Game Animation

Ken-Yi Lee

Game Programming, Fall 2020 @ National Taiwan University

Game Programming

- Rendering
- Looping and control
- Math
- Animation
- Physics
- Behaviour and navigation (AI)
- Effects
- Networking

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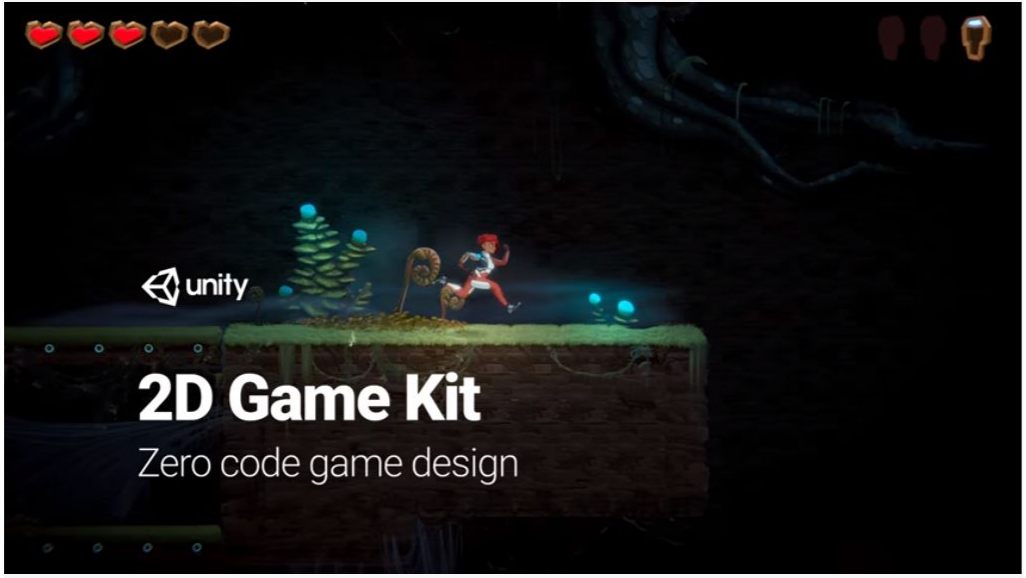
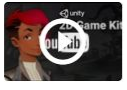


1/9



2D Game Kit

Unity Technologies ★★★★☆ 4 | 255 Reviews

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File size	299.9 MB
Latest version	1.9.3
Latest release date	Jul 21, 2020
Supported Unity versions	2017.3.0 or higher
Support	Visit site

2D

Demo ：2D Game Kit

- Play
- Introduce scene assets

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2D sprite animation

- Keyframes / image sequence

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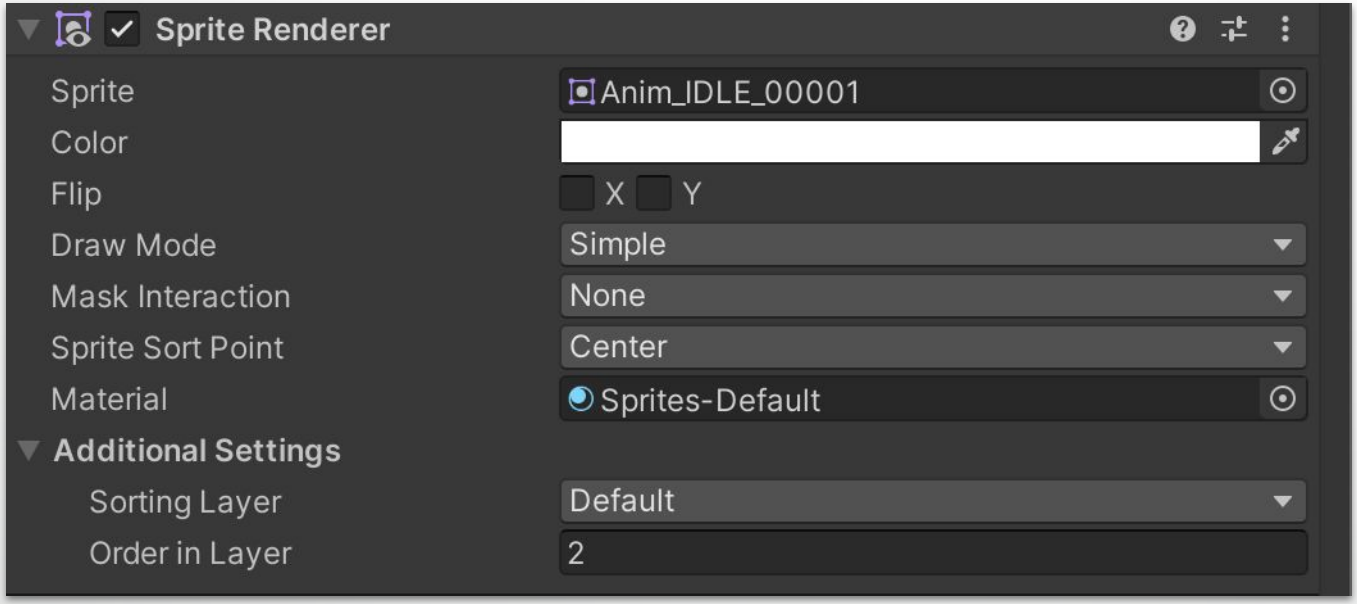
Sprite renderer



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Demo ：2D Game Kit

- Inspect **Ellen** [Prefab]

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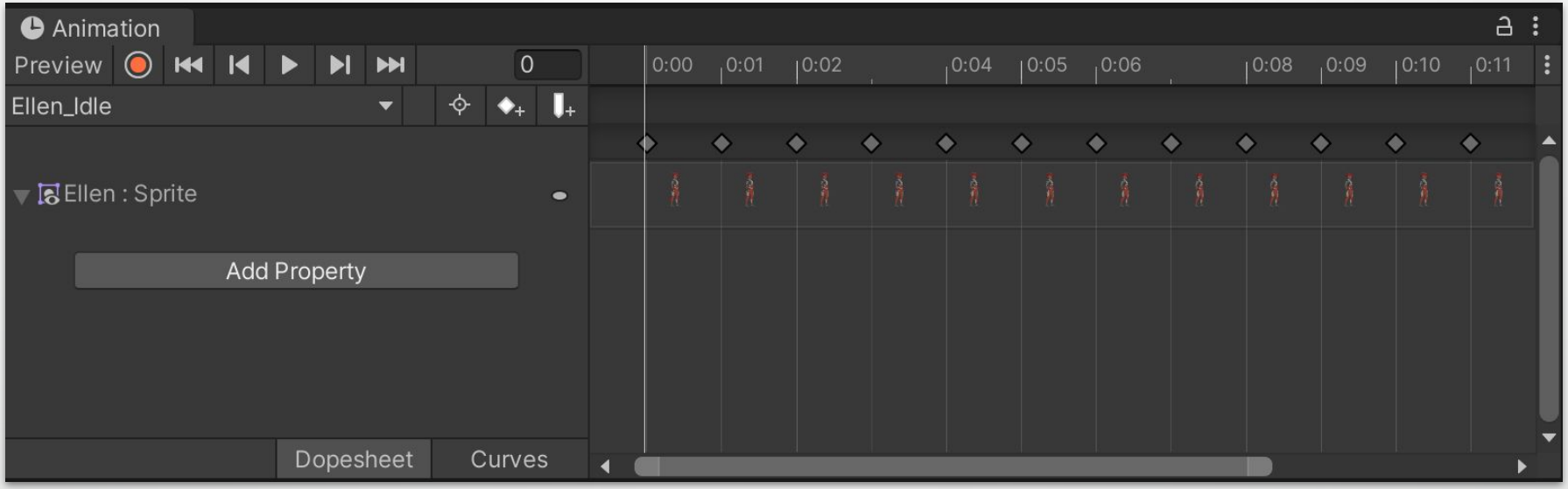
Animation clip : keyframe animation



