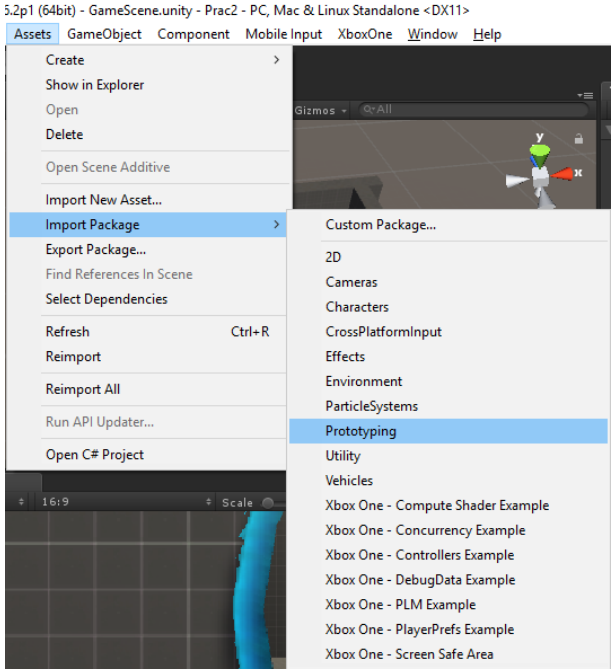
DESENVOLUPAMENT DE JOCS 3D

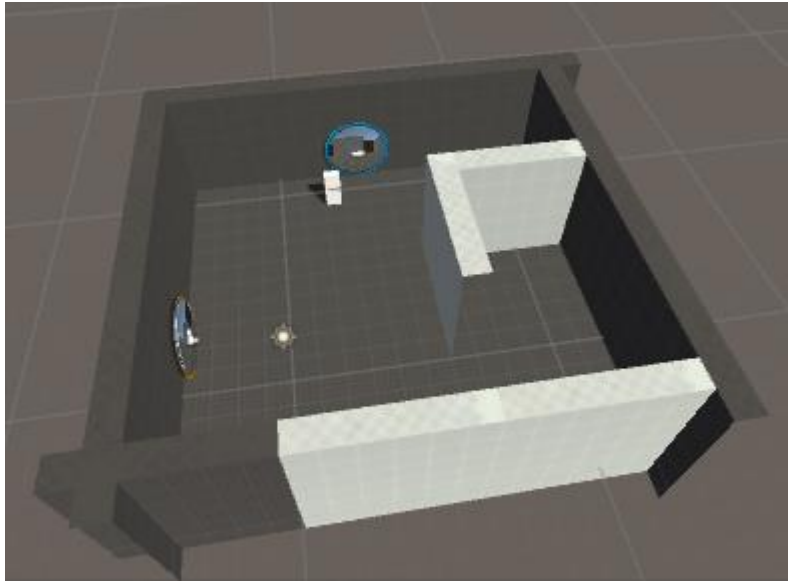
Práctica

Práctica 2 - https://youtu.be/MRsd0ptJxV8

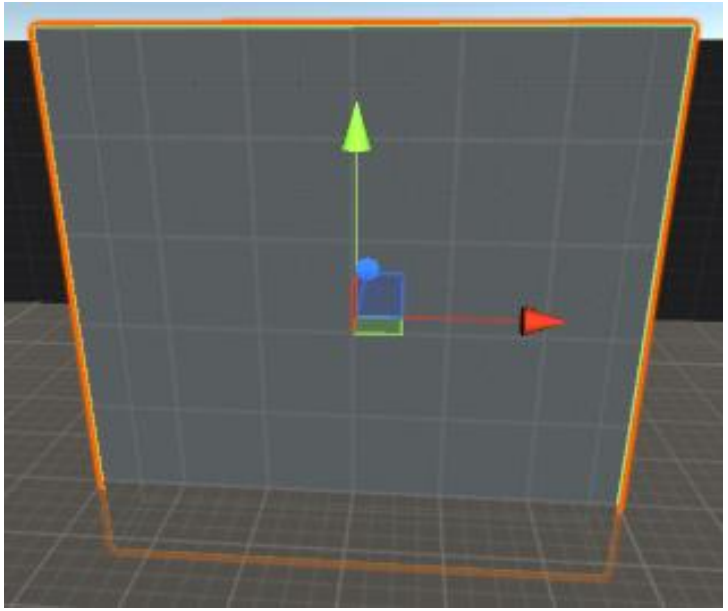
Creando nivel – Prototyping



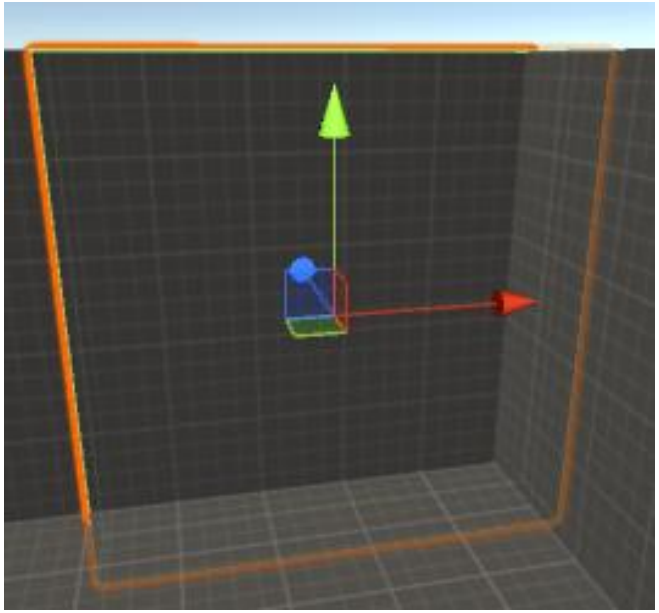
Creando nivel



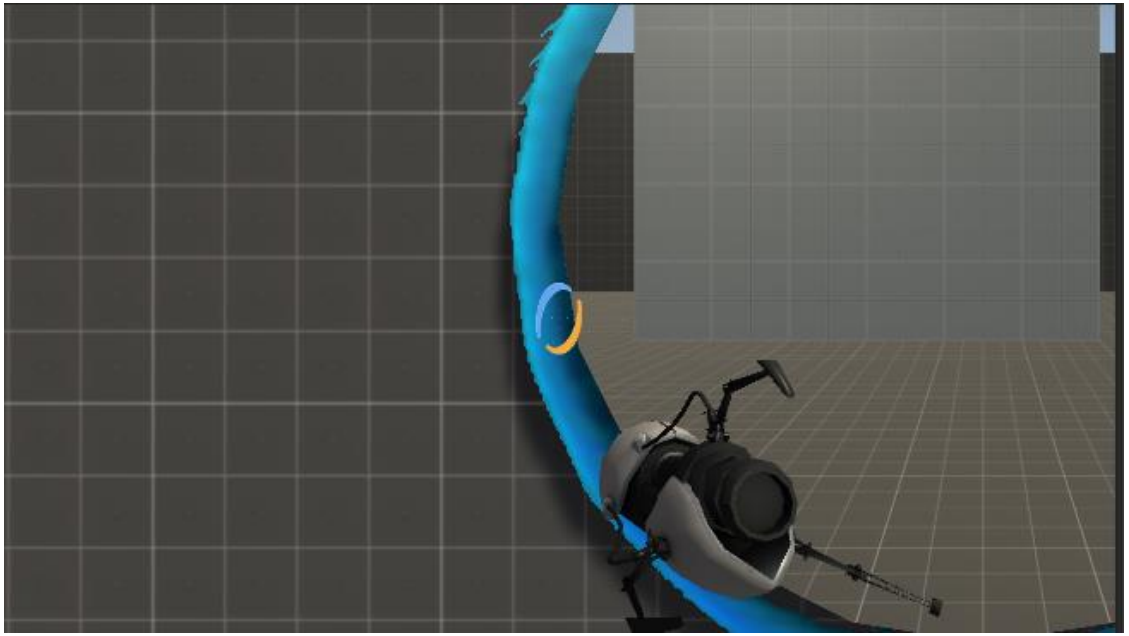
Creando nivel – Pared pintable



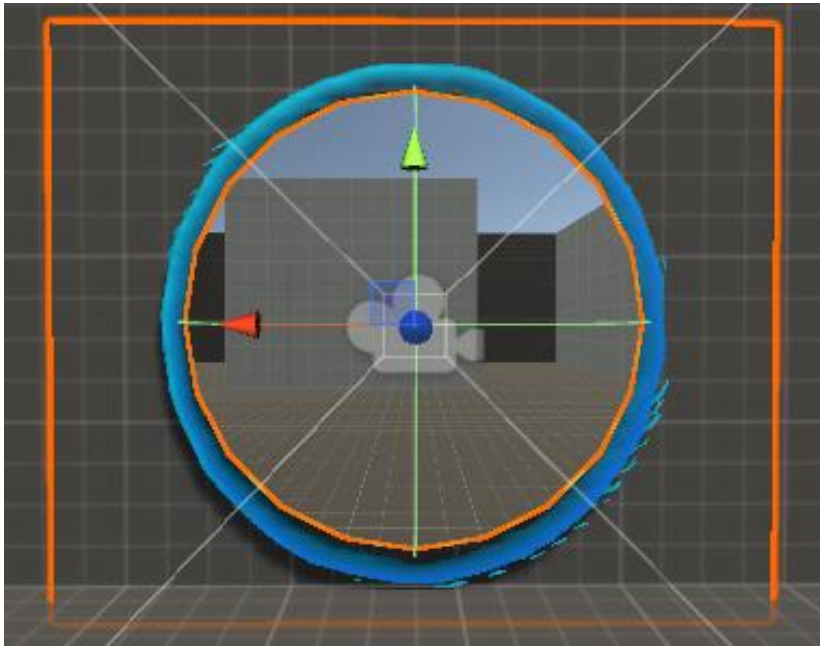
