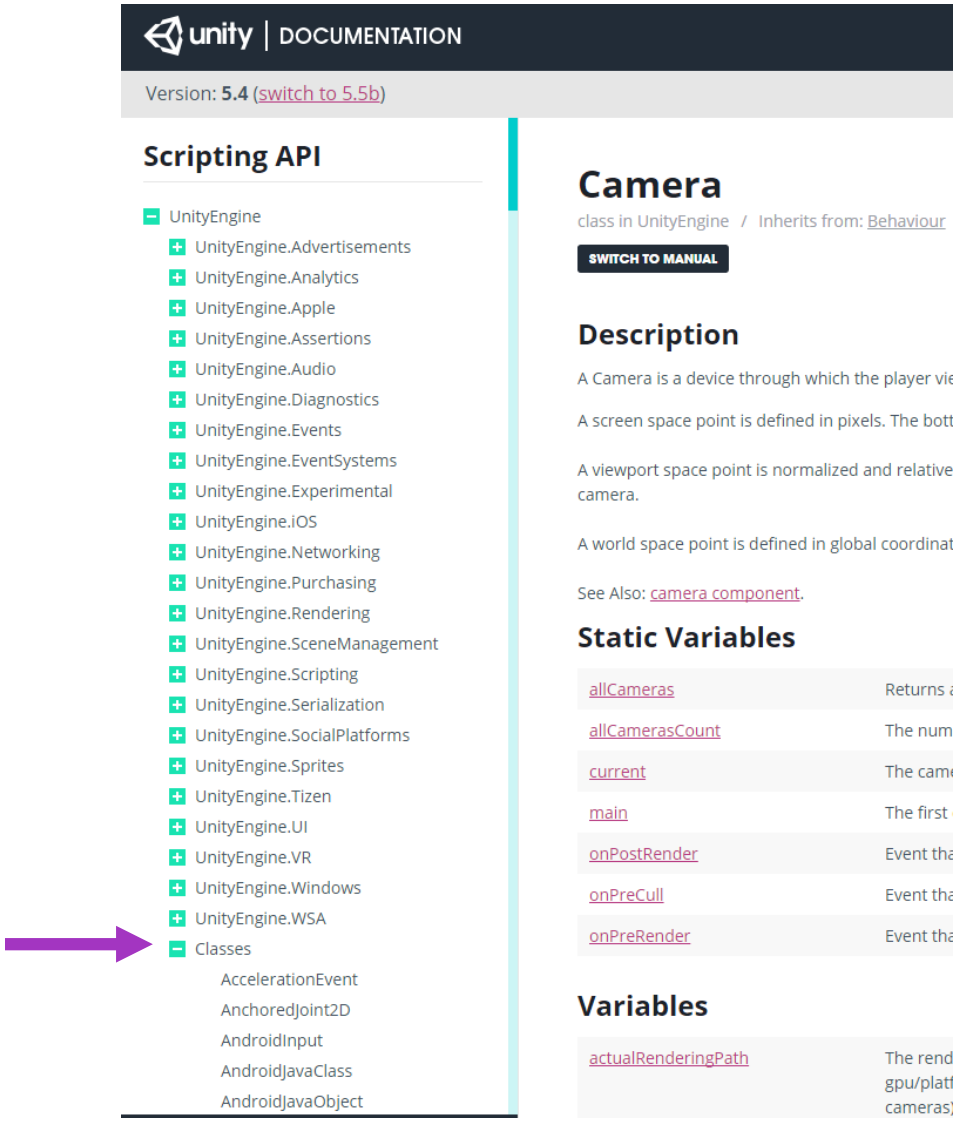
C#

(C Sharp)



- Camera
- Color
- Collider
- Debug
- GameObject
- Light
- Material
- Mathf
- MeshCollider
- MeshRenderer
- MonoBehaviour
- PhysicMaterial
- Random
- ...

Instantiate??