Demo ：2D Game Kit

- Inspect **Ellen** prefab
- Inspect **Ellen_Idle** animation

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Source: Unity Learn

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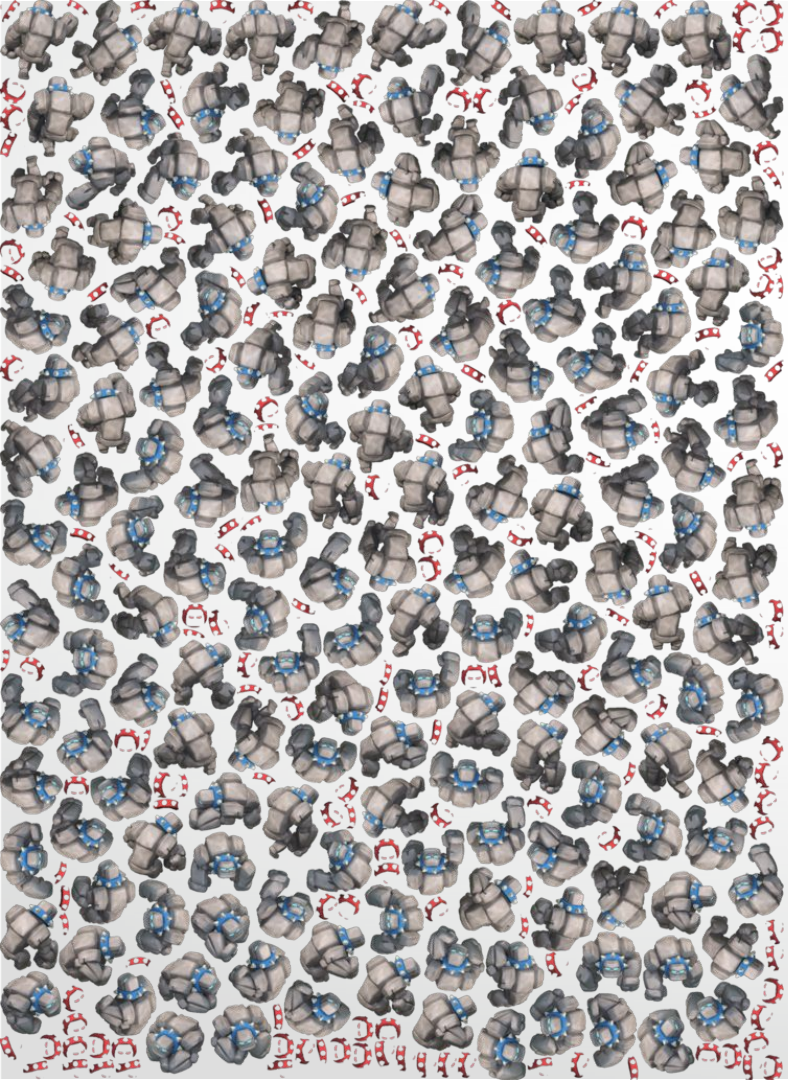
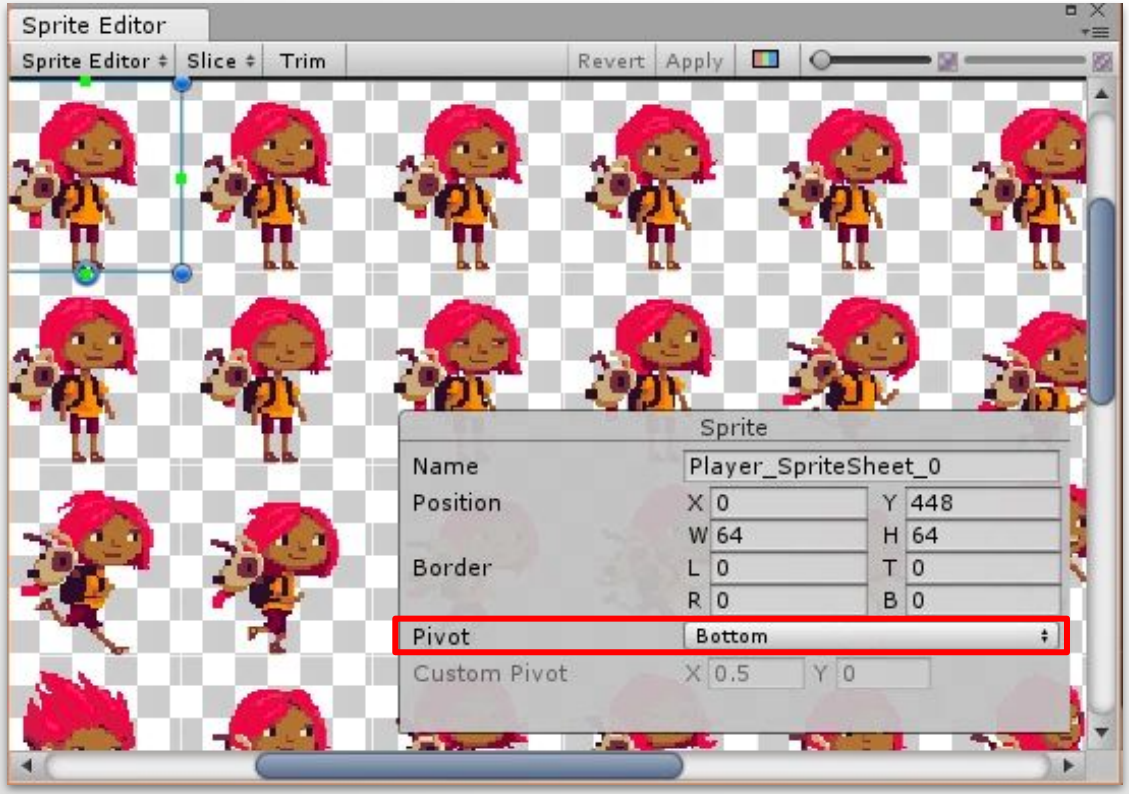
Tight ?

Source: Unity Learn



Root motion



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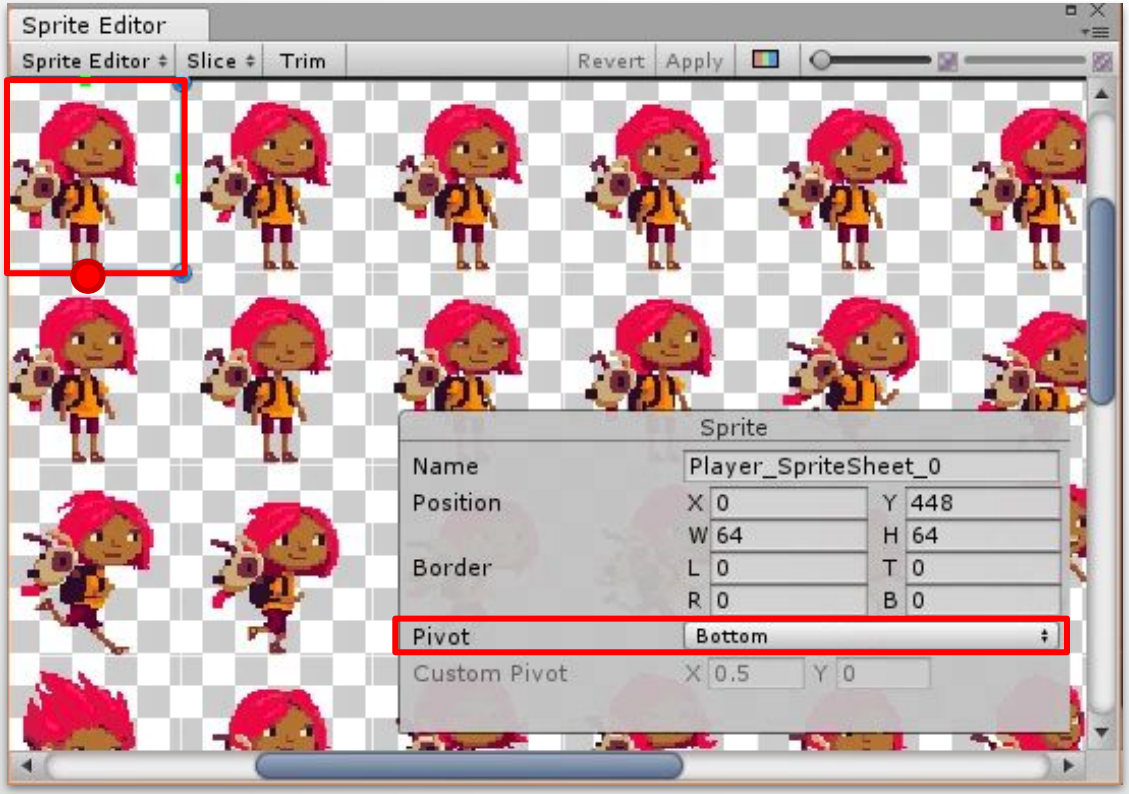
Root motion


Sprite Editor
Sprite Editor
Slice
Trim
Revert
Apply
Sprite
Name
Player_SpriteSheet_0
Position
X 0
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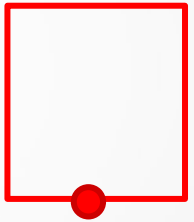
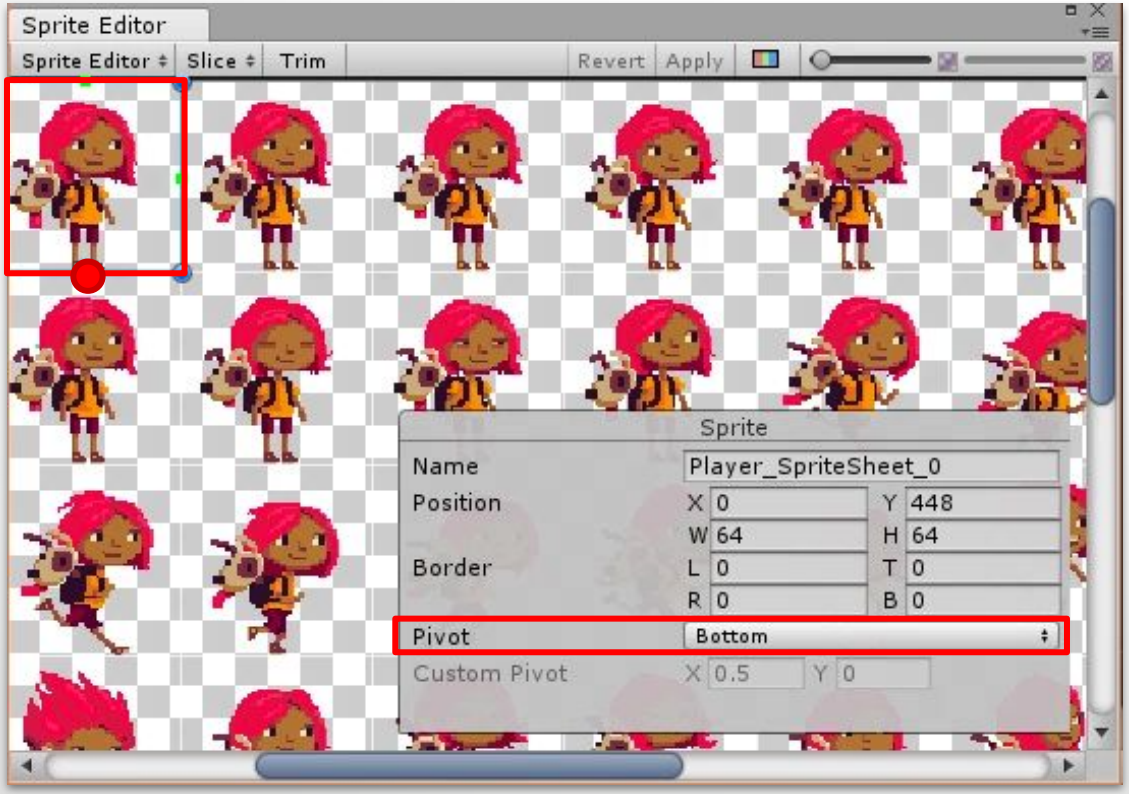
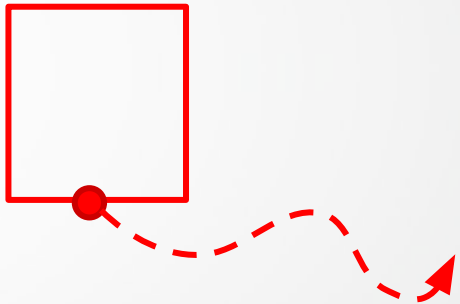
W 64
H 64
Border
L 0
T 0
R 0
B 0
Pivot
Bottom
Custom Pivot
X 0.5
Y 0