Creando nivel – Pared no pintable

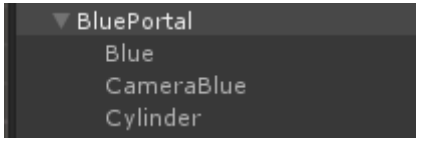


FPSPlayerController

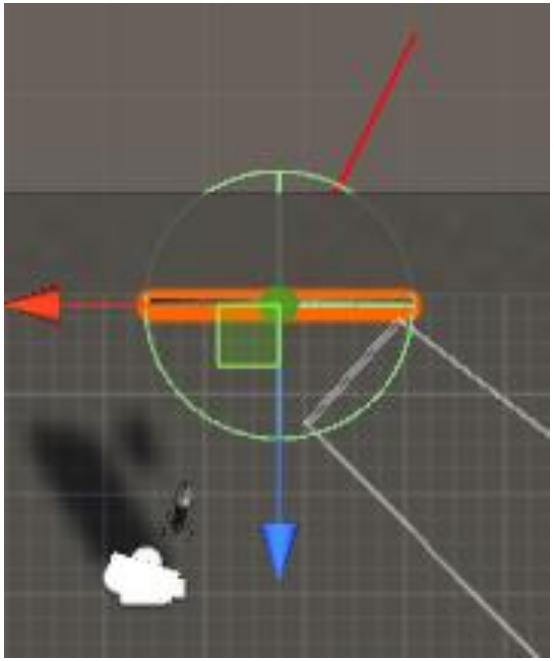


Portales





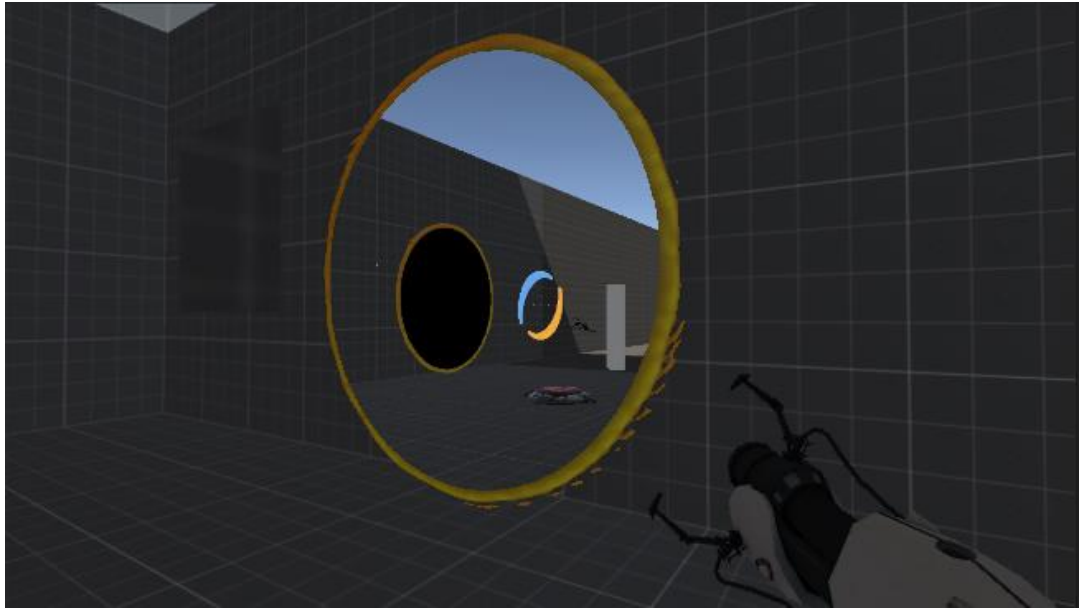
Portales



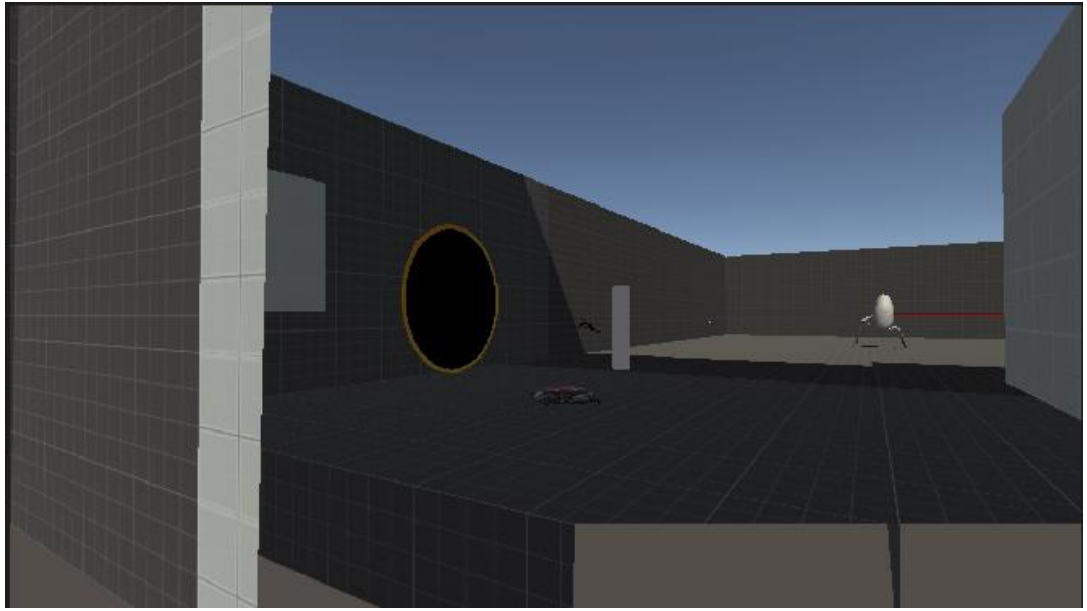
Portales – Implementación

```
public Transform m_PlayerCamera;
public Portal m_MirrorPortal;
public Camera m_PortalCamera;
public float m_NearClipOffset=0.5f;
```