Object.Instantiate

public static Object **Instantiate**(Object **original**);
public static Object **Instantiate**(Object **original**, Transform **parent**);
public static Object **Instantiate**(Object **original**, Transform **parent**, bool **worldPositionStays**);
public static Object **Instantiate**(Object **original**, Vector3 **position**, Quaternion **rotation**);
public static Object **Instantiate**(Object **original**, Vector3 **position**, Quaternion **rotation**, Transform **parent**);

Parameters

original	An existing object that you want to make a copy of.
position	Position for the new object (default Vector3.zero).
rotation	Orientation of the new object (default Quaternion.identity).
parent	The transform the object will be parented to.
worldPositionStays	If when assigning the parent the original world position should be maintained.

Returns

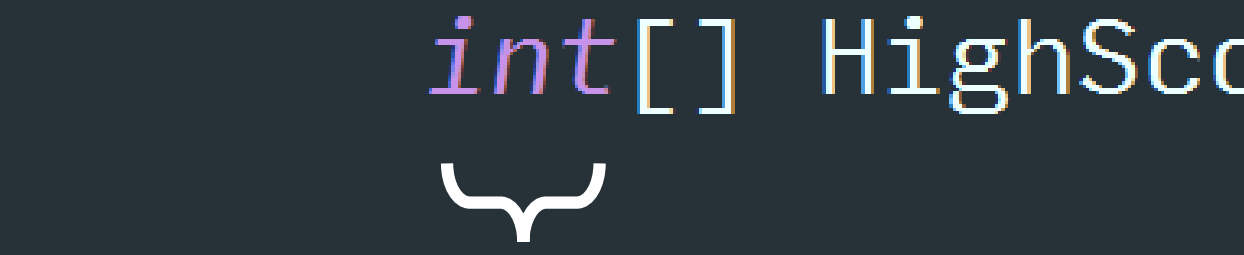
Object A clone of the original object.

https://docs.unity3d.com/ScriptReference/Object.Instantiate.html

Casting & Manipulating

```
// Spawning and casting
Vector3 spawnPoint = new Vector3(1f, 0f, 0f);
Quaternion spawnRotation = Quaternion.identity;
GameObject clone = (GameObject) Instantiate(Prefab, spawnPoint, spawnRotation, transform);

// Now we have a GameObject, rather than an Object. We can use any of the methods
// available on a GameObject:

// Apply a random scale
Vector3 randomScale = new Vector3(1f, Random.Range(1f, 3f), 1f);
clone.transform.localScale = randomScale;
```

Arrays


int[] HighScores;
ARRAY TYPE

Ways to Create an Array

```
// Empty integer array
int[] HighScores;

// Empty integer array with four element
int[] HighScores = new int[4];

// Integer array with specific values
int[] HighScores = { 10, 12, 15, 20 };
```

Resources

- Ray Wenderlich – Video on arrays
- Unity tutorial on arrays
- Blog post: data structures in Unity and when to use them
- Unity tutorial on Lists and Dictionaries

Explosions

Making the Pokémon “Explodable”

We need a prefab that has colliders and physics:

1. Model settings: check “Generate Colliders”
2. Add model to the scene to create a game object
3. Mesh Collider: check “Convex”
   *(*any mesh collider with a rigidbody needs to be set to convex)*
4. Add a Rigidbody component to the game object
5. Create a prefab from the game object

Three Scripts

- RandomlySpawn.cs
  - Attached to an empty game object
  - Randomly place Pokémon in our scene
- FireExplosive.cs
  - Attached to the player
  - Throw an explosive Poké Ball from the player
- Explosive.cs
  - Attached to the Poké Ball
  - Explodes on contact

Scripting Concepts

- Destroy(...)
- Finding collisions
  - OnCollisionEnter(Collision collision)
  - Collision
  - Physics class & Physics.OverlapSphere(...)
  - Collider
- Applying forces to rigidbodies
  - Rigibody.AddForce(...)
  - Rigibody.AddRelativeForce(...)
  - Rigibody.AddExplosionForce(...)
- Drawing debugging information
  - Gizmos class & OnDrawGizmos
  - Gizmos.color
  - Gizmos.DrawSphere(...)

