VR Development pathway

All lesson plans

Pathway description

This learning pathway is designed for anyone interested in learning to create experiences for VR. This pathway assumes a basic knowledge of Unity and basic knowledge of programming.

Skills covered in this course

Beginner VR Development:

- Deploy VR projects to Unity-supported head-mounted displays (HMDs).
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit.

Beginner VR Design:

- Evaluate a proposed VR experience in order to suggest ways it could be improved.
- Decide which XR hardware to target, given the goals of a particular project.

Intermediate VR Development:

- Program custom VR interactions in order to meet the requirements of a project brief.
- Optimize the performance of an app in order to meet headset framerate requirements.

How to use the pathway		
The VR Development pathway is broken up into four missions, with each mission containing multiple tutorials and assessments. The following missions make up the complete pathway:		
	VR Basics	**12 - 17 hours**
	Events and Interactions	**10 - 15 hours**
	Ergonomics and Optimization	**10 - 15 hours**
	Custom VR Development	**13 - 19 hours**

Students are encouraged to complete all the missions in the correct sequence to ensure the best learning experience.

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Mission 1: VR basics

Part of the **VR Development** pathway

Overview

In this mission, you will learn the basics of setting up a VR project and implementing simple interactivity.

In these tutorials, you will do the following:

- Set up a VR-ready project with the room of your choice
- Implement locomotion so that users can move around the scene
- Add grabbable objects users can pick up and throw around
- Set up sockets that objects can snap into
- Learn about the VR software landscape

In the Challenge for this mission, you will apply your skills in an architectural review prototype. Then, in the Lab, you'll fill out a design document to lay out a concept for your own project and then begin working on it. Finally, in the Quiz, you will test your new knowledge.

What you'll learn

Beginner VR Development

- Deploy VR projects to Unity-supported head-mounted displays (HMDs)
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Beginner VR Design

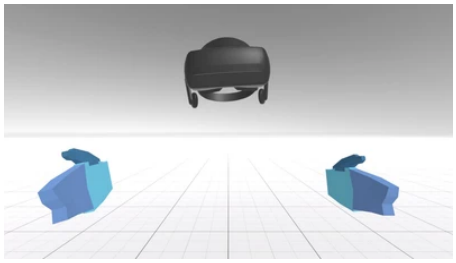
- Evaluate a proposed VR experience in order to suggest ways it could be improved

- Decide which XR hardware to target, given the goals of a particular project

Content in this mission

1. Welcome to the Pathway
2. VR Software Setup
3. 1.1 - VR project setup
4. 1.2 - VR Locomotion
5. 1.3 - Grabbable Objects
6. 1.4 - Sockets
7. Challenge 1 - Architecture Review
8. The VR software landscape
9. Lab 1 - VR Personal Project Basics
10. Submission 1 - Share your Work
11. Mission 1 Quiz - VR Basics

Welcome to the Pathway

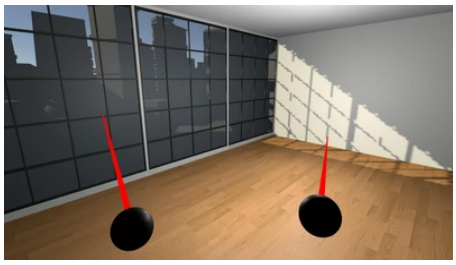
Lesson link	Welcome to the Pathway
Length	**35 minutes**
Summary Virtual reality (VR) is a fast-growing, exciting field with a lot of career opportunities in related disciplines. In this first tutorial, you will learn all about the **VR Development** pathway, a guided learning experience that prepares you for work in VR development.	
Steps 1. Overview 2. What is the **VR Development** pathway? 3. Who is this pathway for? 4. How does VR fit into XR? 5. The career landscape in VR development 6. How is the pathway structured? 7. VR hardware requirements 8. Who worked on this pathway? 9. Next steps	

VR Software Setup

Lesson link	VR Software Setup
Length	**1 hour**

Overview In this lesson, you will get all the necessary software for your computer and your VR device installed and configured for VR development. If you haven't already, you should install the recommended version of Unity to be able to follow along with this course. Depending on which VR device you intend to use, you may also need to install additional export modules. You will also make sure that your VR headset is configured properly for development and testing, including downloading any additional device-specific software that is required. **What you'll learn** Beginner VR Development • Deploy VR projects to Unity-supported head-mounted displays (HMDs)	
Steps 1. Overview 2. Course requirements 3. Before you begin 4. Quest device setup 5. Recap	

1.1 - VR Project Setup

Lesson link	[1.1 - VR Project Setup]()
Length	**1 hour and 30 minutes**
Summary By the end of this lesson, you will have a new Unity project with a big empty room that you will experience in VR. **Materials** • Create-with-VR_2021LTS.zip • Rig Simulator Keyboard Shortcuts.pdf **Skills** Beginner VR Development • Deploy VR projects to Unity-supported head-mounted displays (HMDs)	
Steps 1. Open a new VR project 2. Open and explore the starter scene 3. Add a room and background 4. Run the app with the Device Simulator 5. Test in VR through Unity 6. Build and run on your device 7. Recap	

1.2 - VR Locomotion

Lesson link	[1.2 - VR Locomotion - Unity Learn]()
Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn how to implement various types of locomotion in VR. By the end of this lesson, you will be able to teleport around your newly furnished room to admire it from all angles.