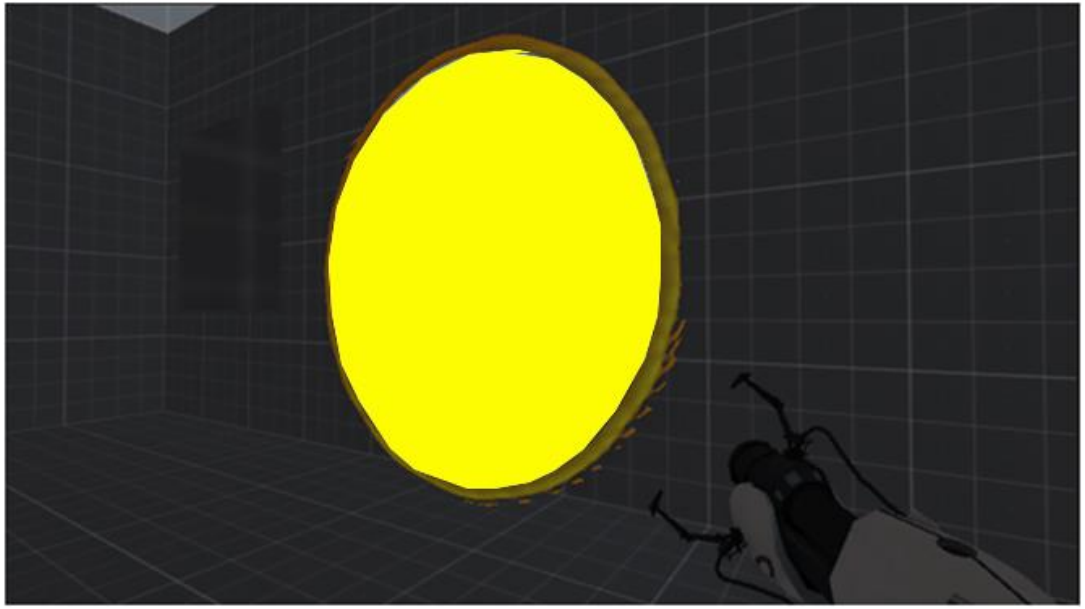
Portal - Cámara



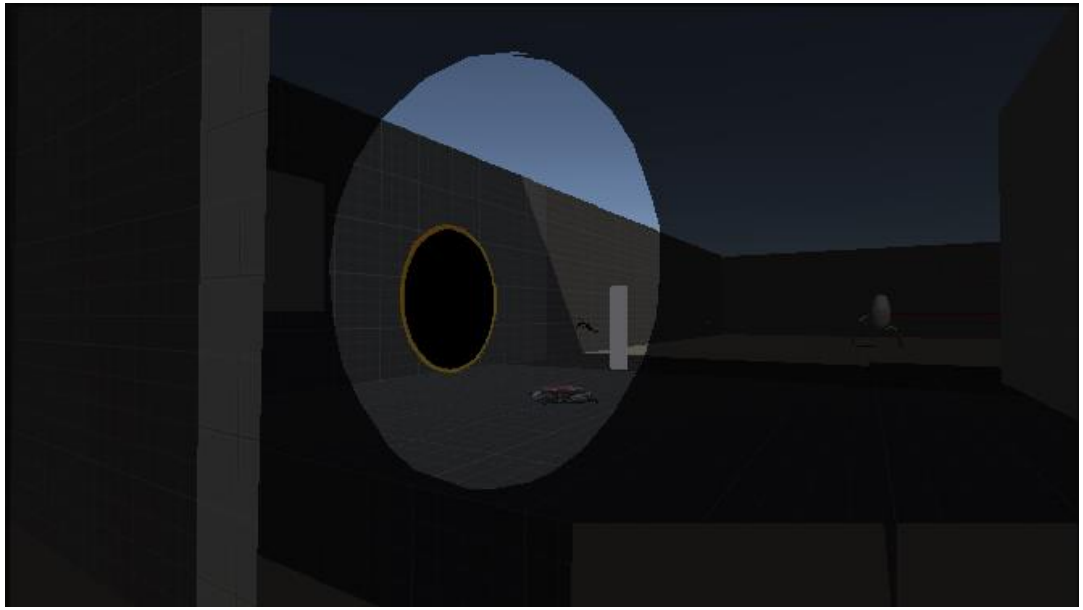
Portal - RenderTarget



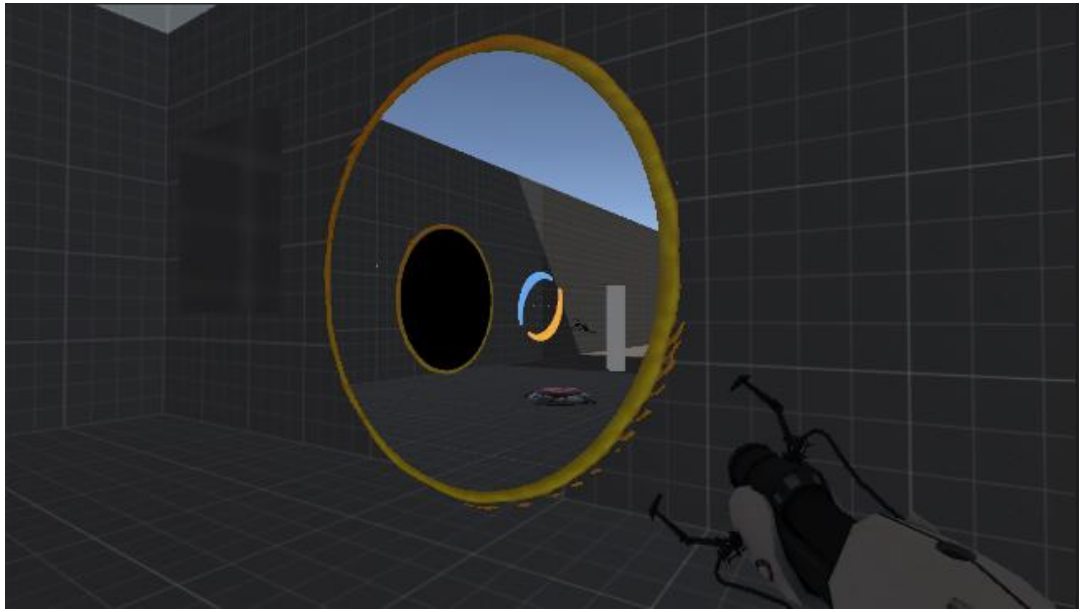
Portal - Shader



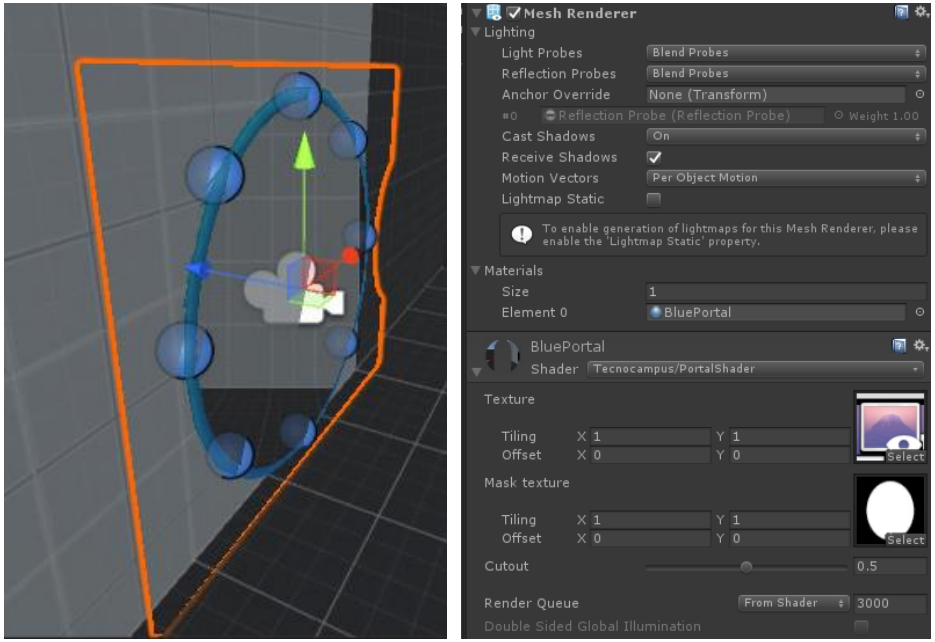
Portal – Shader RenderTarget



Portal - Resultado



Portal Shader - Implementación



Portal Shader – Implementación

```
Shader "Tecnocampus/PortalShader"
{
	Properties
	{
		_MainTex ("Texture", 2D) = "white" {}
		_MaskTex("Mask texture", 2D) = "white" {}
		_Cutout("Cutout", Range(0.0, 1.0)) = 0.5
	}
	SubShader
	{
		Tags{ "Queue" = "Geometry " "IgnoreProjector" = "True" "RenderType" = "Opaque" }
		Lighting Off
		Cull Back
		ZWrite On
		ZTest Less

		Fog{ Mode Off }
```

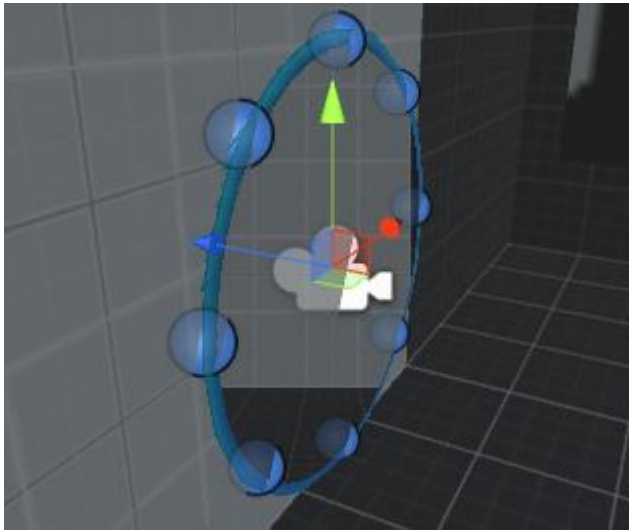
Portal Shader – Implementación

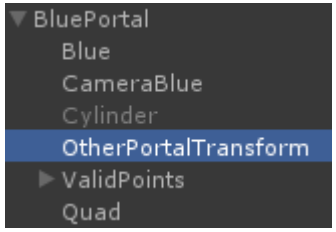
```
Pass
{
	CGPROGRAM
	#pragma vertex vert
	#pragma fragment frag

	#include "UnityCG.cginc"

	struct appdata
	{
			float4 vertex : POSITION;
			float2 uv : TEXCOORD0;
	};

	struct v2f
	{
			float4 vertex : SV_POSITION;
			float2 uv : TEXCOORD0;
			float4 screenPos : TEXCOORD1;
	};
```

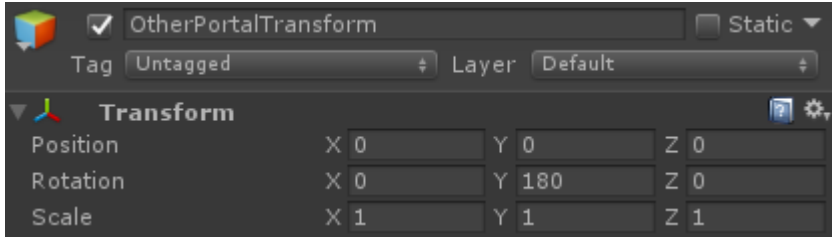
Portal Shader – Implementación

```
                    v2f vert (appdata v)
                    {
                                v2f o;
                                o.vertex = UnityObjectToClipPos(v.vertex);
                                o.uv = v.uv;
                                o.screenPos = ComputeScreenPos(o.vertex);