Gizmos

class in UnityEngine

Description

Gizmos are used to give visual debugging or setup aids in the scene view.

All gizmo drawing has to be done in either OnDrawGizmos or OnDrawGizmosSelected functions of the script.
OnDrawGizmos is called every frame. All gizmos rendered within OnDrawGizmos are pickable. OnDrawGizmosSelected is called only if the object the script is attached to is selected.

Static Variables

color	Sets the color for the gizmos that will be drawn next.
matrix	Set the gizmo matrix used to draw all gizmos.

Static Functions

DrawCube	Draw a solid box with center and size.
DrawFrustum	Draw a camera frustum using the currently set Gizmos.matrix for it's location and rotation.
DrawGUITexture	Draw a texture in the scene.
DrawIcon	Draw an icon at a position in the scene view.
DrawLine	Draws a line starting at from towards to.
DrawMesh	Draws a mesh.
DrawRay	Draws a ray starting at from to from + direction.
DrawSphere	Draws a solid sphere with center and radius.
DrawWireCube	Draw a wireframe box with center and size.
DrawWireMesh	Draws a wireframe mesh.
DrawWireSphere	Draws a wireframe sphere with center and radius.

Physics.OverlapSphere

public static Collider[] **OverlapSphere**(Vector3 **position**, float **radius**, int **layerMask** = AllLayers, QueryTriggerInteraction **queryTriggerInteraction** = QueryTriggerInteraction.UseGlobal);

Parameters

position	Center of the sphere.
radius	Radius of the sphere.
layerMask	A Layer mask that is used to selectively ignore colliders when casting a ray.
queryTriggerInteraction	Specifies whether this query should hit Triggers.