Skills
Beginner VR Development
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

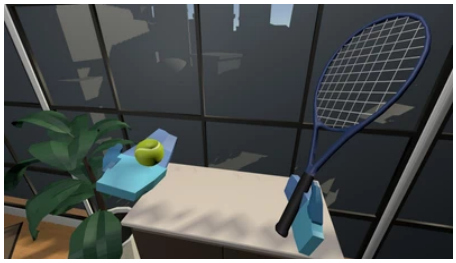
Steps
1. Fill the room with furniture
2. Add snap turning functionality
3. Create a Teleportation Area on a rug
4. Create Teleportation Anchors on mats
5. Customize the Reticles for teleportation
6. Recap

1.3 - Grabbable Objects

Lesson link	[1.3 - Grabbable Objects]()
Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn how to configure objects for basic grabbable interactivity in VR. By the end of this lesson, users will be able to pick up objects in the scene and throw them around.

Skills
Beginner VR Development
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit



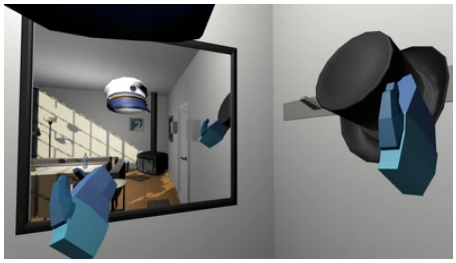
Steps
1. Choose hand models
2. Add a grabbable object
3. Hide hands and disable anchor control
4. Fine-tune the throwing experience
5. Add an object with a handle
6. Organize the Hierarchy
7. Recap

1.4 - Sockets

Lesson link	1.4 - Sockets
Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn how to configure sockets that objects can snap into in VR. By the end of this lesson, users will be able to hang hats up on hooks - and even wear the hats too!

Skills
Beginner VR Development
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit.



Steps
1. Add grabbable hats to the scene
2. Turn the hook into a simple socket
3. Duplicate the sockets and attach hats by default
4. Make your head a socket for hats
5. Prevent other objects from acting like hats
6. Recap

Challenge 1 - Architecture Review

Lesson link	Challenge 1 - Architecture Review
Length	**1 hour**

Summary
In this challenge, you'll apply the skills you learned while making your VR room in an architecture review app. In this prototype, the user can examine a building at real-world scale, inspect a miniature 3D model and floor plan of that building, and even use a ruler to take measurements as they look around.

This challenge will assess skills learned in the following lessons:

- VR locomotion
- Grabbable objects
- Sockets

Skills
Beginner VR Development
- Deploy VR projects to Unity-supported head-mounted displays (HMDs)
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Steps

1. Challenge walkthrough
2. Getting started
3. Challenge tasks
4. Bonus tasks
5. Hints

The VR software landscape

Lesson link	[The VR software landscape]
Length	**20 minutes**

Summary
If you're not an active user of a particular medium, you'll have difficulty designing effective experiences for that medium. You're much better positioned to create comfortable, intuitive experiences when you are very familiar with the medium you're designing for.

In this tutorial, you will do the following things:

- Familiarize yourself with a wide range of typical VR experiences
- Learn about the advantages and disadvantages of VR compared to traditional screen-based experiences
- Learn what makes for effective VR experiences

Skills
Beginner VR Design
- Evaluate a proposed VR experience in order to suggest ways it could be improved
- Decide which XR hardware to target, given the goals of a particular project

Steps
1. Overview
2. What makes for a great VR experience?
3. Explore the VR landscape
4. What's so great about developing for VR?
5. The limitations of VR
6. Next steps

Lab 1 - VR Personal Project Basics

Lesson link	[Lab 1 - VR Personal Project Basics]
Length	**2 hours**

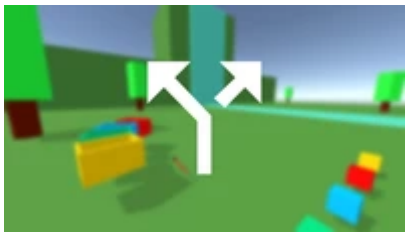
Summary
In this first lab, you'll fill out a design document to lay out your concept and then set up a basic VR scene using simple primitive shapes.