                                return o;
                    }

                    sampler2D _MainTex;
                    sampler2D _MaskTex;
                    float _Cutout;

                    fixed4 frag (v2f i) : SV_Target
                    {
                                i.screenPos /= i.screenPos.w;

                                fixed4 l_MaskColor= tex2D(_MaskTex, i.uv);
                                if (l_MaskColor.a < _Cutout)
                                            clip(-1);
                                fixed4 col = tex2D(_MainTex, float2(i.screenPos.x, i.screenPos.y));

                                return col;
                    }
                    ENDCG
          }
    }
}
```

Portal – Cálculo posición de cámara (opción 1)



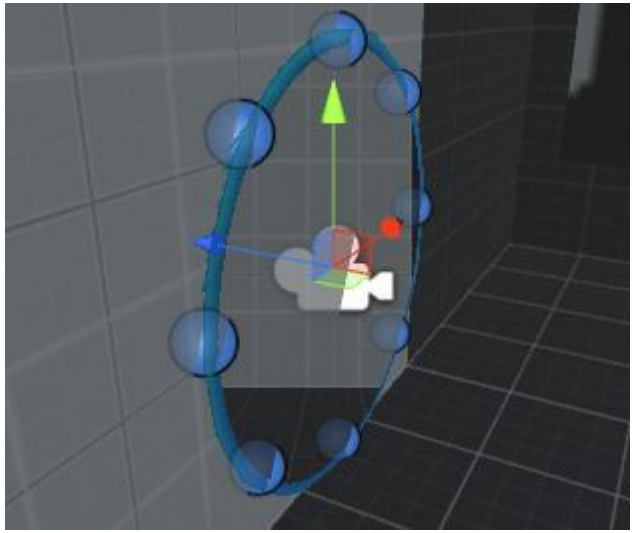




Portal – Cálculo posición de cámara (opción 1) Implementación

```
Vector3 l_ReflectedPosition=m_MirrorTransform.InverseTransformPoint(m_PlayerCamera.position);
Vector3 l_ReflectedDirection=m_MirrorTransform.InverseTransformDirection(m_PlayerCamera.forward);
m_MirrorPortal.m_PortalCamera.transform.position=m_MirrorPortal.transform.TransformPoint(l_ReflectedPosition);
m_MirrorPortal.m_PortalCamera.transform.forward=m_MirrorPortal.transform.TransformDirection(l_ReflectedDirecti
    on);

m_PortalCamera.nearClipPlane=Vector3.Distance(m_PortalCamera.transform.position,
    this.transform.position)+m_NearClipOffset;
```