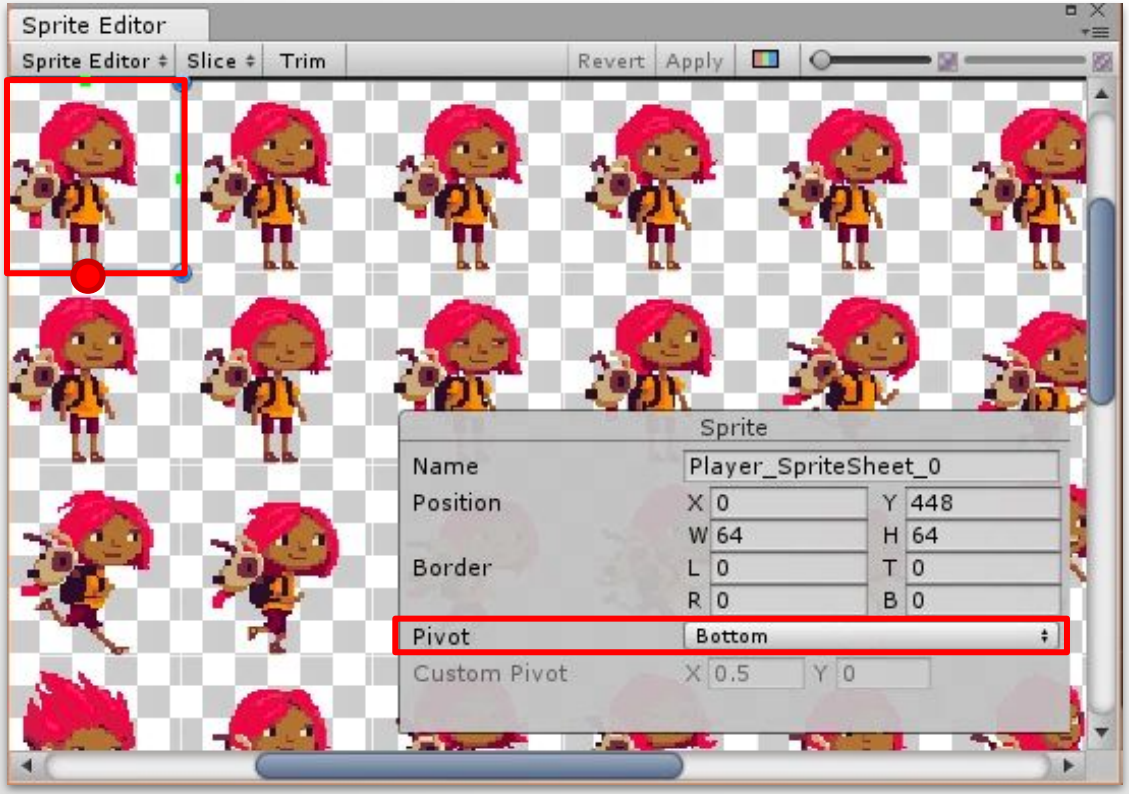


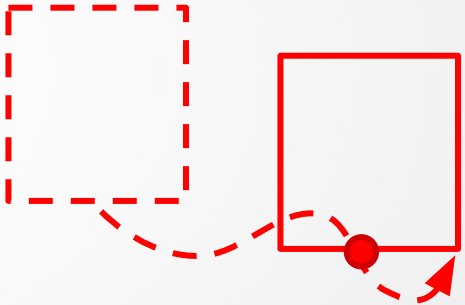
Root motion


Sprite Editor
Sprite Editor
Slice
Trim
Revert
Apply
Sprite
Name
Player_SpriteSheet_0
Position
X 0
Y 448
W 64
H 64
Border
L 0
T 0
R 0
B 0
Pivot
Bottom
Custom Pivot
X 0.5
Y 0



Root motion


Sprite Editor
Sprite Editor
Slice
Trim
Revert
Apply
Sprite
Name
Player_SpriteSheet_0
Position
X 0
Y 448
W 64
H 64
Border
L 0
T 0
R 0
B 0
Pivot
Bottom
Custom Pivot
X 0.5
Y 0



Demo ：2D Game Kit

- Inspect **Ellen** prefab
- Inspect **Ellen_Idle** animation

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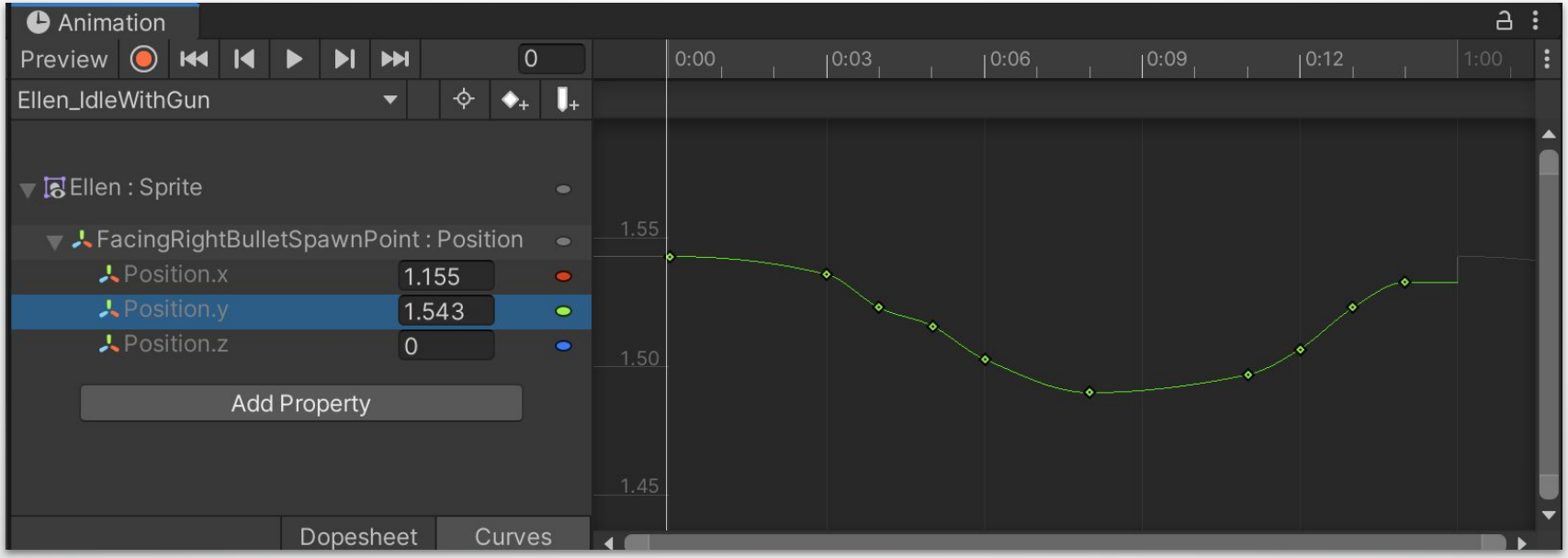
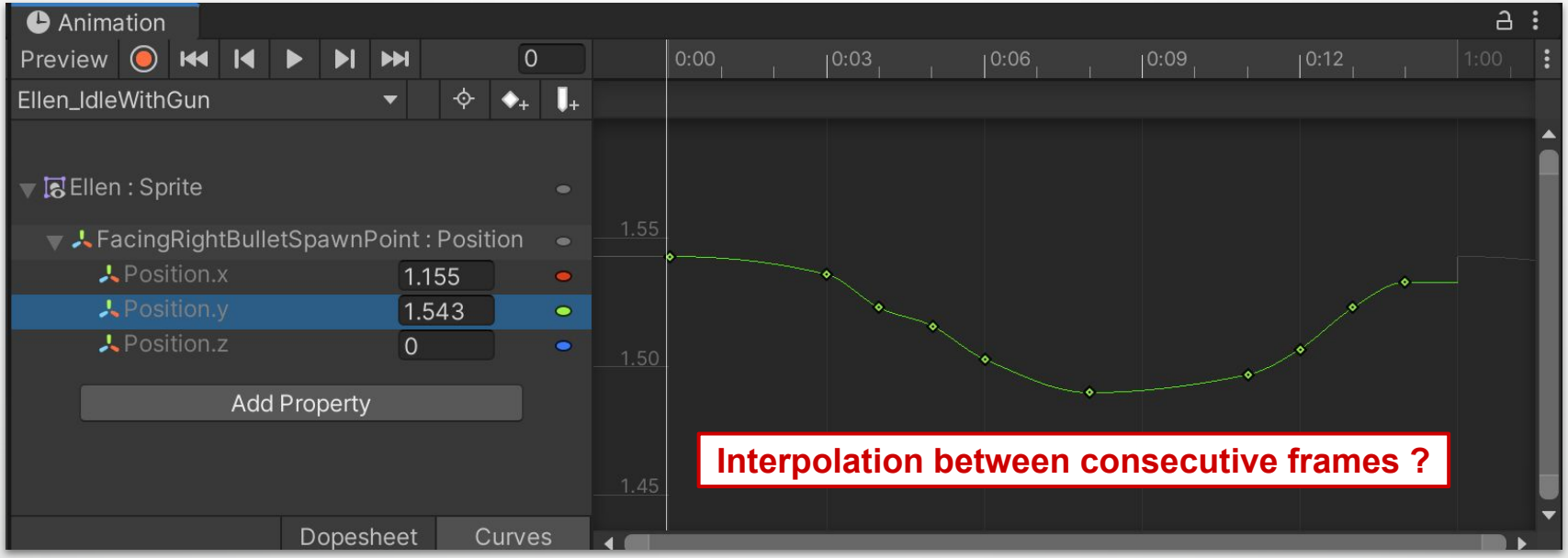
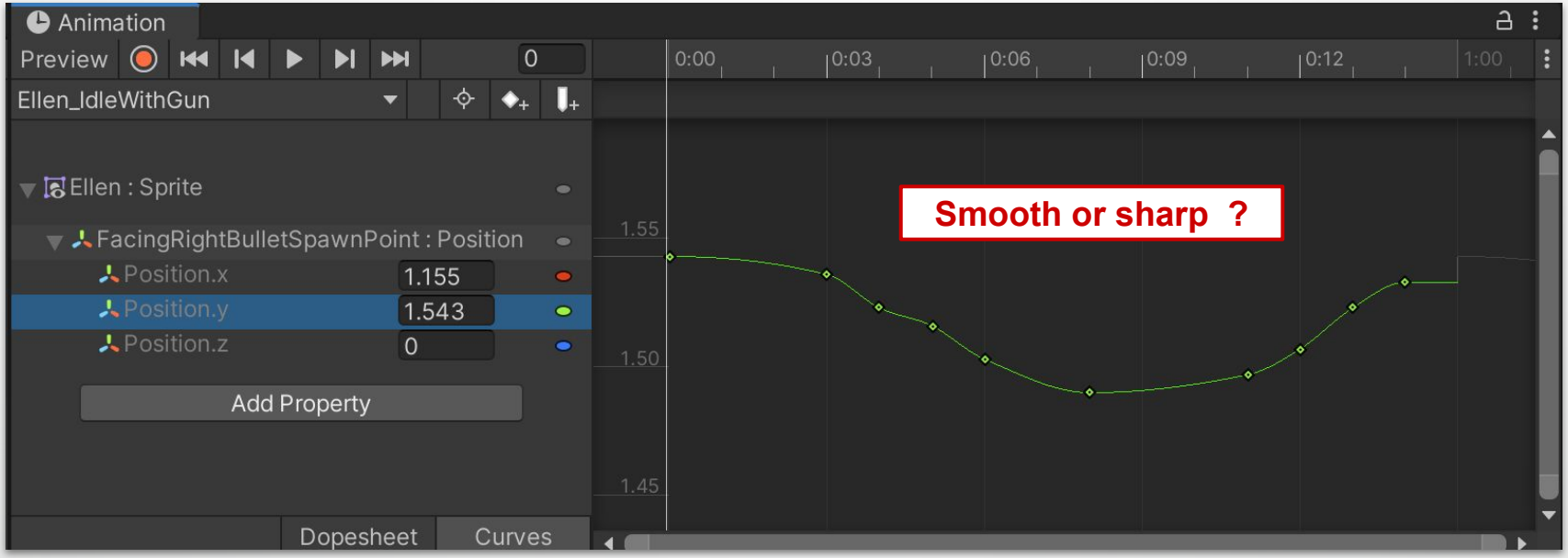
Parametric animation