This lab will draw on skills learned in the following lessons:

- VR Project Setup
- VR locomotion
- Grabbable objects
- Sockets

Skills
Beginner VR Development
- Deploy VR projects to Unity-supported head-mounted displays (HMDs)
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Materials
- Project Design Doc - VR [WORD].docx
- Project Design Doc - VR [PDF].pdf
- Project Design Doc - VR [GDOC]



Steps
1. Fill out your design document
2. Open and run a new VR project
3. Set up the basic scene with primitives
4. Set up basic locomotion
5. Set up basic grabbable objects
6. Organize your Hierarchy
7. Recap

Submission 1 - Share your Work

Lesson link	Lab 1 - VR Personal Project Basics
Length	**2 hours**

Summary
If you went above and beyond in your VR room, the challenge, or your personal project for this Unit, please share screenshots or videos here!

Mission checkpoint

Quiz: Mission 1 Quiz

Mission 2: Events and Interactions

Part of the **VR Development** pathway

Overview

In this mission, you will implement more complex interactions in a VR-based project to make the experience more immersive.

In these tutorials, you will do the following:

- Implement audio and haptic feedback
- Apply new functionality to specific objects
- Allow the user to toggle between multiple types of interactors
- Add user interfaces to the world
- Learn about the XR hardware landscape

In the Challenge for this mission, you will apply your skills in a 3D painting prototype. Then, in the Lab, you'll implement the core functionality of your personal project. Finally, in the Quiz, you will test your new knowledge.

Skills

Beginner VR Development

- Deploy VR projects to Unity-supported head-mounted displays (HMDs)
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Beginner VR Design

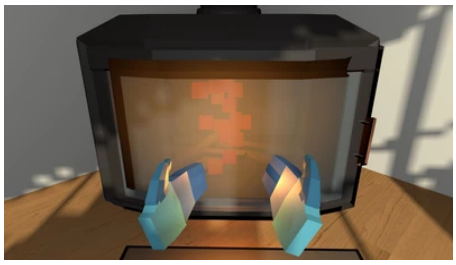
- Evaluate a proposed VR experience in order to suggest ways it could be improved
- Decide which XR hardware to target, given the goals of a particular project

Content in this mission

1. 2.1 - Audio and Haptics
2. 2.2 - Activation Events
3. 2.3 - Direct and Ray Interactors
4. 2.4 - User Interface
5. Challenge 2 - 3D Painting
6. The XR hardware landscape
7. Lab 2 - Personal Project Events & Interactions
8. Submission 2 - Share your Work
9. Mission 2 Quiz - VR Events & Interaction

2.1 - Audio and Haptics

Lesson link	2.1 - Audio and Haptics
Length	**1 hour 30 minutes**

Summary In this lesson, you will learn how to increase the immersion of your project through touch and audio stimuli. By the end of this lesson, the user will receive haptic and auditory feedback when they hover over or grab an object. There will also be 3D spatial ambient sound in the scene. **Skills** Beginner VR Development ● Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit	
Steps 1. Add haptic feedback on hover and select enter 2. Add audio feedback on either hover or select enter 3. Add 3D audio from the fireplace 4. Add a Reverb Zone 5. Recap	

2.2 - Activation Events

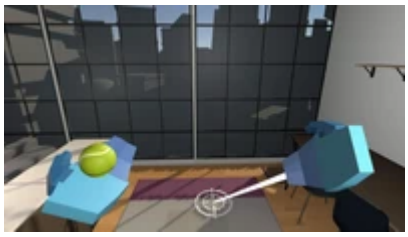
Lesson link	2.2 - Activation Events
Length	**1 hour 30 minutes**
Summary In this lesson, you will learn how to add unique functionality to an object when the user interacts with it in a certain way. By the end of this lesson, users will be able to pick up a remote and press a button on a controller to turn on a TV. **Materials** ● Polaroid-Scripts.zip **Skills** Beginner VR Development ● Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit	
Steps 1. Add a grabbable remote control object 2. Play a sound when you activate the remote 3. Change the remote's indicator light color when activated 4. Make the TV play video 5. Control the TV with the remote 6. Recap	

2.3 - Direct and Ray Interactors

Lesson link	2.3 - Direct and Ray Interactors

Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn how to implement Direct Interactors and how to switch between interactors on the same controller. By the end of this lesson, the user will be able to grab things directly with their hands and then toggle a ray to point at things when they need to.



Skills
Beginner VR Development
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Steps
1. Add a Direct Interactor to the right controller
2. Add haptic and audio feedback to your Direct Interactor
3. Prevent ray from picking up objects
4. Create a Direct and Ray Interactor for each hand
5. Toggle ray with button press
6. Add additional binding and repeat for the other hand
7. Recap

2.4 - User Interface

Lesson link	[2.4 - User Interface]()
Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn how to implement world space user interfaces in VR. By the end of this lesson, the user will be greeted by a welcome screen that provides basic instructions. They will also be able to bring up a simple reset menu that allows them to reload the scene.

