The XR Interaction Toolkit

How to quickly build core XR mechanics in Unity

Logistics

- Stanford XR Conference this Saturday!
  - https://www.conference.stanfordxr.org/
- OH changes
  - Eric: Tuesday 3:30-4:00 PM
- Assets Lecture - Watch by Wednesday
  - https://edstem.org/us/courses/21632/discussion/1478824
- Vote on Unity Lab topics
  - Poll: Unity Topics for Future Classes #30
- Consider using a Version Control System for your project
  - Version control? #27
  - TLDR GitHub (probably no LFS needed) or GitLab (if you have large >100MB art files)
- Milestone 2 due next Monday
  - Details to announce

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XR Interaction Toolkit

The XR Interaction Toolkit package is a high-level, component-based, interaction system for creating VR and AR experiences. It provides a framework that makes 3D and UI interactions available from Unity input events. The core of this system is a set of base Interactor and Interactable components, and an Interaction Manager that ties these two types of components together. It also contains components that you can use for locomotion and drawing visuals.

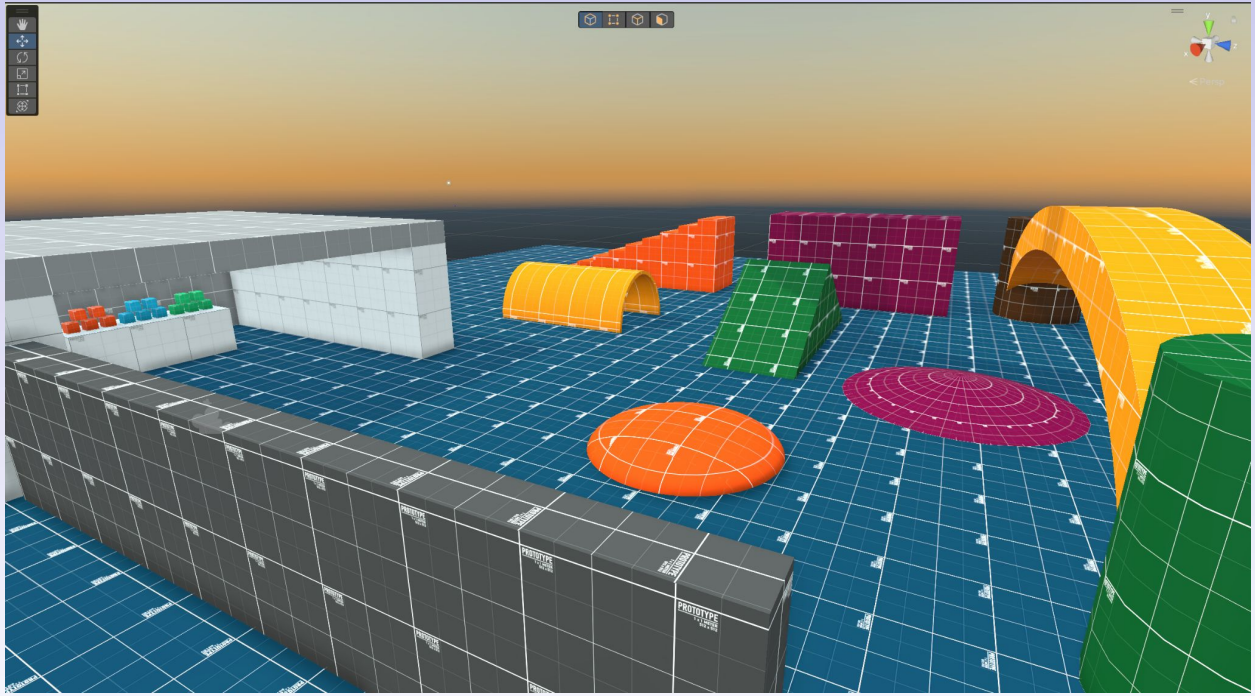
XR Interaction Toolkit contains a set of components that support the following Interaction tasks:

- Cross-platform XR controller input: Meta Quest (Oculus), OpenXR, Windows Mixed Reality, and more.
- Basic object hover, select and grab
- Haptic feedback through XR controllers
- Visual feedback (tint/line rendering) to indicate possible and active interactions
- Basic canvas UI interaction with XR controllers
- Utility for interacting with XR Origin, a VR camera rig for handling stationary and room-scale VR experiences

To use the AR interaction components in the package, you must have the AR Foundation package in your Project. The AR functionality provided by the XR Interaction Toolkit includes:

- AR gesture system to map screen touches to gesture events
- AR interactable can place virtual objects in the real world
- AR gesture interactor and interactables to translate gestures such as place, select, translate, rotate, and scale into object manipulation
- AR annotations to inform users about AR objects placed in the real world

Demo Map



If interested in making something similar:

- https://unity.com/features/probuilder
- https://assetstore.unity.com/packages/2d/textures-materials/gridbox-prototype-materials-129127

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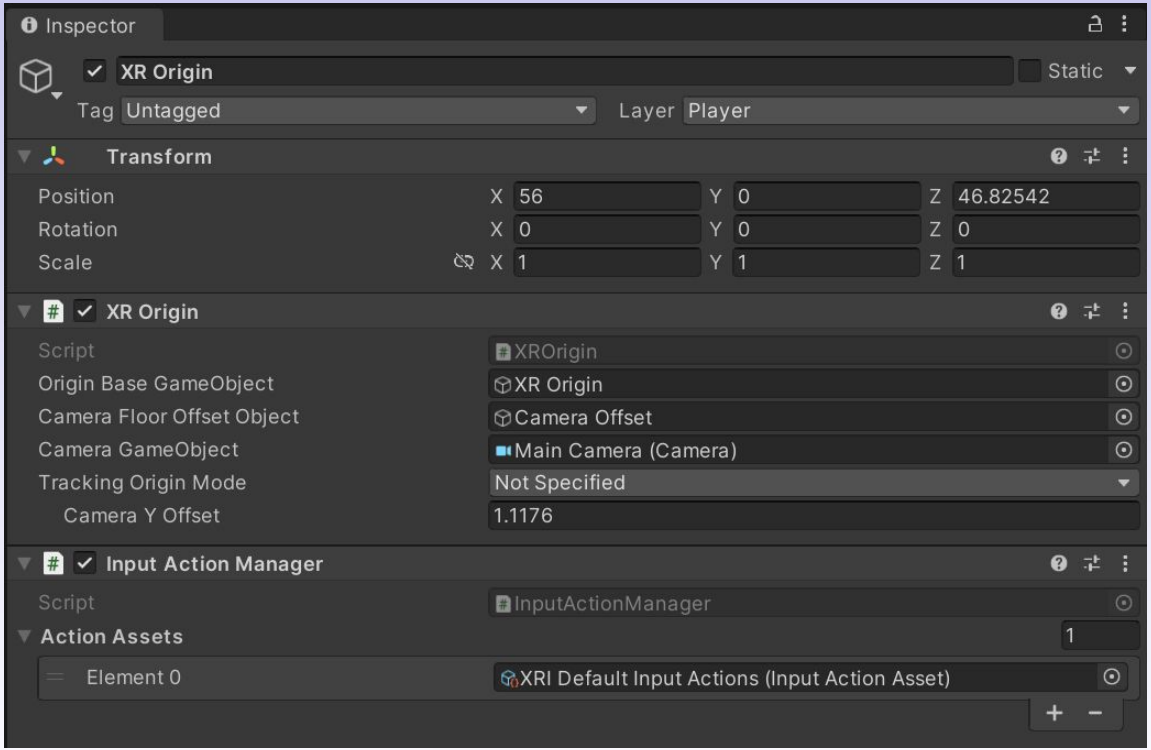
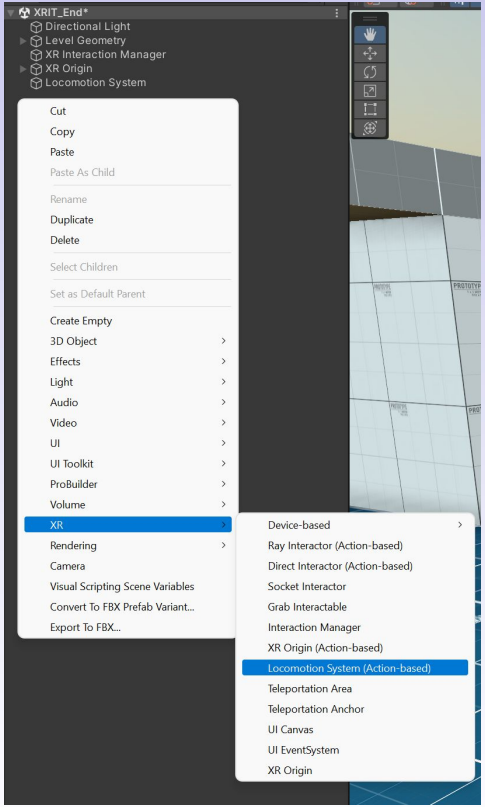
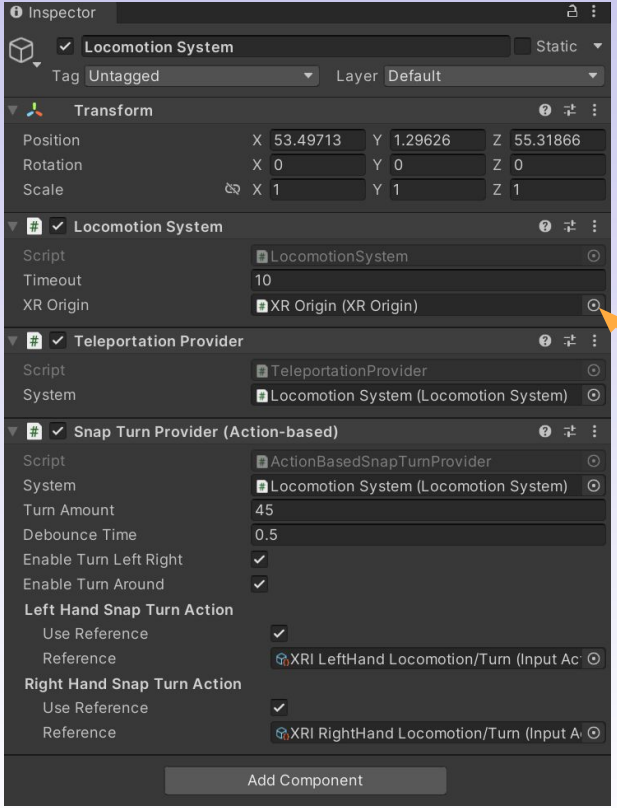
Start: XR Origin with Controller Tracking



Set up an XR Origin (Action-based) and controller tracking via an Input Action Manager as shown in [HW2: Beatsaber Lite - Google Docs]

Locomotion Start (Including Snap Turn)





In the hierarchy, add an XR->Locomotion System (Action-based) as a separate game object from your XR Origin