Parametric animation



Parametric animation



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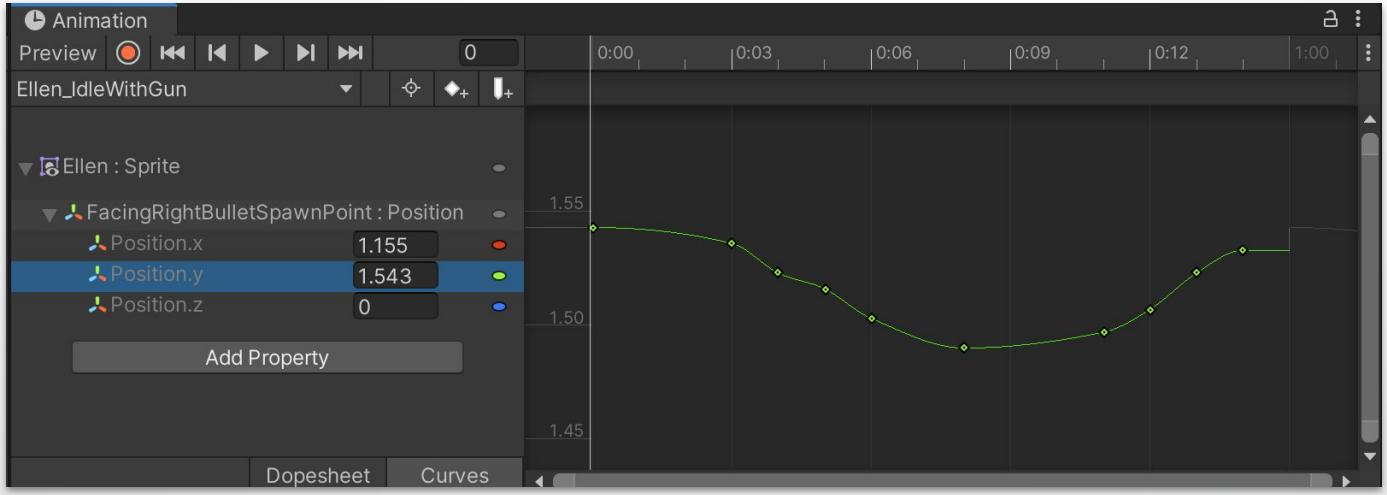
Animation clip: Curves

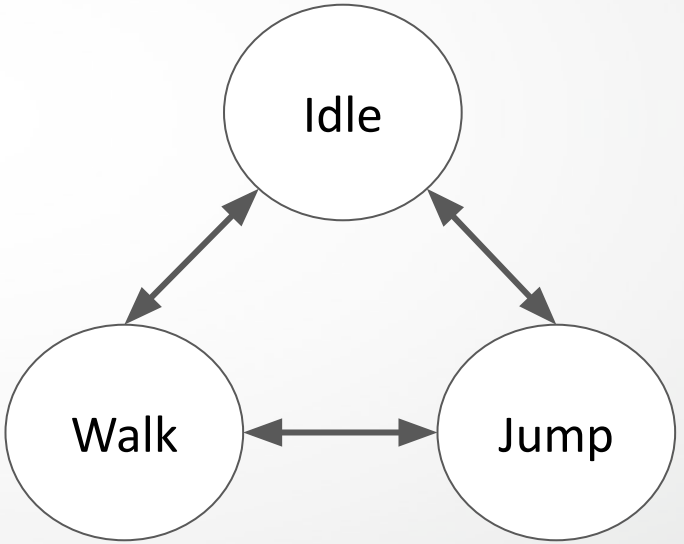
- (DEMO) Ellen [Prefab] > Animation > Ellen_IdleWithGun



(DEMO)

State machine

- Current state ?
- On state enter / leave ?



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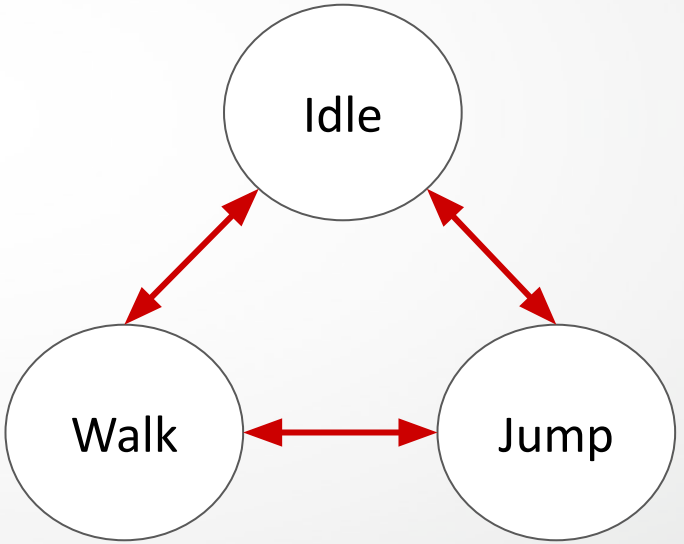
State machine

- Current state ?
- On state enter / leave ?
- Transition between states ?



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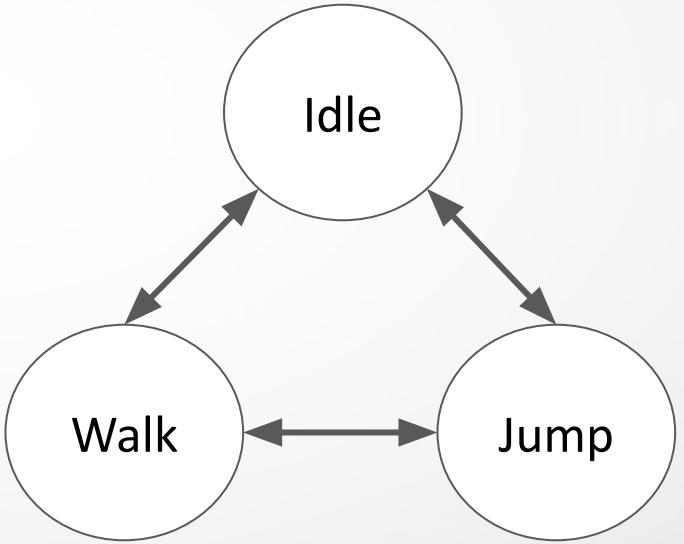
Animation state machine

- Current animation ?
- On animation play / finished ?
- Blending between animations ?



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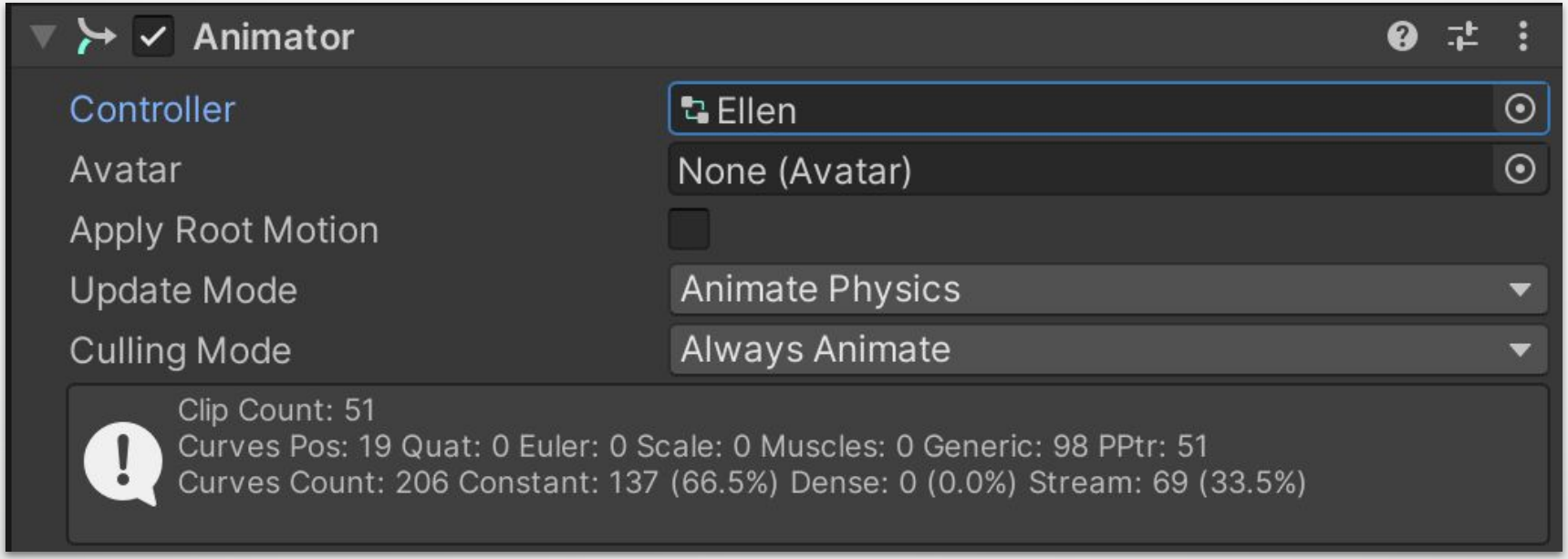
Animator controller