Skills
Beginner VR Development
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Steps
1. Add a world space UI into the room
2. Edit the welcome text
3. Add an OK button to the panel
4. Make the OK button remove the welcome panel
5. Make a reset UI canvas
6. Show reset panel on secondary button press
7. Teleport back to the starting position on button press
8. Recap

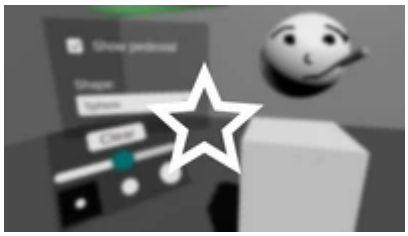
Challenge 2 - 3D Painting

Lesson link	Challenge 2 - 3D Painting
Length	**1 hour 30 minutes**

Summary
In this challenge, you'll apply the skills you learned while making your VR room in a 3D painting app. In this app, the user can choose the shape they want to paint on, select the color and size of their brush on a handheld palette, and then create their masterpiece!

This challenge will review your skills learned in the following lessons:

- Audio and Haptics
- Activation Events
- Direct and Ray Interactors
- User Interface



Skills
Beginner VR Development
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Steps
1. Challenge walkthrough
2. Getting started
3. Challenge tasks
4. Bonus tasks
5. Hints

The XR hardware landscape

Lesson link	The XR hardware landscape
Length	**20 minutes**

Summary
There are so many VR headsets out there that it can be overwhelming at first. If you are going to work in the world of VR development, it's important to get your bearings in this vast, rapidly-evolving hardware landscape.

In this tutorial, you will do the following things:

- Recall the difference between VR and other types of XR (such as AR and MR)
- Learn the differences between the most widely used XR hardware systems
- Investigate the latest hardware trends in VR

Skills Beginner VR Design • Decide which XR hardware to target, given the goals of a particular project	
Steps 1. Overview 2. Recap: VR vs. AR vs. MR 3. Opportunities for work in XR 4. Categories of XR hardware 5. HMD tech: passthrough 6. HMD tech: hand tracking 7. HMD tech: body and eye-tracking 8. Next steps	

Lab 2 - Personal Project Events & Interactions

Lesson link	Lab 2 - Personal Project Events & Interactions
Length	**2 hours**
Summary By the end of this lab, your personal project will have most of its core functionality. This lab will draw on skills learned in the following lessons: • Audio and Haptics • Activation Events • Direct and Ray Interactors • User Interface **Skills** Beginner VR Development • Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit	
Steps 1. Fill in a Design Document for events & interactions 2. Add haptics and audio 3. Implement event-based interactions 4. Set up controller interactors and layers 5. Create a main menu UI 6. Recap	

Submission 2 - Share your Work

Lesson link	Submission 2 - Share your Work
Length	**10 minutes**

Summary If you went above and beyond in your VR room, the challenge, or your personal project for this Unit, please share screenshots or videos here!	

Mission checkpoint

Quiz: [Mission 2 Quiz - VR Events & Interactions]()

Mission 3: Ergonomics and Optimization

Part of the **VR Development** pathway

Overview

In this mission, you will focus on ergonomics and optimization for VR in order to make your app as accessible and comfortable as possible.

In these tutorials, you will do the following:

- Improve comfort and accessibility
- Evaluate key performance metrics
- Implement optimized baked lighting
- Configure and build your app for sharing
- Learn to keep up with XR tech changes

In the Challenge for this mission, you will apply your skills in an industrial training simulation prototype. Then, in the Lab, you'll implement the core functionality of your personal project. Finally, in the Quiz, you will test your new knowledge.

Skills

Beginner VR Development

- Deploy VR projects to Unity-supported head-mounted displays (HMDs)
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Beginner VR Design

- Evaluate a proposed VR experience in order to suggest ways it could be improved
- Decide which XR hardware to target, given the goals of a particular project

Intermediate VR Development

- Program custom VR interactions in order to meet the requirements in a project brief
- Optimize the performance of an app in order to meet headset framerate requirements

Content in this mission

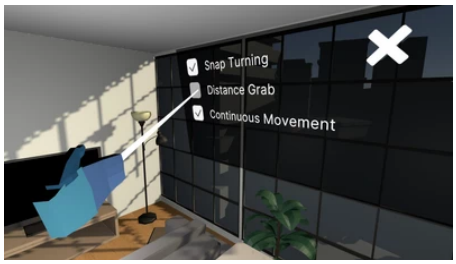
1. 3.1 - Comfort and Accessibility
2. 3.2 - Optimization
3. 3.3 - Lighting
4. 3.4 - Building and Sharing
5. Challenge 3 - Training Simulation
6. Keeping up with XR technology
7. Lab 3 - Personal Project Ergonomics & Optimization
8. Submission 3 - Share your Work
9. Mission 3 Quiz - VR Ergonomics & Optimization

3.1 - Comfort and Accessibility

Lesson link	[3.1 - Comfort and Accessibility]()
Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn how to reduce the risk of simulator sickness and increase the inclusivity of your app, allowing it to be enjoyed by as many people as possible. By the end of this lesson, your app will be more comfortable and accessible.