If you don't set the XR origin, it's fine because it will find it on Start

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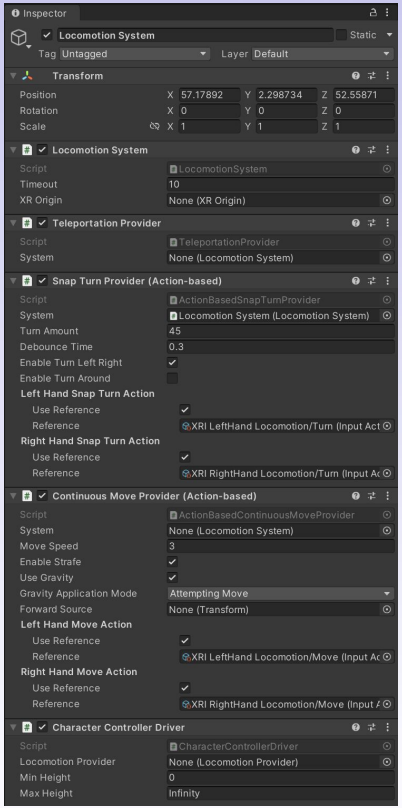
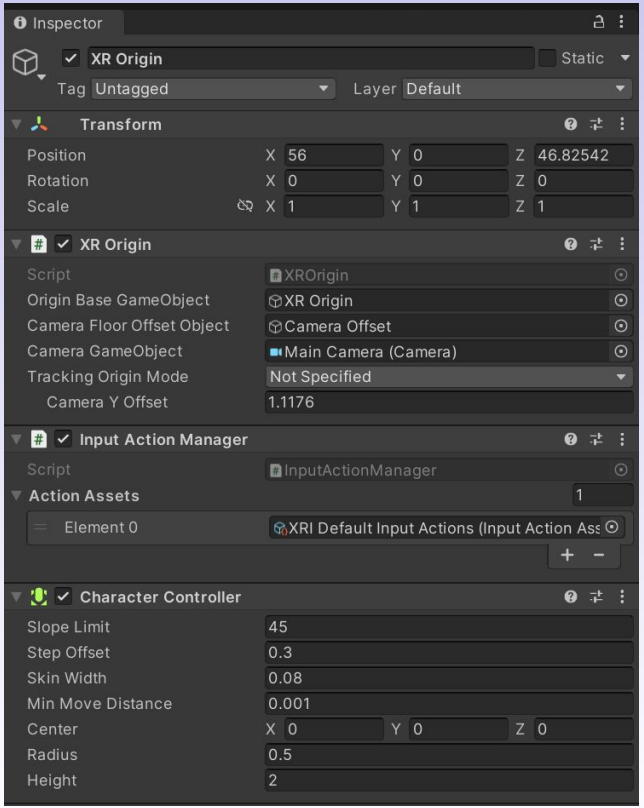
Continuous Locomotion





- Add a Continuous Move Provider (Action-based) (enables continuous movement) and Character Controller Driver (makes the character capsule match your height and position) to your Locomotion System
- Add a Character Controller to your XR Origin
- [How to do Continuous Movement in Unity VR | OpenXR Locomotion Tutorial - YouTube]

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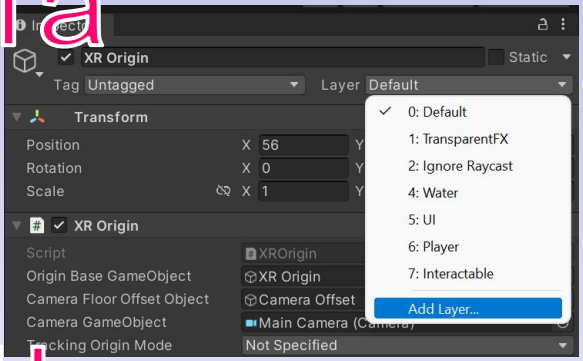
Aside: Collision Layers

1a



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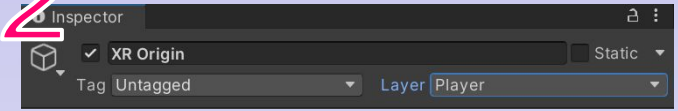

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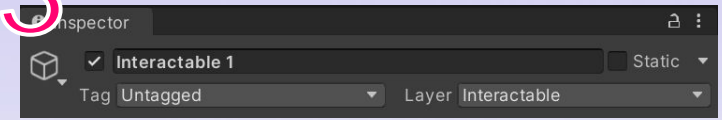