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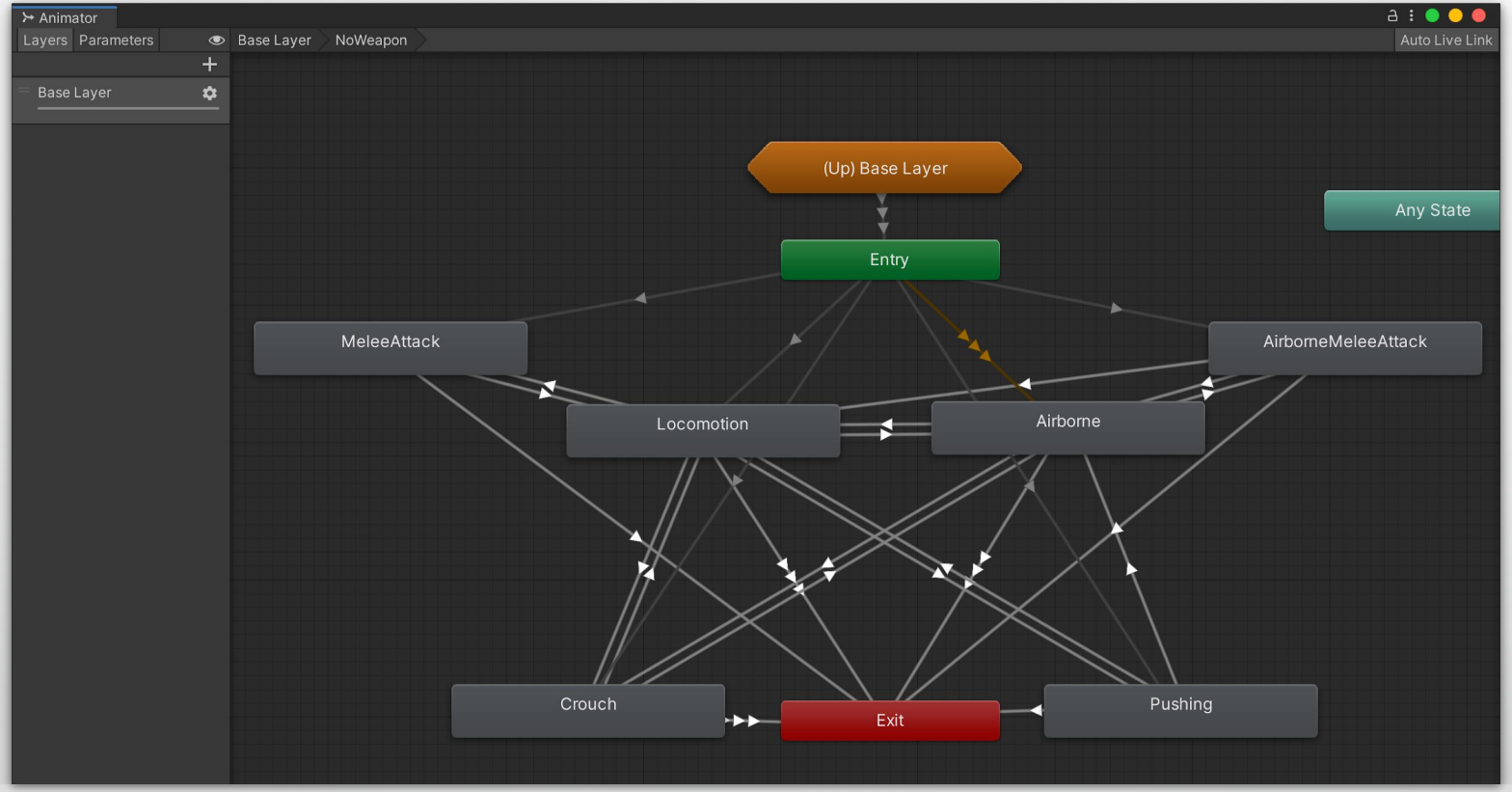
Animator states



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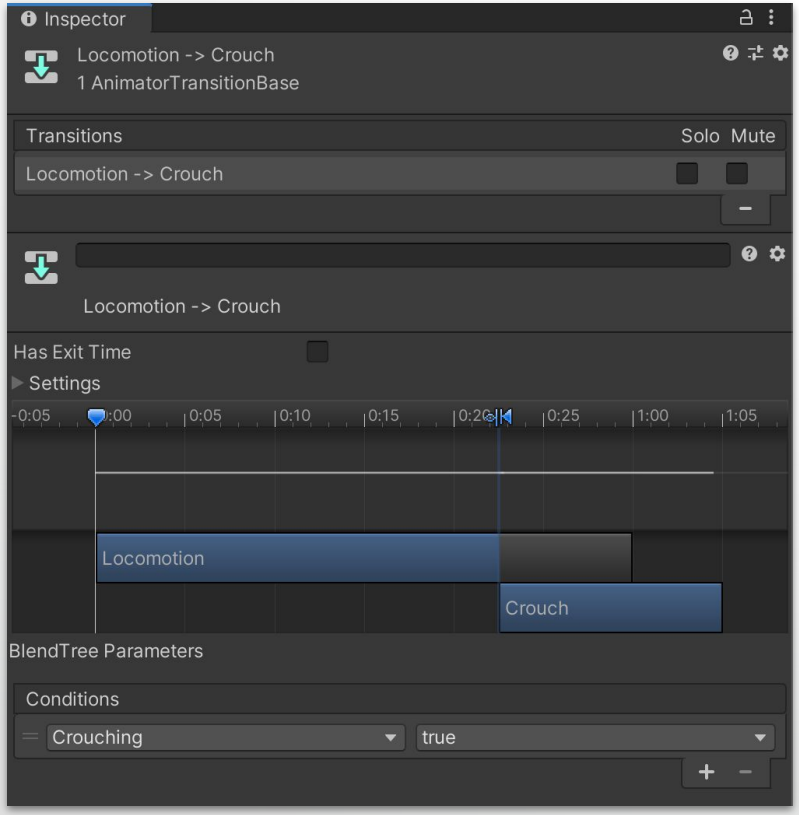
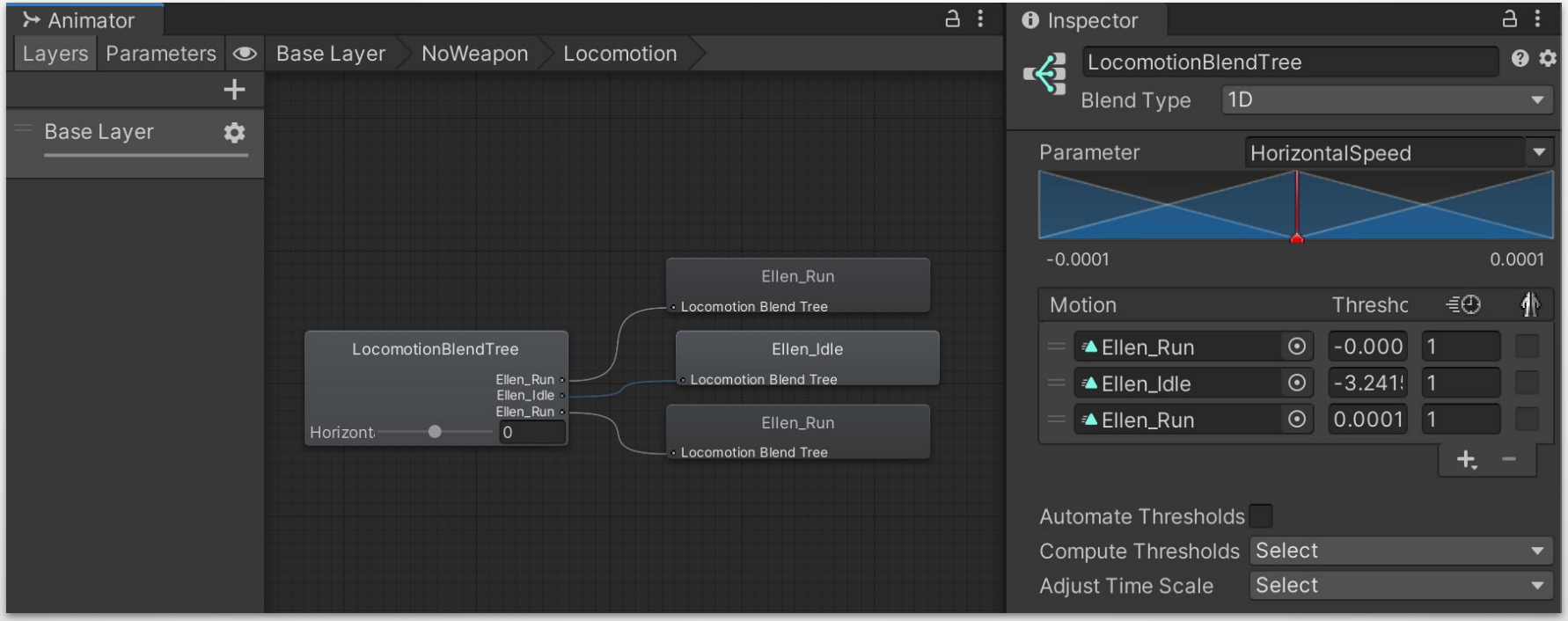
(DEMO)

Animator transition



BlendTree


Animator
Layers
Parameters
Base Layer
NoWeapon
Locomotion
Base Layer
LocomotionBlendTree
Ellen_Run
Ellen_Idle
Ellen_Run
Horizont
0
Ellen_Run
Locomotion Blend Tree
Ellen_Idle
Locomotion Blend Tree
Ellen_Run
Locomotion Blend Tree
Inspector
LocomotionBlendTree
Blend Type
1D
Parameter
HorizontalSpeed
-0.0001
0.0001
Motion
Thresho
Ellen_Run
-0.000
1
Ellen_Idle
-3.241
1
Ellen_Run
0.0001
1
Automate Thresholds
Compute Thresholds
Select
Adjust Time Scale
Select

V1

V2

V3

V3

V1

Unity-Technologies / 2d-animation-samples

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Sam-Unity Updated 2DIK 4307e16 on Feb 28, 2019 69 commits

Assets	3rd party license to MD and LICENSE.md	2 years ago
Documentation	Updated 2DIK	2 years ago