Skills
Beginner VR Design
- Evaluate a proposed VR experience in order to suggest ways it could be improved



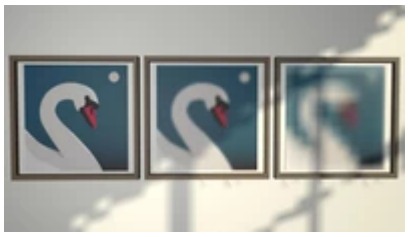
Steps
1. Create a simple black canvas for fading
2. Fade in on scene load
3. Teleporting with fade
4. Add a settings panel
5. Add a snap turning setting
6. Add a distance grab setting
7. Recap

3.2 - Optimization

Lesson link	[3.2 - Optimization]()
Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn about each of the key performance metrics for VR (fps, polycount, and draw calls) and how to ensure these metrics are optimized. By the end of this lesson, your app will be more optimized for performance.

Skills
Intermediate VR Development
- Optimize the performance of an app in order to meet headset framerate requirements



Steps
1. Take stock of current fps
2. Minimize draw calls
3. Minimize polycount
4. Optimize textures
5. Optimize particles and post-processing

6. Enable anti-aliasing
7. Recap

3.3 - Lighting

Lesson link	3.3 - Lighting
Length	**1 hour 30 minutes**

Summary
In this lesson, you will learn how to use light modes, lightmapping, and light probes in order to optimize the lighting for VR. By the end of this lesson, the lighting in your scene will be both beautiful and performant.

Skills
Intermediate VR Development
- Optimize the performance of an app in order to meet headset framerate requirements

Steps
1. Experiment with your lighting settings
2. Prepare and bake your first lightmap
3. Adjust scene lighting and re-bake
4. Add mixed lighting
5. Add light probes
6. Finalize lightmap
7. Recap

3.4 - Building and Sharing

Lesson link	3.4 - Building and Sharing
Length	**1 hour 30 minutes**

Summary
In this lesson, you will follow guidelines for VR best practices and explore options for sharing your work. By the end of this lesson, you'll configure your app appropriately and build a version of it that is ready to share.

Skills
Beginner VR Design
- Decide which XR hardware to target, given the goals of a particular project

Steps
1. Enter the app's name and version number

2. Confirm recommended publish settings
3. Look into sharing or publishing your app
4. Recap

Challenge 3 - Training Simulation

Lesson link	Challenge 3 - Training Simulation
Length	**1 hour 30 minutes**

Summary
In this challenge, you'll apply the skills you learned while making your VR room in an industrial training simulation. In this app, using buttons, knobs, levers, and joysticks, the user has to collect crates dropped into the factory and stack them on a nearby platform.

This challenge will assess skills learned in the following lessons:
- Comfort and Accessibility
- Optimization
- Lighting

Skills
Intermediate VR Development
- Optimize the performance of an app in order to meet headset framerate requirements

Beginner VR Design
- Evaluate a proposed VR experience in order to suggest ways it could be improved

Steps
1. Challenge walkthrough
2. Getting started
3. Challenge tasks
4. Bonus tasks
5. Hints

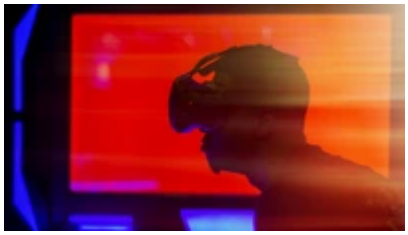
Keeping up with XR technology

Lesson link	Keeping up with XR technology
Length	**20 minutes**

Summary
The technology and trends in VR change at a rapid rate. In the time it takes you to complete this pathway, there will have probably been changes in the industry already!

In this tutorial, you will learn the following things:

- Why keeping up to date is important
- Tips and tricks for keeping up to date efficiently



Skills
Intermediate VR Development
- Optimize the performance of an app in order to meet headset framerate requirements

Beginner VR Design
- Evaluate a proposed VR experience in order to suggest ways it could be improved

Steps
1. Overview
2. Why is keeping up-to-date important?
3. How do you keep up?
4. Don't be afraid to try new things
5. Next steps

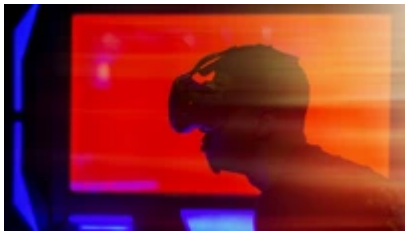
Lab 3 - Personal Project Ergonomics & Optimization

Lesson link	Lab 3 - Personal Project Ergonomics & Optimization
Length	**2 hours**

Summary
By the end of this lab, your personal project will be filled with beautiful art, optimized for performance and ready to share.

This lab will draw on skills learned in the following lessons:

- Comfort and Accessibility
- Optimization
- Lighting
- Building & Sharing



Skills
Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief
- Optimize the performance of an app in order to meet headset framerate requirements

Beginner VR Design
- Evaluate a proposed VR experience in order to suggest ways it could be improved
- Decide which XR hardware to target, given the goals of a particular project

Steps
1. Fill in a Design Document for ergonomics and optimization
2. Replace primitive objects with 3D art
3. Improve comfort and accessibility
4. Optimize draw calls and polycount
5. Optimize lighting
6. Confirm settings and build your app
7. Recap

Submission 3 - Share your Work

Lesson link	Submission 3 - Share your Work
Length	**10 mins**
Summary If you went above and beyond in your VR room, the challenge, or your personal project for this Unit, please share screenshots or videos here!	