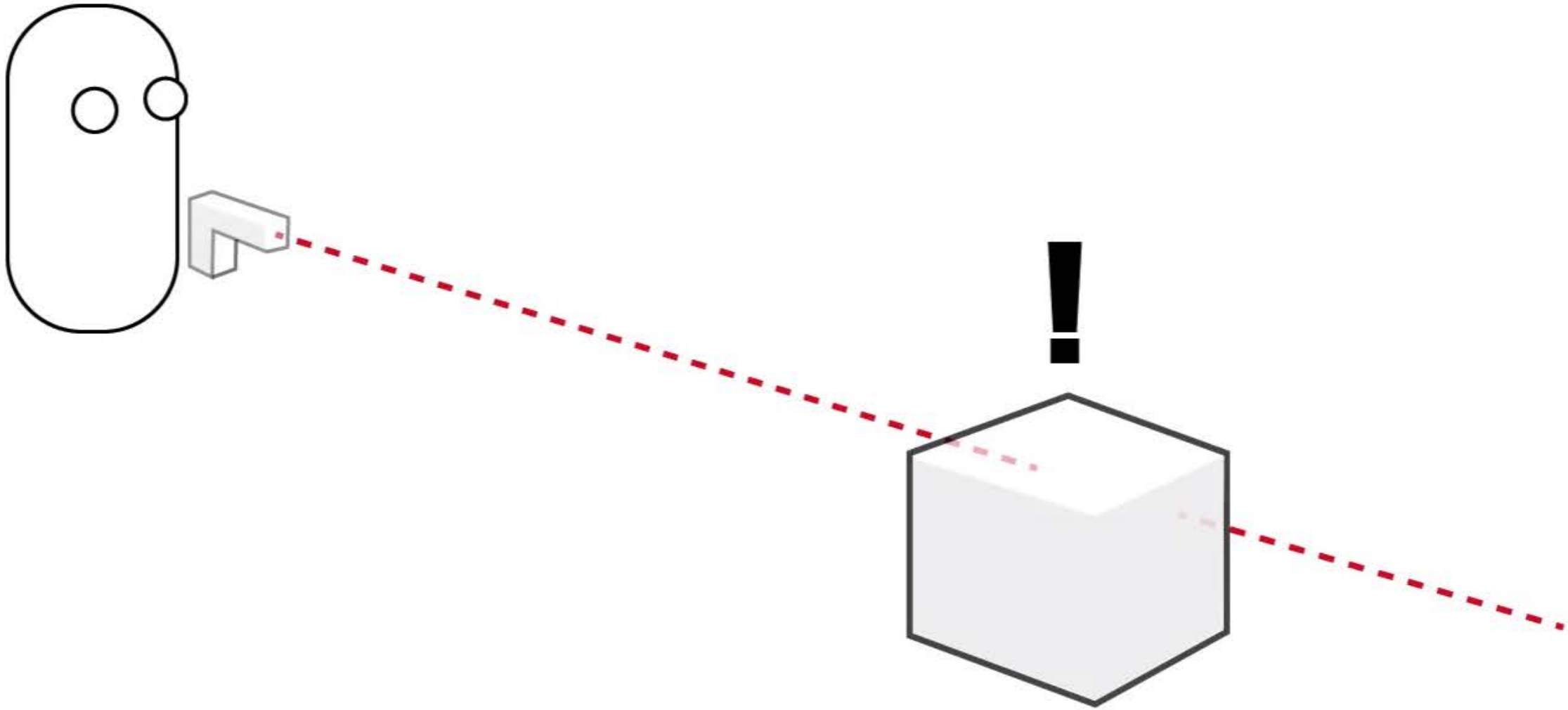
Description

Returns an array with all colliders touching or inside the sphere.

NOTE: Currently this only checks against the bounding volumes of the colliders not against the actual colliders.

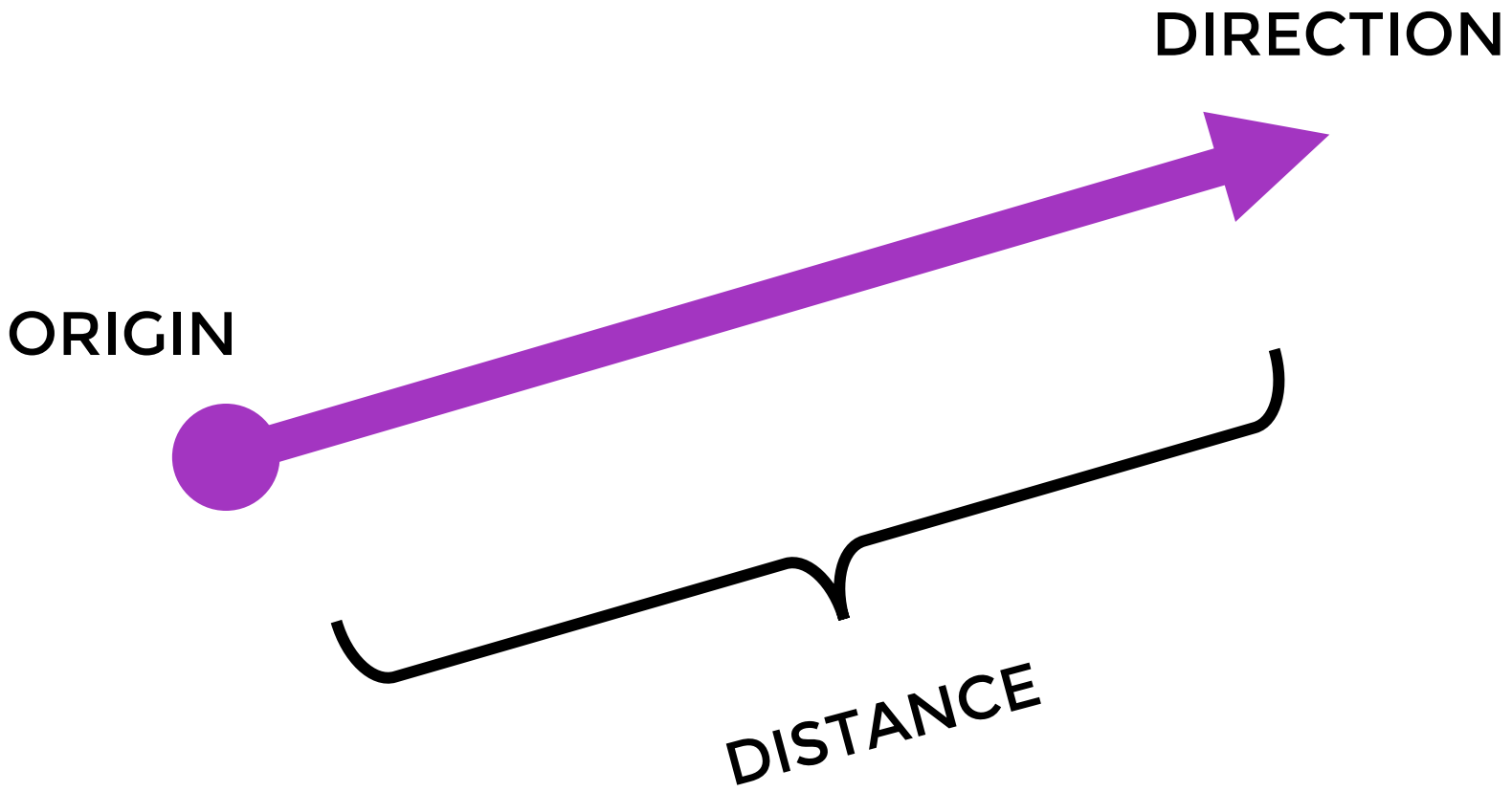
```
using UnityEngine;
using System.Collections;

public class ExampleClass : MonoBehaviour {
    void ExplosionDamage(Vector3 center, float radius) {
        Collider[] hitColliders = Physics.OverlapSphere(center, radius);
        int i = 0;
        while (i < hitColliders.Length) {
            hitColliders[i].SendMessage("AddDamage");
            i++;
        }
    }
}
```