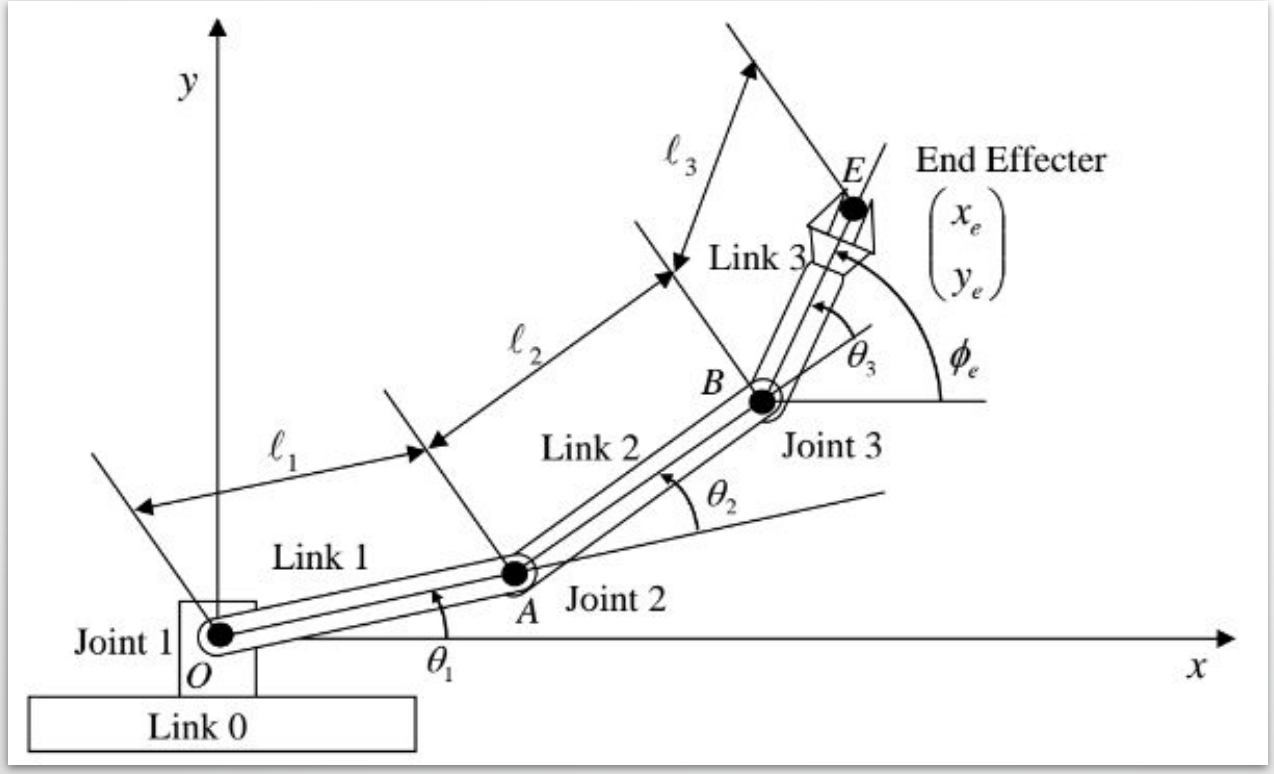
About

Samples for 2D Animation features.

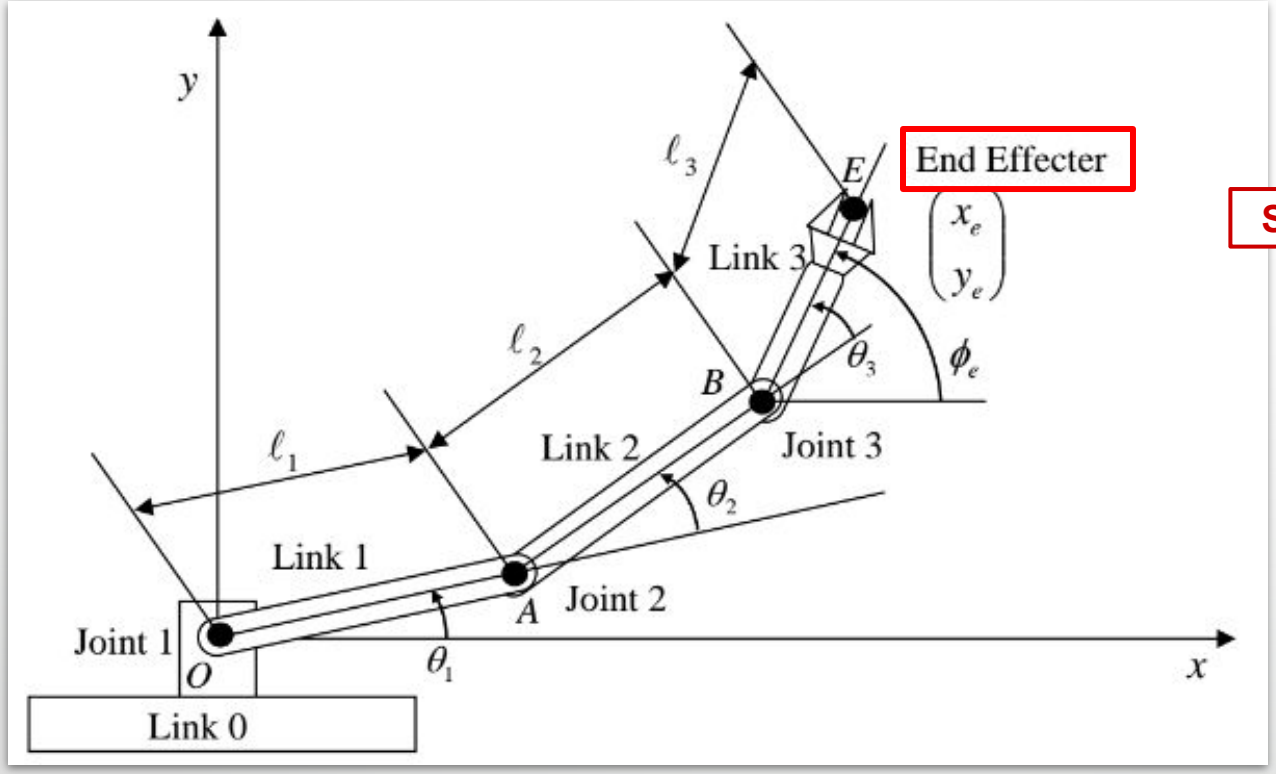
Readme

(DEMO)

Inverse kinematics (IK)

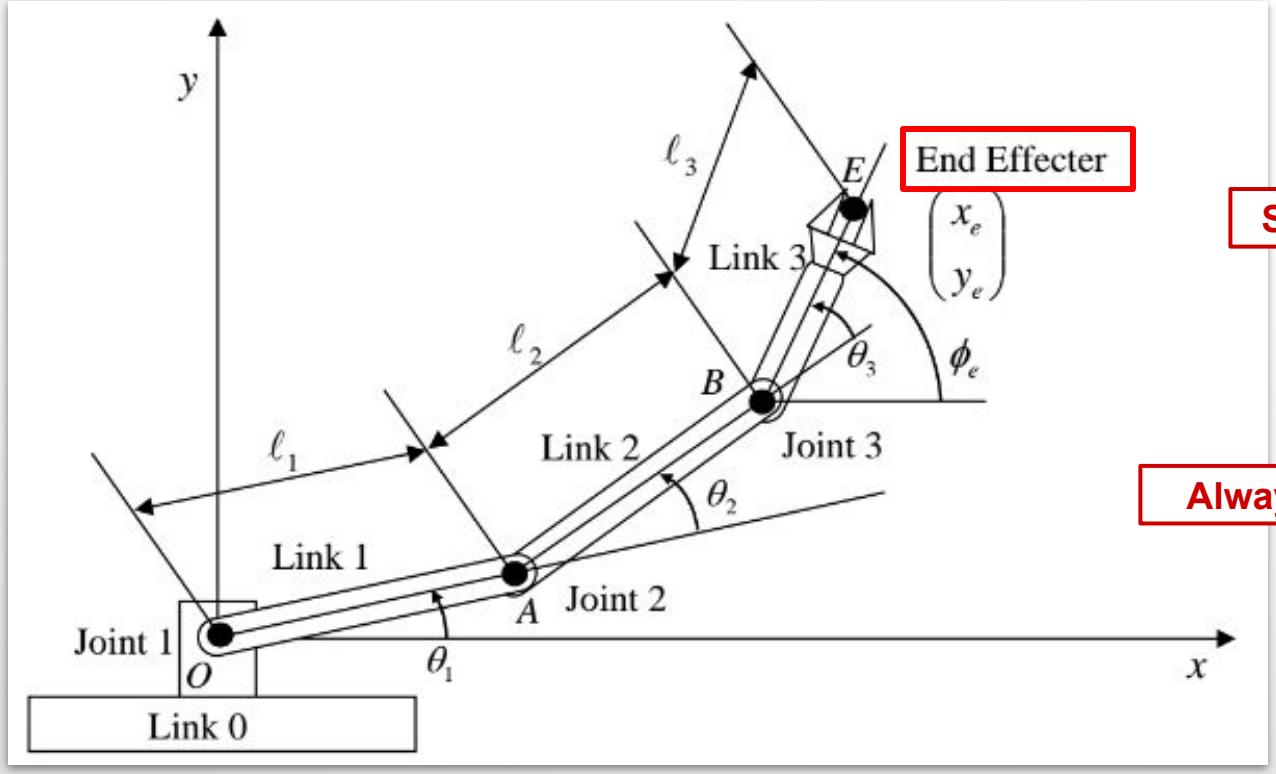


Inverse kinematics (IK)



Set desired target

Inverse kinematics (IK)