Mission checkpoint

Quiz: Mission 3 Quiz - VR Ergonomics & Optimization

Mission 4: Custom VR Development

Part of the **VR Development** pathway

Overview

In the previous missions, you used pre-made interaction scripts provided to you as part of the Create with VR project. This mission will teach you to write scripts specifically for VR applications. You'll write these scripts from scratch in the context of three separate projects.

In project 1, the XRI example scene created by the XR Interaction Toolkit team, you'll reference existing code and documentation to program some more advanced, customized interactables.

In project 2, you'll follow guidelines from a project brief to create part of a VR escape room. Rather than following step-by-step instructions here, you'll only receive hints.

In project 3, which you'll submit to receive your pathway badge, you'll create your own unique VR project. The challenge here is to create a clone with a twist: a version of an established VR experience, but with a unique alteration.

As mentioned in the first tutorial of this pathway, you should already have a good foundational knowledge of scripting in the Unity engine to make the most out of this learning content.

If you don't already have a foundational understanding of scripting, now is an excellent time to learn. We recommend you complete the **Junior Programmer** pathway, and then return here.
If you feel almost ready but want to brush up on a few skills without doing the entire **Junior Programmer** pathway, why not check out the Beginner Scripting and Intermediate Scripting series.

Skills

Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief
- Optimize the performance of an app in order to meet headset framerate requirements

Beginner VR Development
- Deploy VR projects to Unity-supported head-mounted displays (HMDs)
- Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit

Beginner VR Design
- Evaluate a proposed VR experience in order to suggest ways it could be improved
- Decide which XR hardware to target, given the goals of a particular project

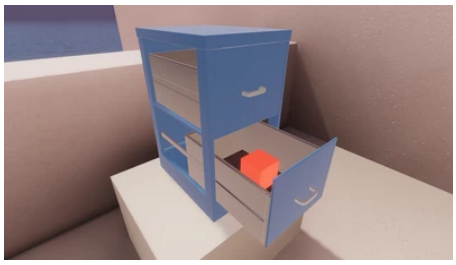
Content in this mission

1. What is in this mission?
2. Project 1: XRI Template walkthrough
3. Project 2: Escape Room Project brief
4. Project 3: Clone with a twist!
5. Submit your final project

What is in this mission?

Lesson link	[What is in this mission?]()
Length	**10 minutes**

Summary
It's time to take your programming skills and apply them to create custom VR interactions.
In this first tutorial of the mission, you will learn what to expect from this mission, including an overview of the three distinct projects you'll be working on.



Steps
1. Projects in the mission
2. What you need to know before proceeding
3. Next steps: Pre-assessment

Project 1: XRI Template walkthrough

Lesson link	[Project 1: XRI Template walkthrough - Unity Learn]()
Length	**3 hour 30 minutes**

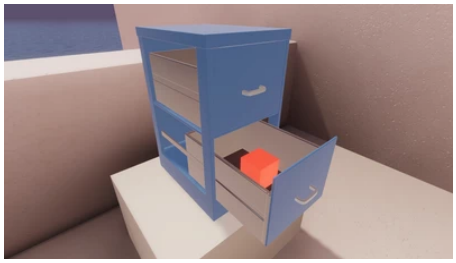
Summary
In this project, you will explore and expand on the XRI template scene. In this scene, there are stations containing a variety of common VR interactions. These range from simple, grabbable objects to more intricate, comprehensive experiences like a claw machine game.

Your task will be to make a new station in this scene with a couple of custom objects:

- A helpful scanner that displays other objects' information
- A fun little balloon inflator object

In order to accomplish this, you will need to inspect the components of the existing objects in the scene and reference the online documentation. Since this is how most developers learn how to program new types of interactions, it will be perfect preparation for work in VR development.

Skills
Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief



Tutorials in this project

1. Explore the sample scene
2. What you need to know before proceeding
3. Next steps: Pre-assessment

Explore the sample scene

Lesson link	Explore the sample scene
Length	**30 minutes**

Summary
As a more experienced developer, there's no better way to learn new programming techniques than working on an existing fully-functional project.
In this tutorial, you will do the following:
Download and explore the XRI template scene
Review the online documentation for the XR Interaction Toolkit.

Materials
XRI-Example-Scene_2021.3.zip

Steps
1. Overview
2. Download and open the example scene
3. Explore the scene on your device or the rig simulator
4. Explore the components
5. Explore the Scripting API
6. More things to try
7. Next steps

Set up the scanner

Lesson link	Set up the scanner
Length	**1 Hour**

Summary
With the examples provided in the scene, and the documentation ready for your reference, it's time to begin development on a custom VR interactable: the scanner.