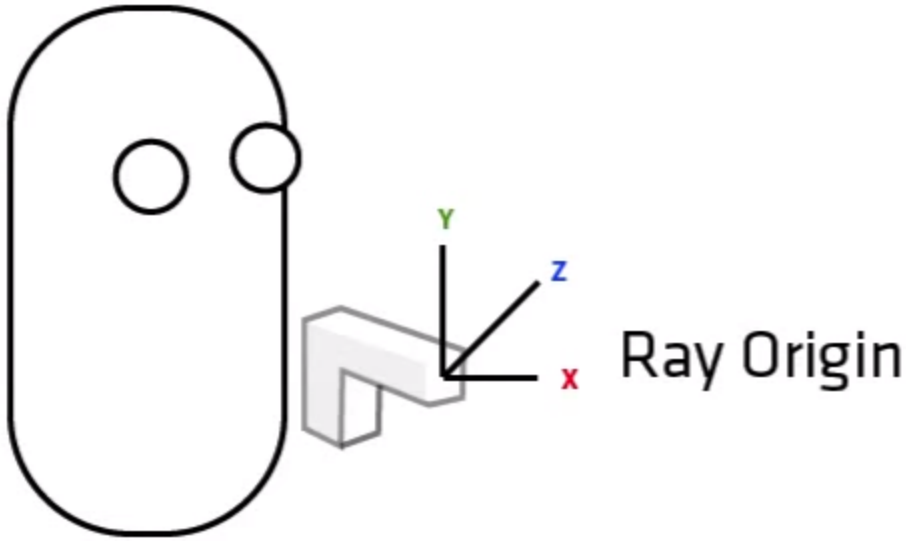
Raycasting

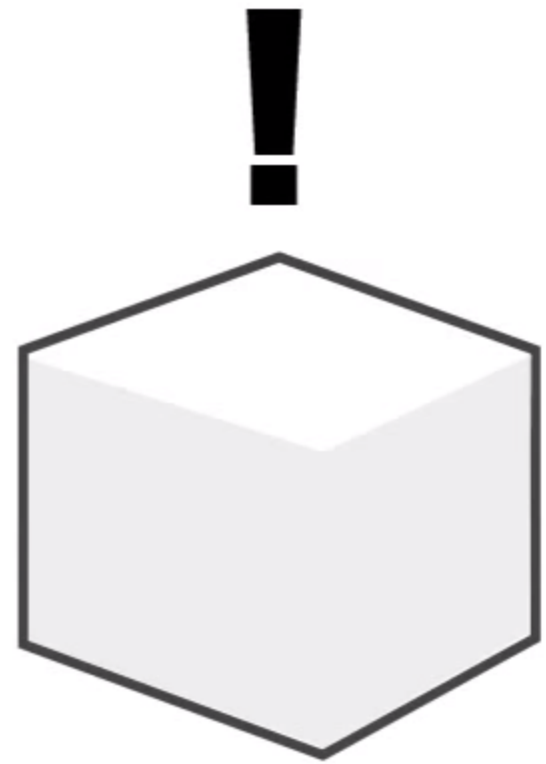


https://unity3d.com/learn/tutorials/topics/physics/raycasting

Ray







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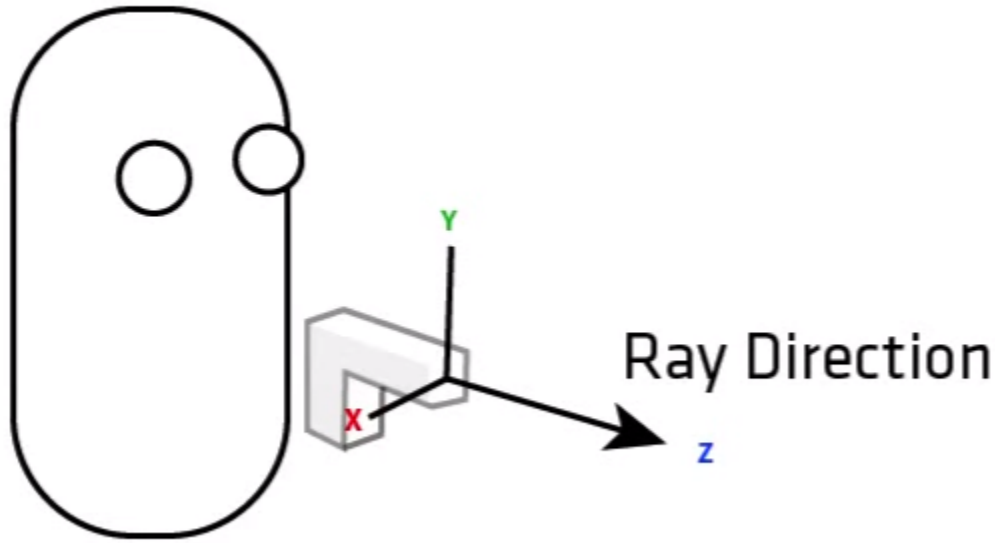

