transform.transform.localScale = new Vector3(0.2f, 0.2f, 0.2f);

        }

    }

    // Having the player spaceship respond to moving off-screen, in the same way that asteroids already do

    void CheckIfOffScreen()

    {

        Vector3 currentWorldPos = spaceship.transform.position;

        Vector3 viewPosition = Camera.main.WorldToViewportPoint(currentWorldPos);

        if (viewPosition.x > 1f)

        {

            spaceship.transform.position = new Vector3(-currentWorldPos.x + 1, 0, currentWorldPos.z);

        }

        if (viewPosition.y < 0f)

        {

            spaceship.transform.position = new Vector3(currentWorldPos.x, 0, -currentWorldPos.z - 1);

        }

        if (viewPosition.x < 0f)

        {

            spaceship.transform.position = new Vector3(-currentWorldPos.x - 1, 0, currentWorldPos.z);

        }

        if (viewPosition.y > 1f)

        {

            spaceship.transform.position = new Vector3(currentWorldPos.x, 0, -currentWorldPos.z + 1);

        }

    }

}

TimedLife.cs

using System.Collections;

using System.Collections.Generic;

using UnityEngine;

/// <summary>

/// Destroys the game object after a random amount of time between minLifetime and maxLifetime.

/// </summary>

public class TimedLife : MonoBehaviour

{

    public float minLifetime, maxLifetime;

    void Start()

    {

        StartCoroutine(HandleLifetime());

    }

    private IEnumerator HandleLifetime()

    {

        yield return new WaitForSeconds(Random.Range(minLifetime, maxLifetime));

        Destroy(gameObject);

    }

}

ScreenWrapper.cs

using System.Collections;

using System.Collections.Generic;

using UnityEngine;

/// <summary>

/// This class wraps the game object around the screen if it goes off-screen.

/// </summary>

public class ScreenWrapper : MonoBehaviour

{

    // Start is called before the first frame update

    // inspector settings

    public Rigidbody rigidBody;

    //

    // Use this for initialization

    void Start()

    {

        // start periodically checking for being off-screen

        InvokeRepeating("CheckScreenEdges", 0.1f, 0.1f);

    }

    private void CheckScreenEdges()

    {

        Vector3 pos = transform.position;

        Vector3 vel = rigidBody.velocity;

        float xTeleport = 0f, zTeleport = 0f;

        if (pos.x < GameManager.screenBottomLeft.x && vel.x <= 0f)

            xTeleport = GameManager.screenWidth;

        else if (pos.x > GameManager.screenTopRight.x && vel.x >= 0f)

            xTeleport = -GameManager.screenWidth;

        if (pos.z < GameManager.screenBottomLeft.z && vel.z <= 0f)

            zTeleport = GameManager.screenHeight;

        else if (pos.z > GameManager.screenTopRight.z && vel.z >= 0f)

            zTeleport = -GameManager.screenHeight;

        if (xTeleport != 0f || zTeleport != 0f)

            transform.position = new Vector3(pos.x + xTeleport, 0f, pos.z + zTeleport);

    }

}