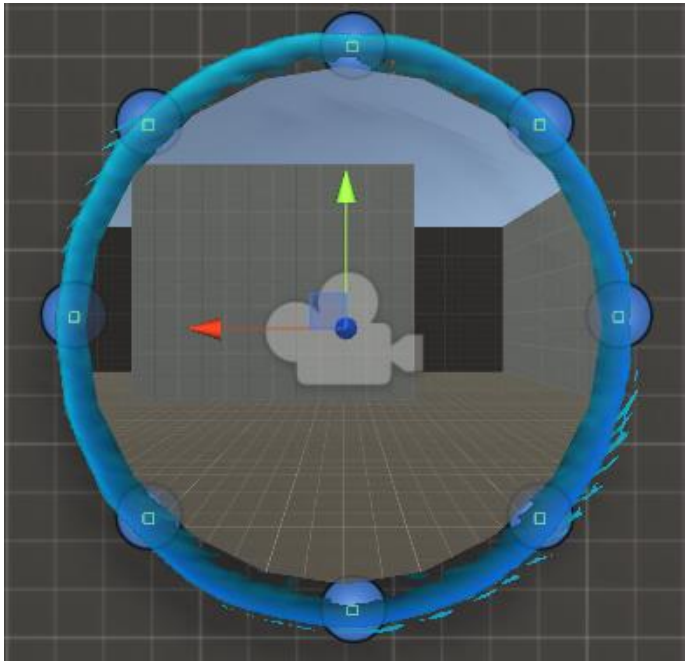
Portal – Cálculo posición de cámara (opción 2)



Portal – Cálculo posición de cámara (opción 2) Implementación

```
Vector3 l_EulerAngles=transform.rotation.eulerAngles;
Quaternion l_Rotation=Quaternion.Euler(l_EulerAngles.x, l_EulerAngles.y+180.0f, l_EulerAngles.z);
Matrix4x4 l_WorldMatrix=Matrix4x4.TRS(transform.position, l_Rotation, transform.localScale);

Vector3 l_ReflectedPosition=l_WorldMatrix.inverse.MultiplyPoint3x4(m_PlayerCamera.position);
Vector3 l_ReflectedDirection=l_WorldMatrix.inverse.MultiplyVector(m_PlayerCamera.forward);
m_MirrorPortal.m_PortalCamera.transform.position=m_MirrorPortal.transform.TransformPoint(l_ReflectedPosition);
m_MirrorPortal.m_PortalCamera.transform.forward=m_MirrorPortal.transform.TransformDirection(l_ReflectedDirecti
    on);

m_PortalCamera.nearClipPlane=Vector3.Distance(m_PortalCamera.transform.position,
    this.transform.position)+m_NearClipOffset;
```

Portales – IsValidPosition



Portales – IsValidPosition – Implementación

```
public List<Transform> m_ValidPoints;

public bool IsValidPosition()
{
     Vector3 l_Normal=Vector3.zero;
     for(int i=0; i<m_ValidPoints.Count; ++i)
     {
          Transform l_ValidPoint=m_ValidPoints[i];
          Ray l_Ray=new Ray(m_PlayerCamera.position, l_ValidPoint.position-m_PlayerCamera.position);

          RaycastHit l_RaycastHit;
          if(Physics.Raycast(l_Ray, out l_RaycastHit))
          {
               //Por tag, normal y distancia coincide en todos los puntos
          }
     }
}
```

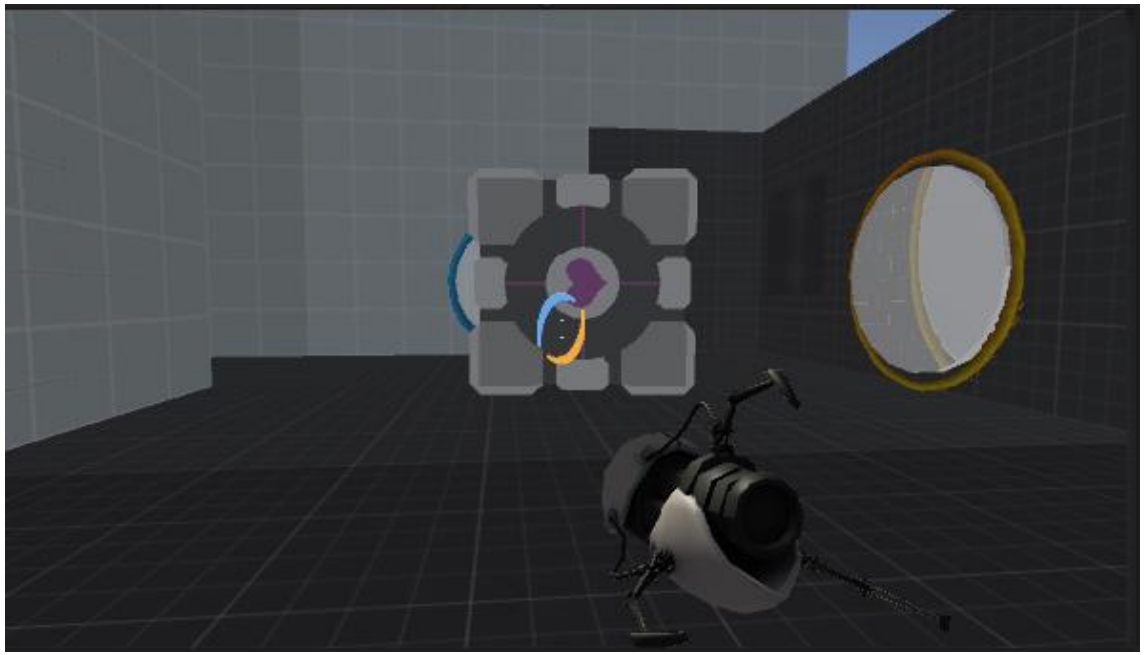
Portales – Teleport

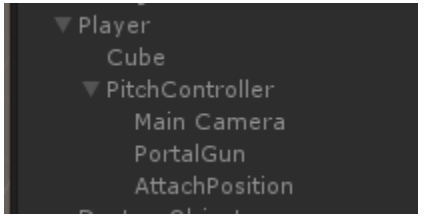
```
public void Teleport(Portal _Portal)
{
     Vector3 l_Position=_Portal.transform.InverseTransformPoint(transform.position);
     transform.position=_Portal.m_MirrorPortal.transform.TransformPoint(l_Position);
     Vector3 l_Direction=_Portal.transform.InverseTransformDirection(-transform.forward);
     transform.forward=_Portal.m_MirrorPortal.transform.TransformDirection(l_Direction);

     m_Yaw=transform.rotation.eulerAngles.y;
}
```

Portales – Implementación

```
void SetPortal(Portal _Portal, Vector3 Position, Vector3 Normal, float Scale)
{
     _Portal.transform.position=Position+Normal*m_SetPortalOffset;
     _Portal.transform.forward=Normal;
     _Portal.transform.localScale=Vector3.one*Scale;
}
```