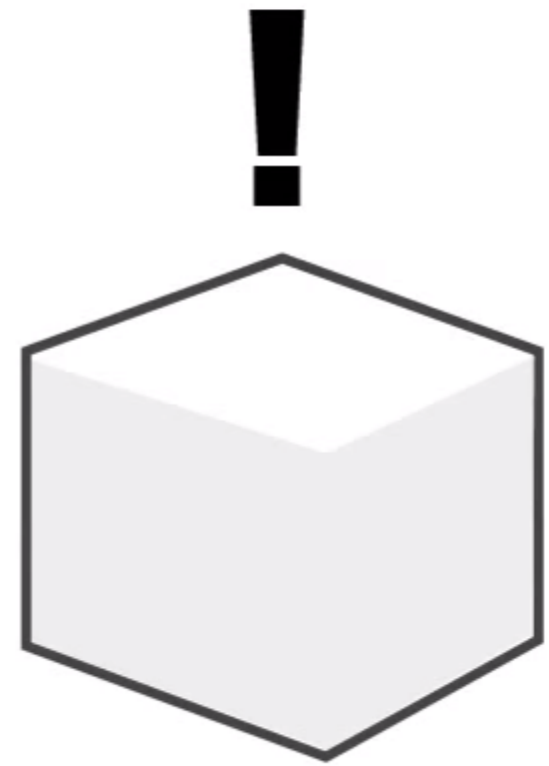

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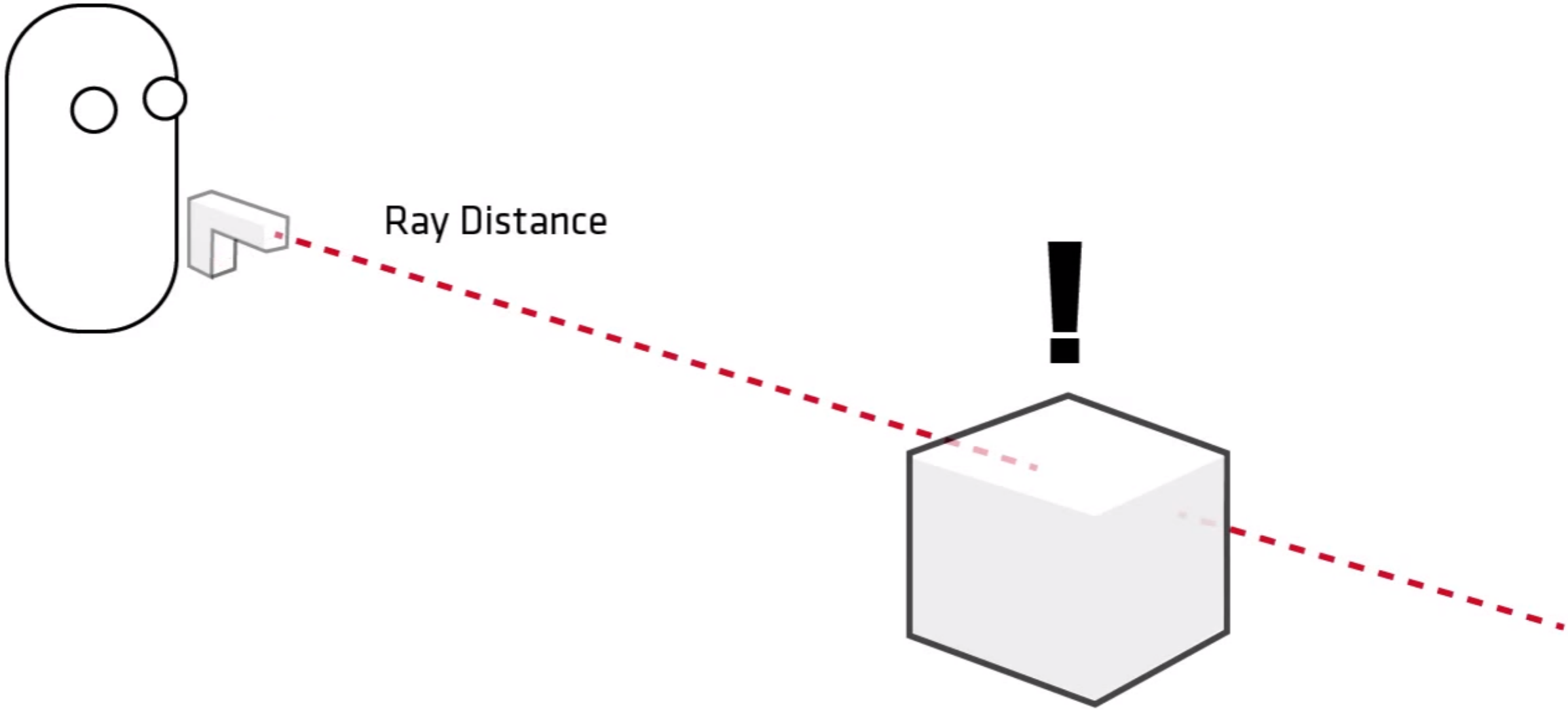

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New Scripting Concepts

- Finding a 3D direction from the mouse position
  - Input.mousePosition
  - Camera class & Camera.ScreenPointToRay(...)
- Raycasting to find object(s) along a path
  - Ray struct
  - Physics.Raycast(...)
  - RaycastHit struct