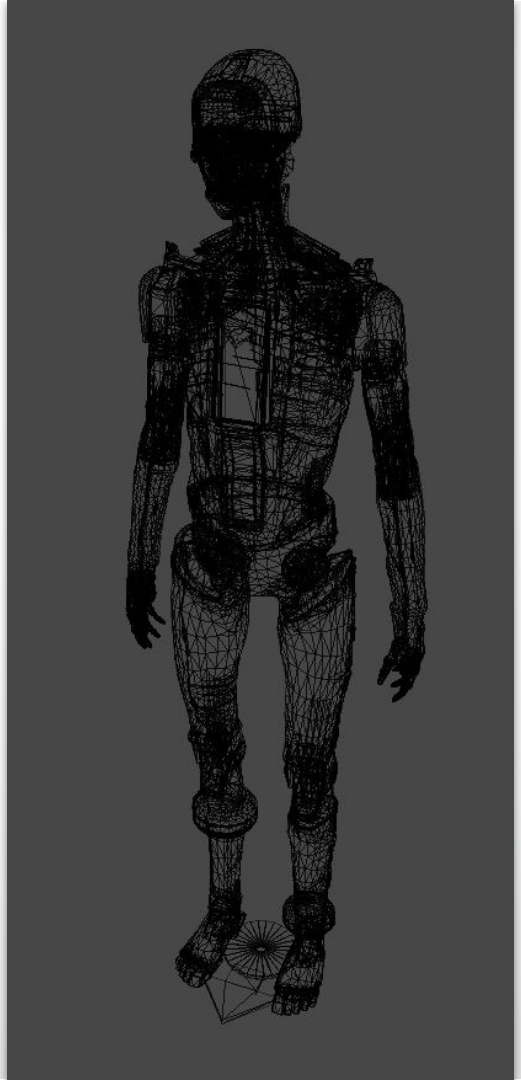


Set desired target

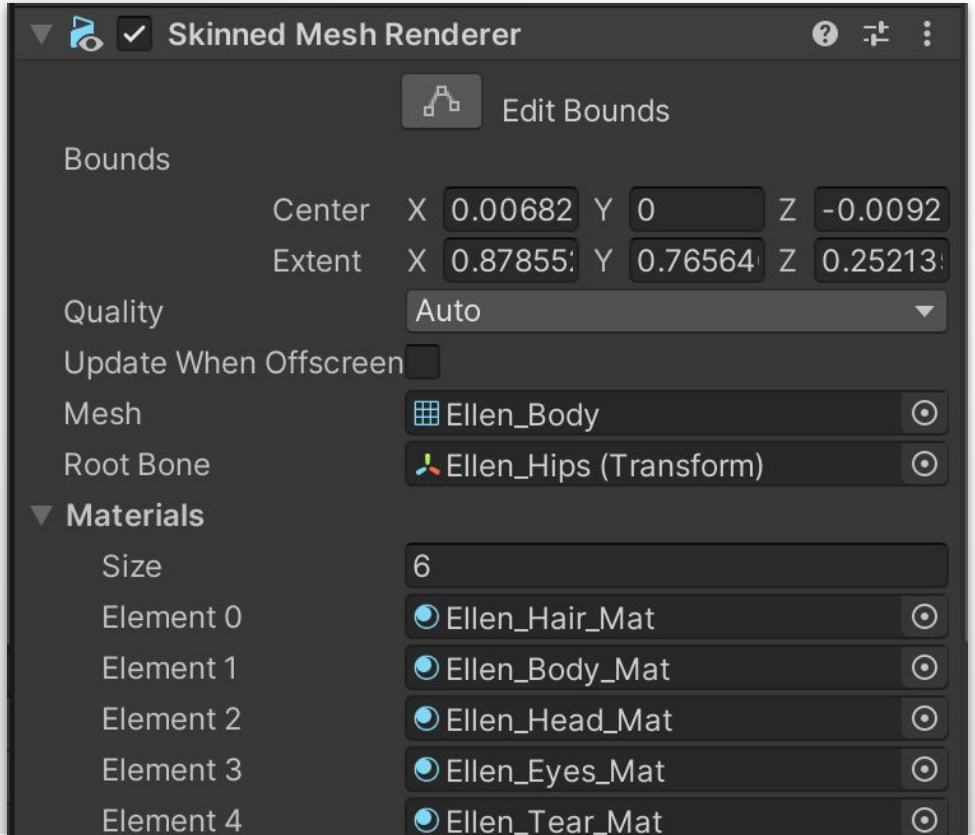
Always possible ?

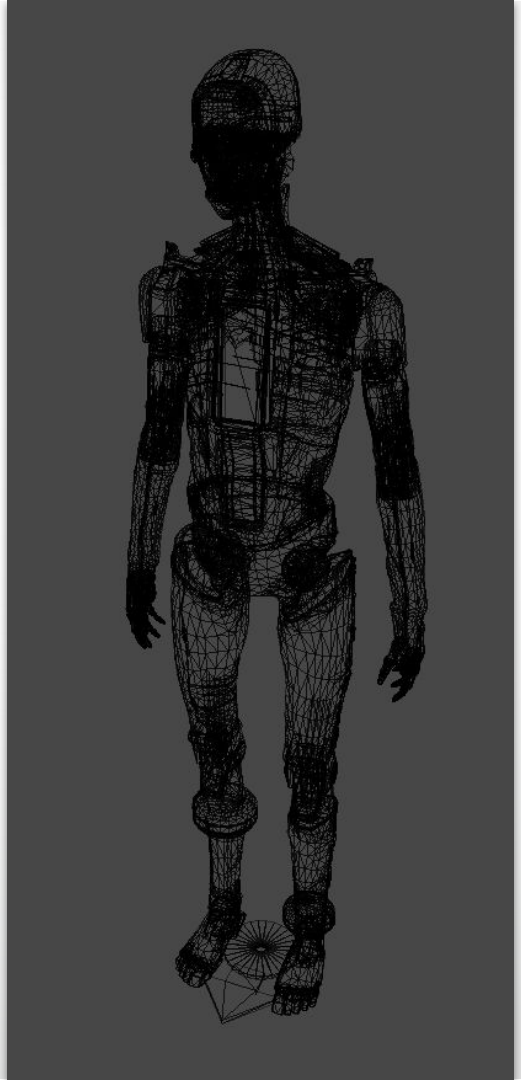
(DEMO)