Portales – AttachObject





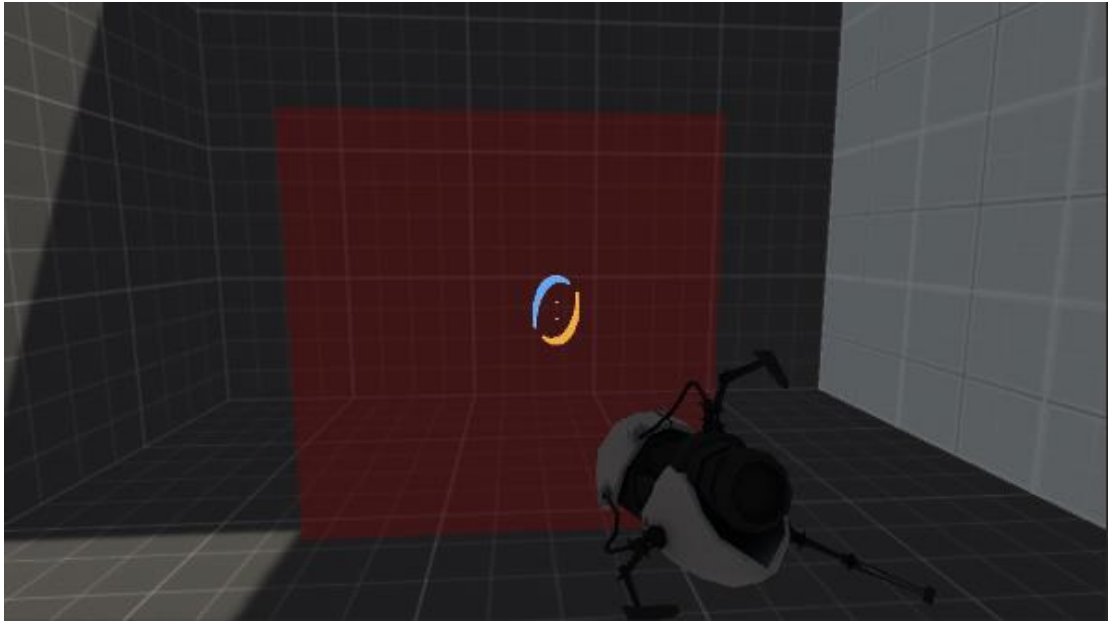
AttachObject – Implementación

```
void UpdateAttachedObject()
{
	Vector3 l_EulerAngles=m_AttachingPosition.rotation.eulerAngles;
	if(!m_AttachedObject)
	{
		Vector3 l_Direction=m_AttachingPosition.transform.position-m_ObjectAttached.transform.position;
		float l_Distance=l_Direction.magnitude;
		float l_Movement=m_AttachingObjectSpeed*Time.deltaTime;
		if(l_Movement>=l_Distance)
		{
			m_AttachedObject=true;
			m_ObjectAttached.MovePosition(m_AttachingPosition.position);
			m_ObjectAttached.MoveRotation(Quaternion.Euler(0.0f, l_EulerAngles.y, l_EulerAngles.z));
		}
		else
		{
			l_Direction/=l_Distance;
			m_ObjectAttached.MovePosition(m_ObjectAttached.transform.position+l_Direction*l_Movement);
			m_ObjectAttached.MoveRotation(Quaternion.Lerp(m_AttachingObjectStartRotation, Quaternion.Euler(0.0f, l_EulerAngles.y, l_EulerAngles.z), 1.0f-
	Mathf.Min(l_Distance/1.5f, 1.0f)));
		}
	}
	else
	{
		m_ObjectAttached.MoveRotation(Quaternion.Euler(0.0f, l_EulerAngles.y, l_EulerAngles.z));
		m_ObjectAttached.MovePosition(m_AttachingPosition.position);
	}
}
```

AttachObject – Implementación

```
void DetachObject(float Force)
{
    m_AttachedObject=false;
    m_AttachingObject=false;
    m_ObjectAttached.isKinematic=false;
    m_ObjectAttached.GetComponent<Companion>().SetTeleport(true);
    m_ObjectAttached.AddForce(m_AttachingPosition.forward*Force);
}
```

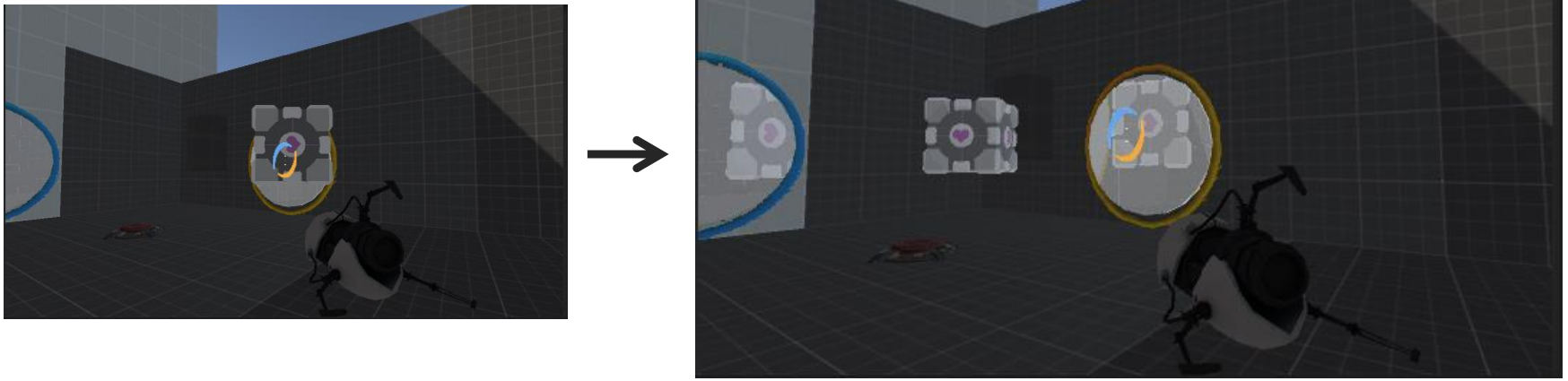
CompanionSpawner



CompanionSpawner – Implementación

```
public class CompanionSpawner : MonoBehaviour
{
    public Transform m_SpawnPosition;
    public GameObject m_CompanionPrefab;

    public void Spawn()
    {
        GameObject.Instantiate(m_CompanionPrefab, m_SpawnPosition.position,
    m_SpawnPosition.rotation, null);
    }
}
```