In this tutorial, you will do the following:
- Set up a new station to hold your custom interactables
- Extend a provided base to inherit default behaviors provided by the XR Interaction Toolkit
- Override provided methods in a script to implement custom behaviors

What you'll learn
Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief

Steps

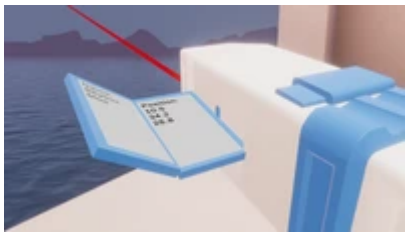
1. Overview
2. Set up a new station in a new scene
3. Extend the basic grab functionality
4. Trigger the screen opening animation
5. Open the screen when the scanner is picked up
6. Close the screen when the scanner is dropped
7. Disable the laser on Awake
8. Call the base method
9. Identify the method for activating an object
10. Turn the laser on and off with the trigger
11. More things to try
12. Next steps

Code the scanning functionality

Lesson link	[Code the scanning functionality]()
Length	**1 Hour**

Summary
For work in VR development, it's important to have a deep understanding of 3D vectors and how to work with them. You often need to calculate distances, angles, and directions – and one of the most useful techniques for getting these values is raycasting.

In this tutorial, you will do the following:
- Use raycasting to identify an object the scanner is pointing towards
- Reference online documentation to use code in line with best practices for VR development



What you'll learn
Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief

Steps
1. Overview
2. Make the text appear and disappear with the laser

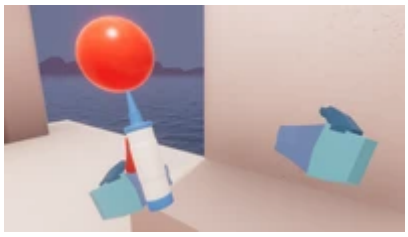
3. Clean up your redundant code
4. Raycast to get the object name and position
5. Dynamically change the size of the laser
6. Scan for objects every frame
7. More things to try
8. Next steps

Balloon Inflator

Lesson link	Balloon Inflator
Length	**1 Hour**

Summary
The next object you'll work on – the balloon inflator – will adjust the size of the balloon based on the precise trigger press value. The harder the trigger is pressed, the more the balloon will inflate. In order to accomplish this more complex, unique interaction, you will need to dive deeper into the API and its documentation.

In this tutorial, you will reference online documentation and existing code samples to program a complex, custom VR interaction.



What you'll learn
Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief

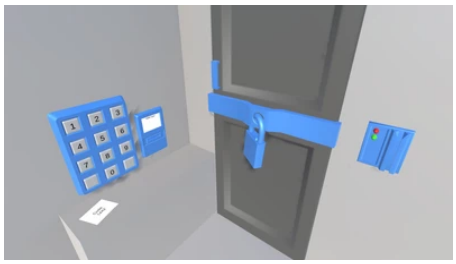
Steps
1. Overview
2. Set up a basic grabbable object
3. Set a reference to the correct controller
4. Scale the balloon based on the trigger value
5. More things to try
6. Next steps

Project 2: Escape Room Project brief

Lesson link	Project 2: Escape Room Project brief
Length	**5 hours 10 minutes**

Summary
In this project, you'll follow a project brief – just like you would in the industry – to create a part of an escape room.
For this escape room, you'll be responsible for programming the final interactions of the experience.

Specifically, the user should be able to do the following:



- Enter a code on a number pad to receive a keycard
- Use that keycard to unlock a door
- Slide the door open to exit the room

Some of the code required for these interactions is complex, so you will have hints to guide you along the way. You will not have step-by-step instructions here; this experience is meant to simulate what it might be like to work as a VR developer.

Project objective
By the end of this learning project you will be able to do the following:

- Identify a high-level approach for programming a given feature in VR
- Extend the functionality of the default interactable and interactor objects
- Perform mathematical calculations on 3D vectors in order to program custom 3D interactions in VR
- Adhere to a VR project brief and implement required functionality

Skills
Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief

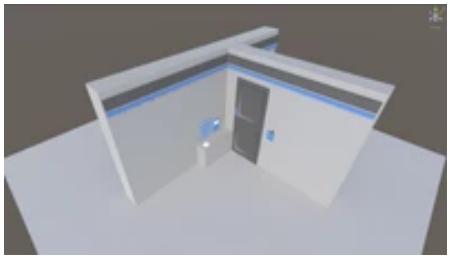
Tutorials in project
1. Tutorial - Escape Room project overview
2. Tutorial - Number pad
3. Tutorial - Keycard reader
4. Tutorial - Sliding Door
5. Quiz - Mission 4 Quiz - Custom VR Development

Escape Room project overview

Lesson link	Escape Room project overview
Length	**30 minutes**

Summary
This project is unlike any you've attempted up to this point. You will be given a project brief and a few hints, but then it is up to you to make it happen. Your goal is to implement the final few interactions in an escape room.