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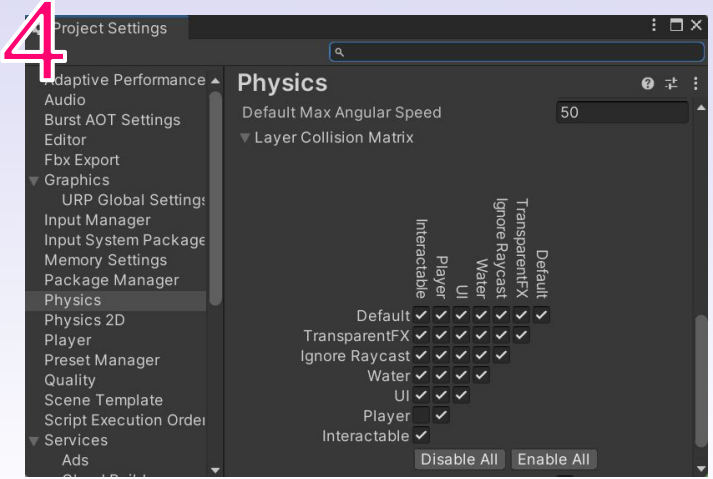

To prevent interactables from freaking out when they collide with your player collider, use Layers:

1. Add layers for your Player and for Interactables
2. Set the XR Origin to the Player layer (say Yes to children)
3. Set the Interactables to the Interactable layer
4. In Project Settings->Physics->(scroll down)->Layer Collision Matrix, uncheck the Player-Interactable collision

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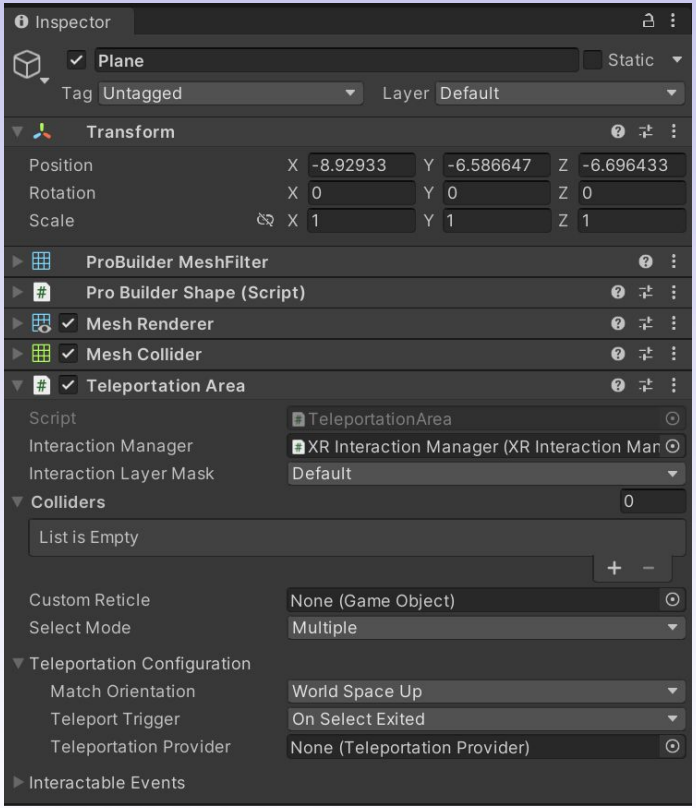
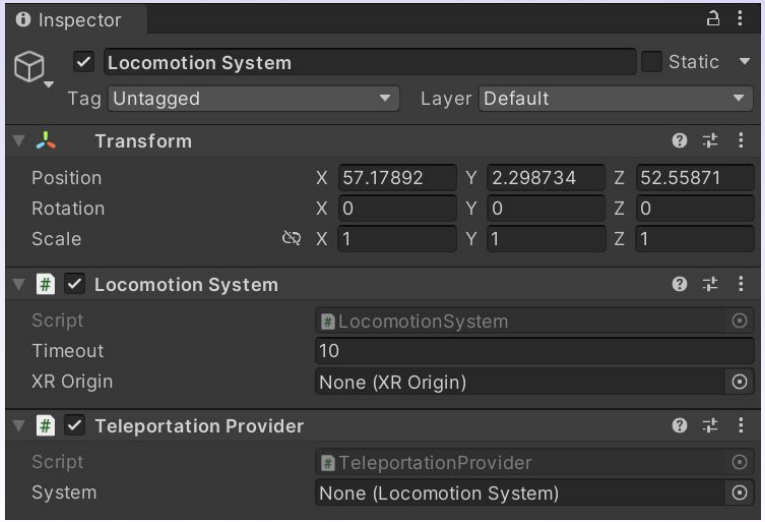
Teleportation