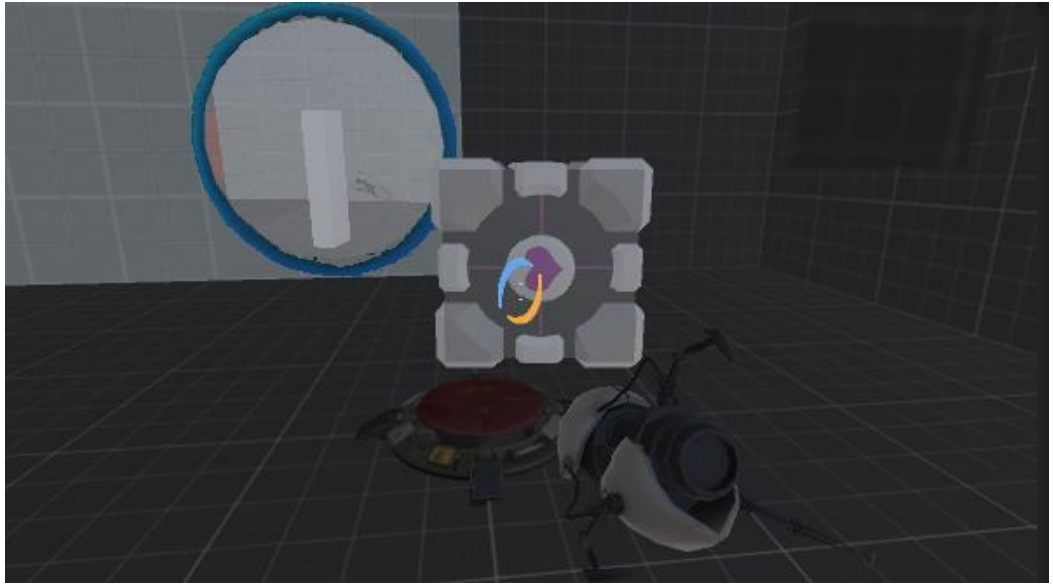
Companion – Teleport

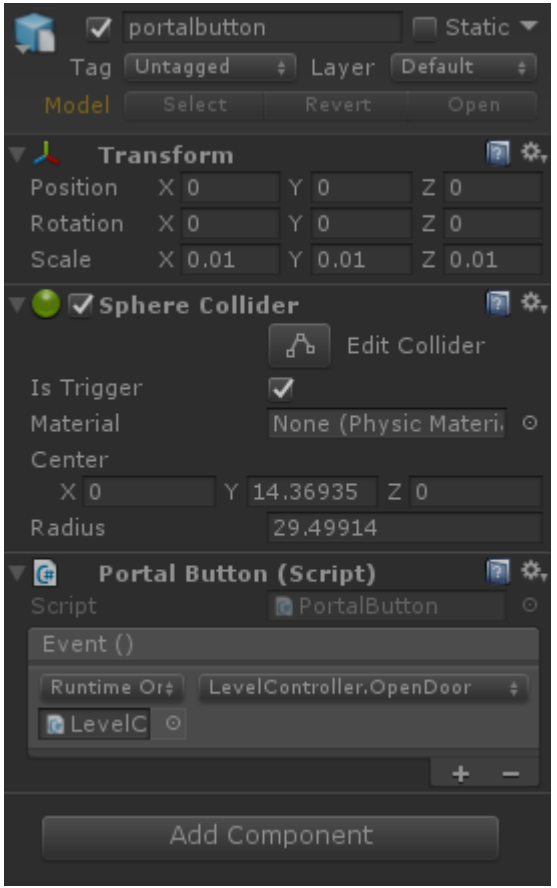


Companion – Implementación

```
public void Teleport(Portal _Portal)
{
    Rigidbody l_Rigidbody=GetComponent<Rigidbody>();
    Vector3 l_Position=_Portal.transform.InverseTransformPoint(transform.position);
    transform.position=_Portal.m_MirrorPortal.transform.TransformPoint(l_Position);
    Vector3 l_Direction=_Portal.transform.InverseTransformDirection(-transform.forward);
    transform.forward=_Portal.m_MirrorPortal.transform.TransformDirection(l_Direction);

    Vector3 l_Velocity=_Portal.transform.InverseTransformDirection(-l_Rigidbody.velocity);
    l_Rigidbody.velocity=_Portal.m_MirrorPortal.transform.TransformDirection(l_Velocity);
    transform.localScale*=(_Portal.m_MirrorPortal.transform.localScale.x/_Portal.transform.loca
    lScale.x);
}
```

PortalButton

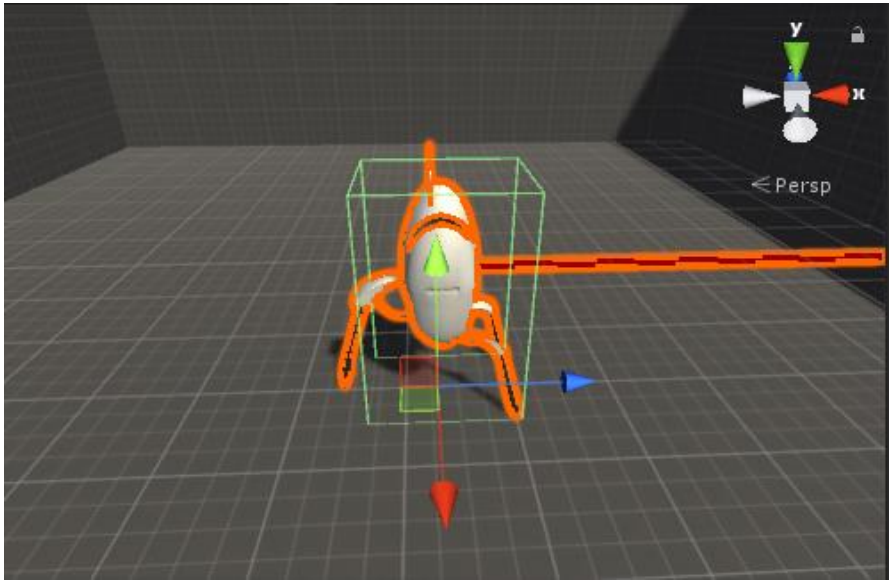


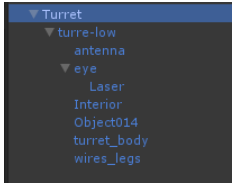


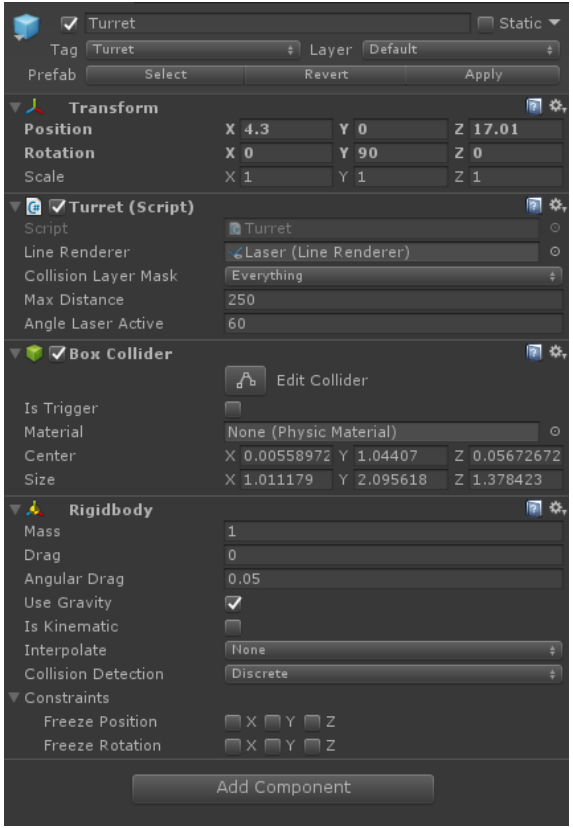
PortalButton – Implementación

```
public class PortalButton : MonoBehaviour
{
    public UnityEvent m_Event;

    void OnTriggerEnter(Collider _Collider)
    {
        if(_Collider.tag=="Companion")
            m_Event.Invoke();
    }
}
```