In this tutorial, you will get an overview of the project, learn how to use the provided hints properly, and then set up the basic project in Unity.



Materials VR-Pathway_Escape-Room_partial-project-brief.pdf VR-Pathway_Escape-Room_Assets.zip	
Steps 1. Overview 2. What is a project brief? 3. What is this project about? 4. How to use the hints 5. Set up your project and scene 6. Next steps	

Number pad

Lesson link	Number pad
Length	**1 Hour 30 minutes**
Summary You're ready to dig into the first of the three features from the project brief: the number pad. Although this interaction is the simplest of the three, this is the first time you'll be asked to program a custom VR interaction without any instructions. In this tutorial, you will program a custom VR number pad according to the requirements of the project brief, with the help of optional hints. **What you'll learn** Intermediate VR Development • Program custom VR interactions in order to meet the requirements in a project brief	
Steps 1. Specific requirements 2. Hint set 1 3. Hint set 2 4. Hint set 3 5. More things to try 6. Next steps	

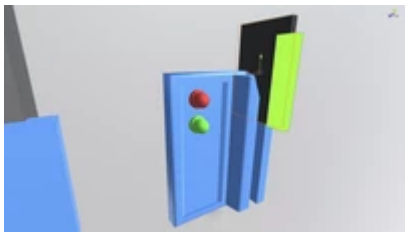
Keycard reader

Lesson link	Keycard reader
Length	**1 Hour 30 minutes**

Summary
You're ready to move on to the second, more challenging feature from the project brief: the keycard reader. This feature will require you to detect precise positions and angles as the card enters and exits the reader, so it will require some 3D vector skills.
In this tutorial, you will do the following:

- Program a custom VR keycard reader according to the requirements of the project brief, with the help of optional hints
- Use mathematical formulas, such as dot products, to program custom 3D interactions

What you'll learn
Intermediate VR Development
- Program custom VR interactions in order to meet the requirements in a project brief



Steps
1. Overview
2. Specific requirements
3. What are dot products?
4. Hint set 1
5. Hint set 2
6. Hint set 3
7. More things to try
8. Next steps

Sliding Door

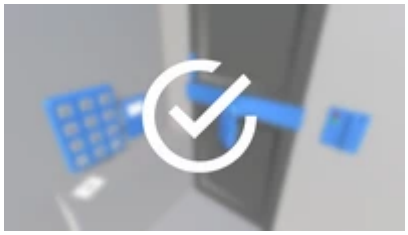
Lesson link	Sliding Door
Length	**1 Hour 30 minutes**

Summary
The time has come for you to attempt the final, most challenging feature from the project brief: the heavy sliding door. This feature will also require significant use of 3D vector math, but it will also test your ability to program interactions that feel natural in VR. This door looks like it would be very heavy and difficult to slide back and forth – it is up to you to make it feel that way through code.

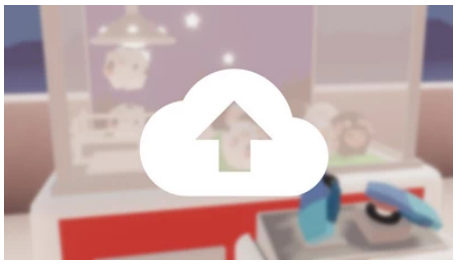
In this tutorial, you will do the following:
- Program a custom sliding door according to the requirements of the project brief, with the help of optional hints
- Use mathematical formulas, such as dot products, to program custom 3D interactions
- Implement features that feel natural and intuitive in VR to promote a sense of presence

Materials • VR-Pathway_Escape-Room_final-scripts.zip	
Steps 1. Overview 2. Specific requirements 3. Hint set 1 4. Hint set 2 5. Hint set 3 6. Compare your code! 7. More things to try 8. Next steps	

Mission 4 Quiz - Custom VR Development

Lesson link	Mission 4 Quiz
Length	**10 Minutes**
Summary In this quiz, you will test the knowledge and skills you learned in Mission 4 related to Custom VR Development. This quiz is part of the **VR Development** pathway. Quiz Objective Program custom VR interactions in order to meet the requirements in a project brief.	

Project 3: Clone with a twist!

Lesson link	Project 3: Clone with a twist!
Length	**3 hours**
Summary You have reached the final tutorial of this pathway. Congratulations! As your final challenge, you'll apply what you've learned throughout the pathway to create one final project. Your task is to recreate (or clone) a familiar VR interaction or experience and add your own personal twist to it. This will serve as a perfect portfolio piece for you, should you wish to try and get a job in the VR development industry. In this tutorial, you will learn what is required for this project and hear our established creators discuss what makes for a great portfolio piece. You will have an opportunity to actually submit this project and earn your pathway badge in the pathway checkpoint that follows this tutorial.	

Steps

1. Overview
2. What do employers look for in a portfolio?
3. Criteria
4. Come up with a concept
5. Work on your project
6. Next steps

Mission checkpoint

Submit your final project