- Have a Teleportation Provider on your Locomotion System (it comes by default)
- Add a Teleportation Area component to the collideable surfaces you want to teleport onto (by default, you can't teleport on an arbitrary surface)
- Also consider XR->Teleportation Anchors
- [How to Teleport in Unity VR using XR Interaction Toolkit | VR Teleportation - YouTube]



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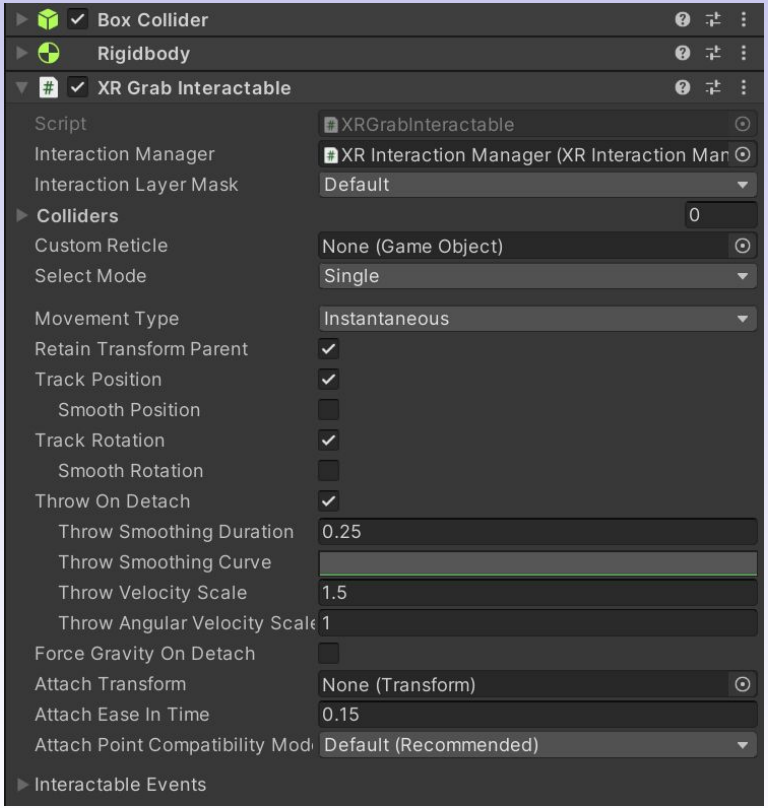
Interactables



- Add an XRGrabInteractable component to the objects you want to grab (by default, you can't grab any arbitrary object)
- Make sure they have a collider (for collision) and a rigidbody (for physics)
- Change the Movement Type to change how the held object tracks to your hand while it's moving (parenting, physics, or forced physics)
- Play with the other settings, they're pretty self-explanatory
- All About VR Interactables - YouTube

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Extra Resources

- XR Interaction Toolkit | XR Interaction Toolkit | 2.0.1 (unity3d.com)
- Justin P Barnett - YouTube
- VR with Andrew - YouTube

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