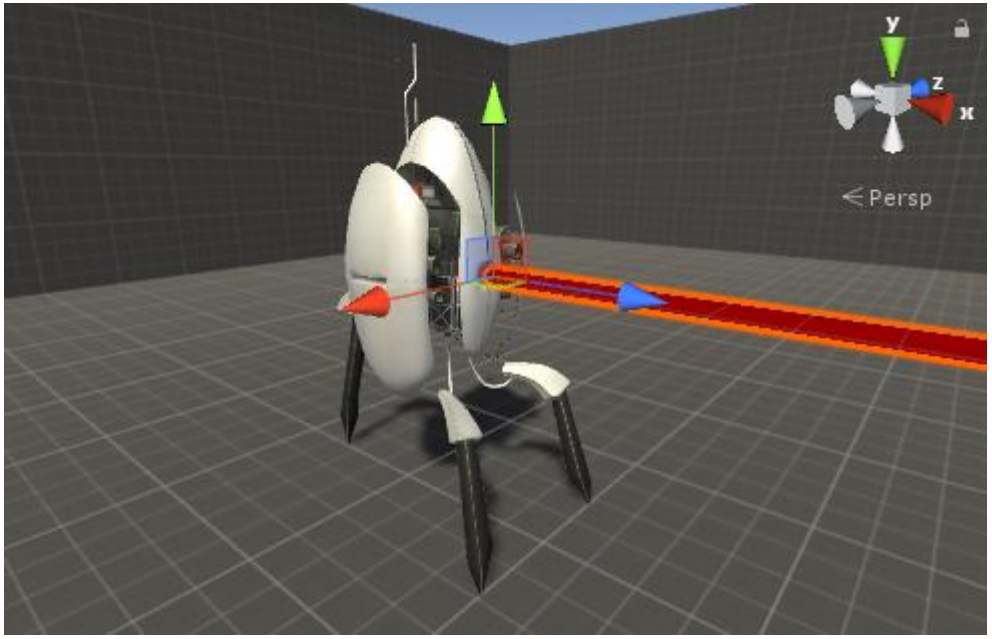
Turret

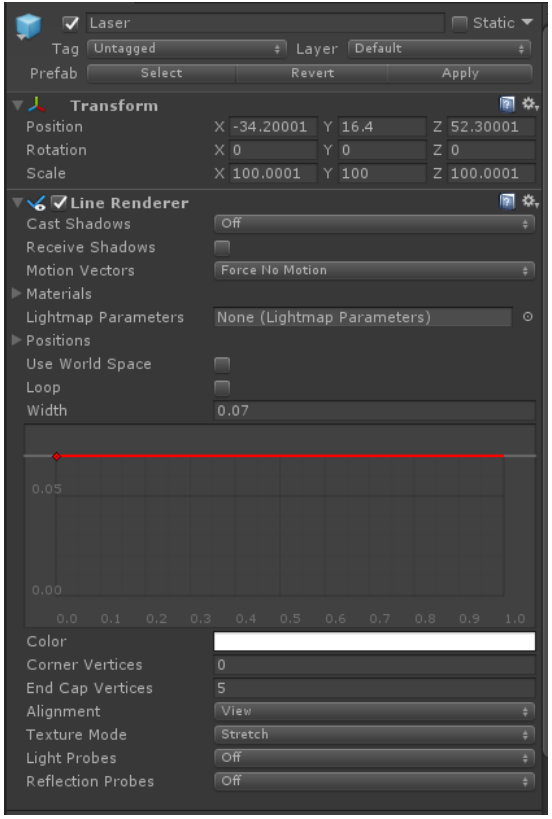

y
x
Persp


Turret
turre-low
antenna
eye
Laser
Interior
Object014
turret_body
wires_legs


Turret
Static
Tag Turret
Layer Default
Prefab Select Revert Apply
Transform
Position X 4.3 Y 0 Z 17.01
Rotation X 0 Y 90 Z 0
Scale X 1 Y 1 Z 1
Turret (Script)
Script Turret
Line Renderer Laser (Line Renderer)
Collision Layer Mask Everything
Max Distance 250
Angle Laser Active 60
Box Collider
Edit Collider
Is Trigger
Material None (Physic Material)
Center X 0.00558972 Y 1.04407 Z 0.05672672
Size X 1.011179 Y 2.095618 Z 1.378423
Rigidbody
Mass 1
Drag 0
Angular Drag 0.05
Use Gravity
Is Kinematic
Interpolate None
Collision Detection Discrete
Constraints
Freeze Position X Y Z
Freeze Rotation X Y Z
Add Component

Turret - Laser





Turret – Implementación

```
public LineRenderer m_LineRenderer;
public LayerMask m_CollisionLayerMask;
public float m_MaxDistance=250.0f;
public float m_AngleLaserActive=60.0f;
```

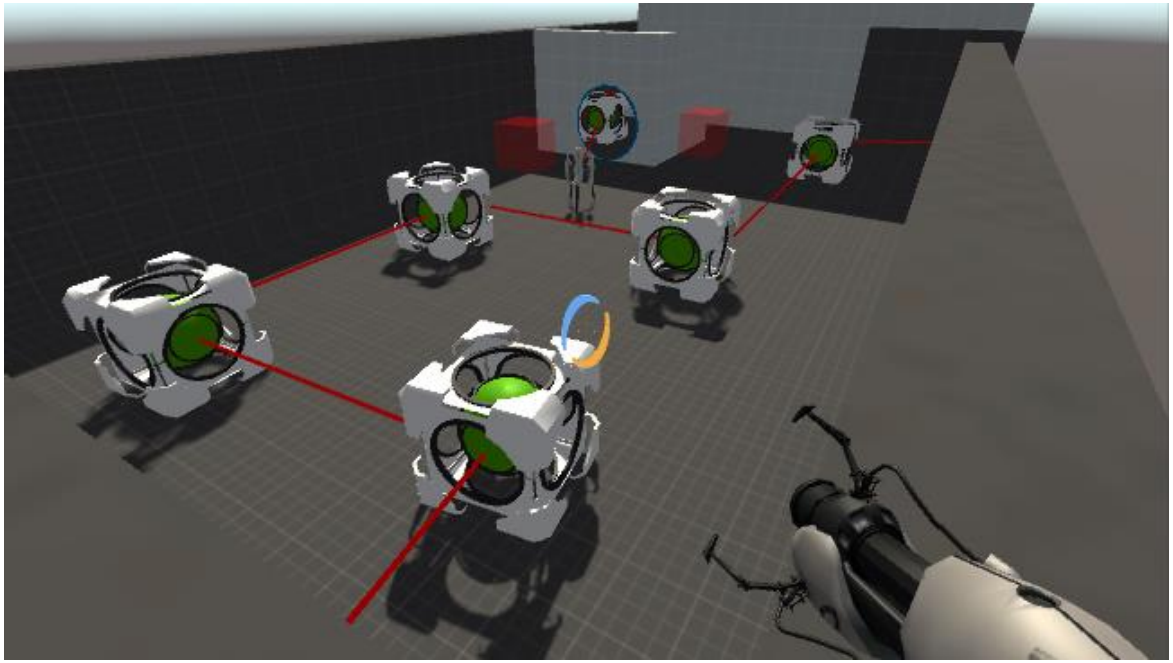
Turret – Laser Implementación

```
Vector3 l_EndRaycastPosition=Vector3.forward*m_MaxDistance;
RaycastHit l_RaycastHit;
if(Physics.Raycast(new Ray(m_LineRenderer.transform.position,
    m_LineRenderer.transform.forward), out l_RaycastHit, m_MaxDistance,
    m_CollisionLayerMask.value))
{
    l_EndRaycastPosition=Vector3.forward*l_RaycastHit.distance;
}
m_LineRenderer.SetPosition(1, l_EndRaycastPosition);
```

Turret – Laser activo Implementación

```
float l_DotAngleLaserActive=Mathf.Cos(m_AngleLaserActive*Mathf.Deg2Rad*0.5f);
bool l_RayActive=Vector3.Dot(transform.up, Vector3.up)>l_DotAngleLaserActive;
```

Refraction Cube



Refraction Cube – Implementación

```
void Update()
{
	m_LineRenderer.gameObject.SetActive(m_CreateRefraction);
	m_CreateRefraction=false;
}
public void CreateRefraction()
{
	m_CreateRefraction=true;
	Vector3 l_EndRaycastPosition=Vector3.forward*m_MaxDistance;
	RaycastHit l_RaycastHit;
	if(Physics.Raycast(new Ray(m_LineRenderer.transform.position, m_LineRenderer.transform.forward), out l_RaycastHit, m_MaxDistance,
	m_CollisionLayerMask.value))
	{
		l_EndRaycastPosition=Vector3.forward*l_RaycastHit.distance;
		if(l_RaycastHit.collider.tag=="RefractionCube")
		{
			//Reflect ray
			l_RaycastHit.collider.GetComponent<RefractionCube>().CreateRefraction();
		}
		//Other collisions
	}
	m_LineRenderer.SetPosition(1, l_EndRaycastPosition);
}
```

Refraction en Portal – Implementación

```
void Update()
{
	m_LineRenderer.gameObject.SetActive(m_CreateRefraction);
	m_CreateRefraction=false;
}
public void CreateRefraction()
{
	m_CreateRefraction=true;
	Vector3 l_EndRaycastPosition=Vector3.forward*m_MaxDistance;
	RaycastHit l_RaycastHit;
	if(Physics.Raycast(new Ray(m_LineRenderer.transform.position, m_LineRenderer.transform.forward), out l_RaycastHit, m_MaxDistance,
	m_CollisionLayerMask.value))
	{
		l_EndRaycastPosition=Vector3.forward*l_RaycastHit.distance;
		if(l_RaycastHit.collider.tag=="RefractionCube")
		{
			//Reflect ray
			l_RaycastHit.collider.GetComponent<RefractionCube>().CreateRefraction();
		}
		//Other collisions
	}
	m_LineRenderer.SetPosition(1, l_EndRaycastPosition);
}
```