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CS 506

Project 5: Arched Doors

In this task, I was given to draw a structure with multiple arched doors using C# programming in Unity3D. I generated the arc doors using mesh.

Further in the code, first I initialized the radius and height of the arc door and also initialized the number of rows and columns. Then I created the arc using GenerateArc method which I am defining later in the program. So basically arc is created using mesh. Then I created the left wall and the right wall using cubes, after that I scaled and changed the position of the cubes in the x and y direction. I am taking the width and depth of the cube for left wall and right wall as 1. Declared the width of the arc door as radius*2+2 since the width of the arc door will be diameter*(1+1) --→ [(radius*2)*(width of the left wall + width of the right wall)]. For the right wall, when I am changing the position of the cube, it's x-coordinate will be (radius*2+1+xPosition) --→(diameter + width of the left wall + xPosition). 'xPosition' is the position of the cube in x-direction and 'yPosition' is the position of the cube in y-direction. Then I defined the method GenerateArc in which includes the mesh, meshFilter(which takes the mesh from the assets and passes it to the Mesh Renderer for rendering on the screen) and meshRenderer(which takes the geometry from the Mesh Filter and renders it at the position defined by the object's transform component) and I give the material of the structure as "standard". I take the angle as -90 because the arc starts from 90 and goes to -90. So in this, I am taking 4 planes- the arc plane, the front plane, the back plane and the top plane. Since we are forming the arc door using quadrilateral mesh, we require 4 points in total. So I have defined those points as x, y, x1, y1 to generate the coordinates and the four vertices.

⇒ **For the Arc plane:** the front coordinates will be (x, y, 0), (x1, y1, 0) and back coordinates will be (x, y, 1), (x1, y1, 1)

⇒ **For the Front plane:** the coordinates will be (x, y, 0), (x1, y1, 0) and the top coordinates will be (x, radius+1, 0), (x1, radius+1, 0) because the y axis of the font plane will be radius of the arc plus the width of the wall, i.e., 1.

⇒ **For the Back plane:** similarly, for the back plane, the coordinates will be same as the front plane just the difference will be that z coordinate will be 1.

⇒ **For the Top plane:** the front coordinates will be (startX, radius + 1, 0), (x1, radius + 1, 0), while the back coordinates will be (startX, radius + 1, 1), (x1, radius + 1, 1) as startX is the starting point of the arc, y-axis would be radius of the arc plus the width of the wall, i.e., 1.

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At the end,

‘mesh.vertices = vertices.ToArray();’ : transmits the coordinates in the mesh
ToArray: convert List type to Array type
mesh.SetIndices(quad.ToArray(), MeshTopology.Quads, 0); : adds index of every vertex clockwise

obj.transform.position = new Vector3(0.5f + radius, height - (radius + 1), 0); : Sets the position of the arc object.

0.5f + radius, height - (radius + 1), 0 --→ coordinates of the center of the arc