3D Model



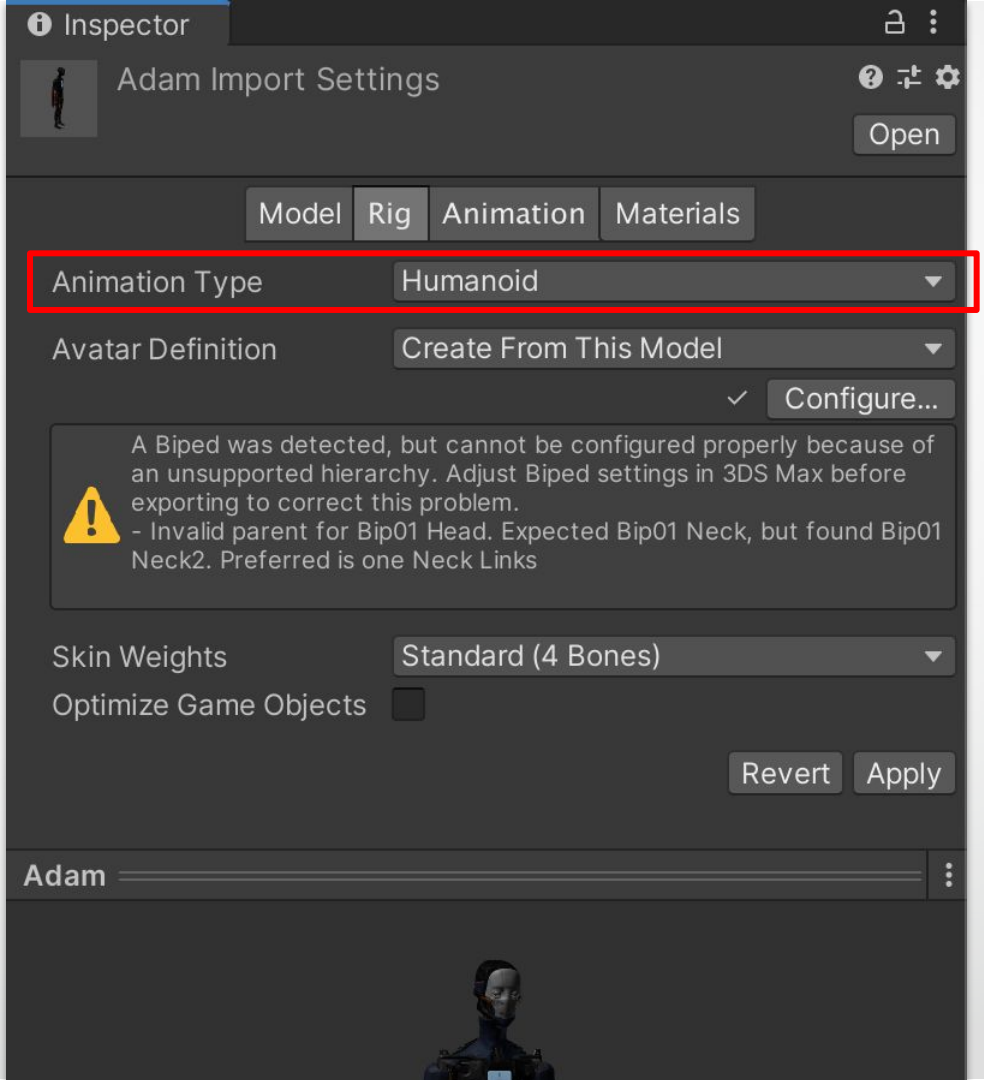
Skinned mesh renderer

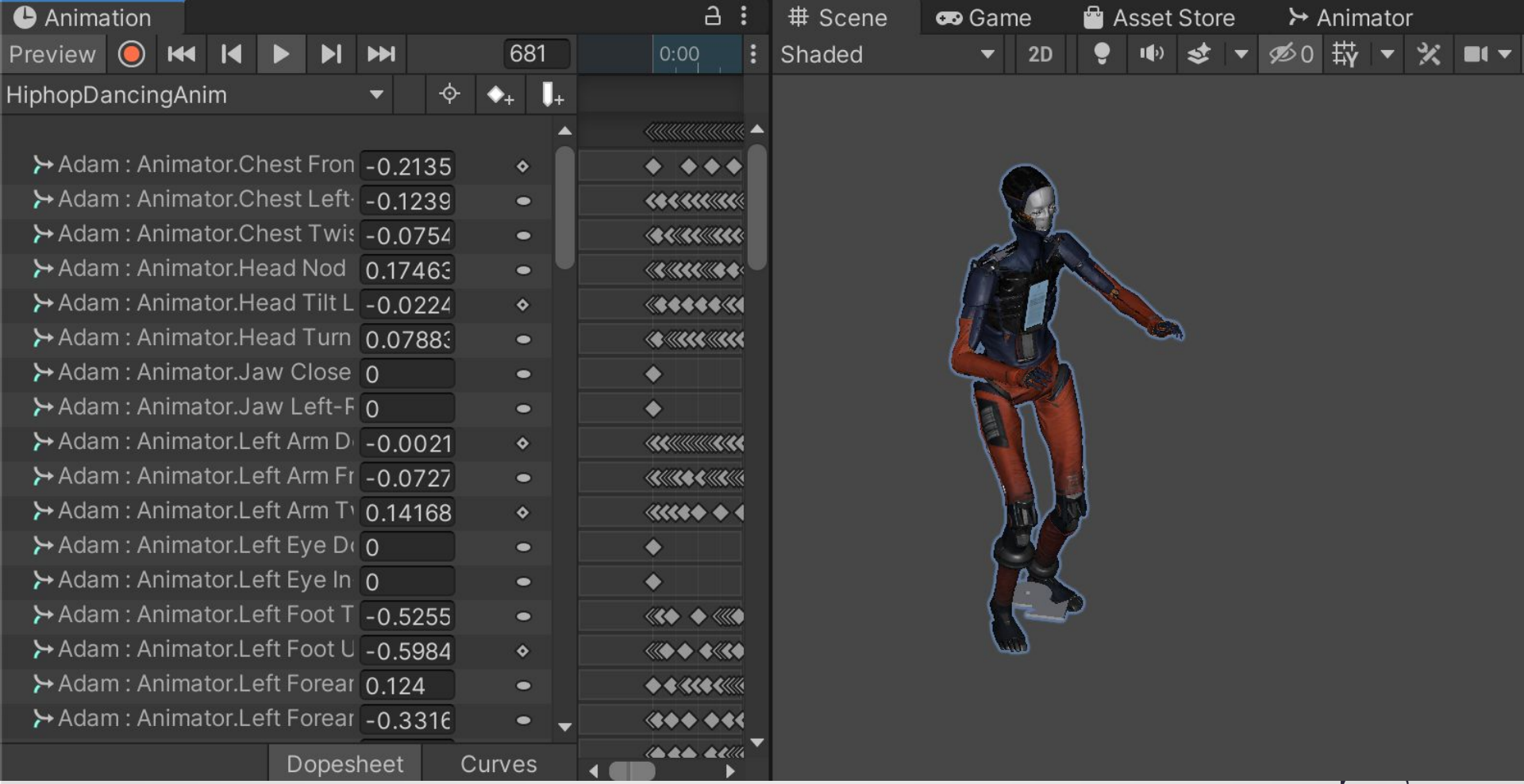




FeisStu

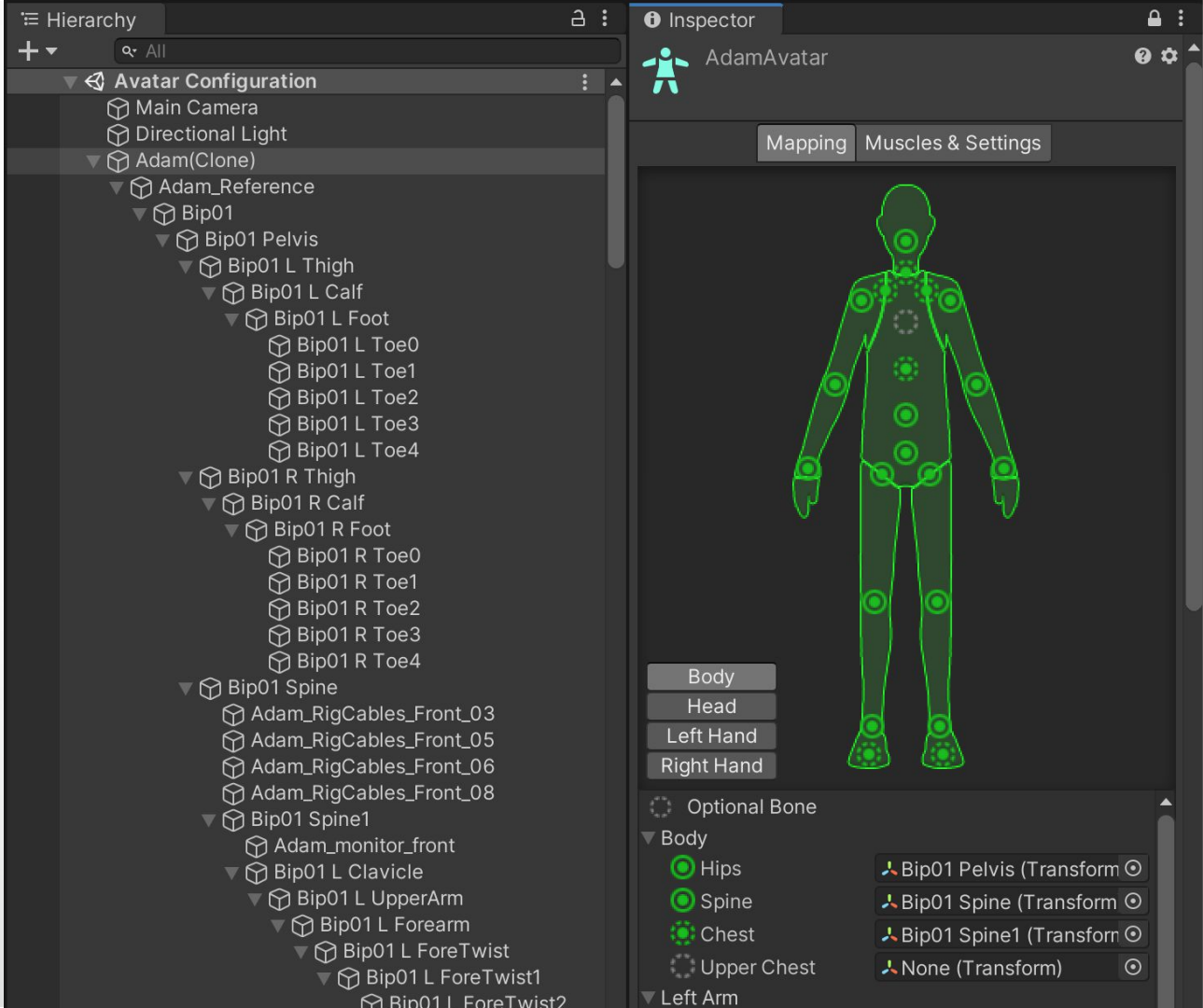
Rig

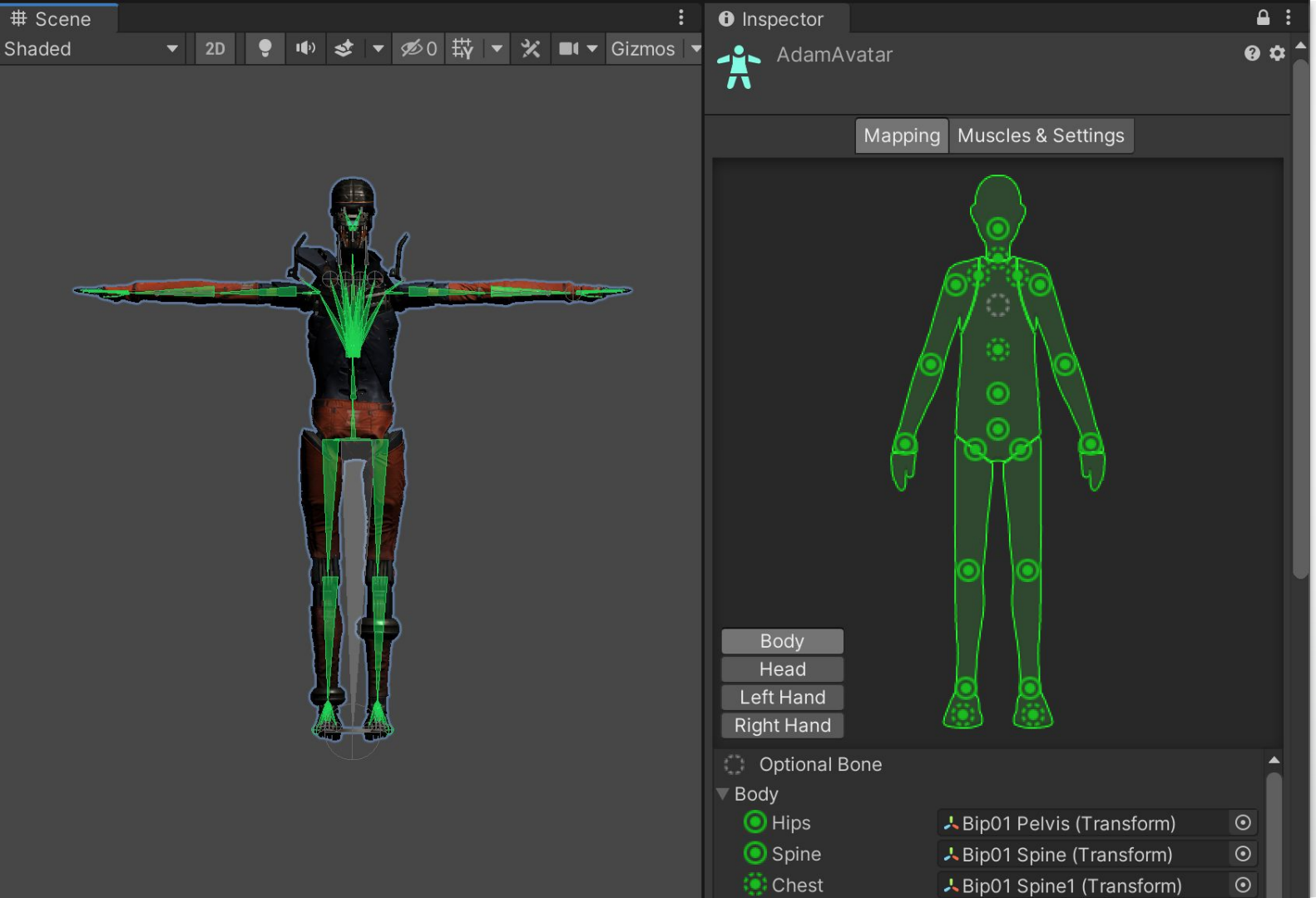

Inspector
Adam Import Settings
Open
Model
Rig
Animation
Materials
Animation Type
Humanoid
Avatar Definition
Create From This Model
Configure...
A Biped was detected, but cannot be configured properly because of an unsupported hierarchy. Adjust Biped settings in 3DS Max before exporting to correct this problem.
- Invalid parent for Bip01 Head. Expected Bip01 Neck, but found Bip01 Neck2. Preferred is one Neck Links
Skin Weights
Standard (4 Bones)
Optimize Game Objects
Revert
Apply
Adam


Animation
Preview
681
0:00
HiphopDancingAnim
Adam : Animator.Chest Fron -0.2135
Adam : Animator.Chest Left- -0.1239
Adam : Animator.Chest Twis -0.0754
Adam : Animator.Head Nod 0.17463
Adam : Animator.Head Tilt L -0.0224
Adam : Animator.Head Turn 0.07883
Adam : Animator.Jaw Close 0
Adam : Animator.Jaw Left-F 0
Adam : Animator.Left Arm D -0.0021
Adam : Animator.Left Arm Fr -0.0727
Adam : Animator.Left Arm T 0.14168
Adam : Animator.Left Eye D 0
Adam : Animator.Left Eye In 0
Adam : Animator.Left Foot T -0.5255
Adam : Animator.Left Foot U -0.5984
Adam : Animator.Left Forear 0.124
Adam : Animator.Left Forear -0.3316
Dopesheet
Curves
Scene
Game
Asset Store
Animator
Shaded
2D

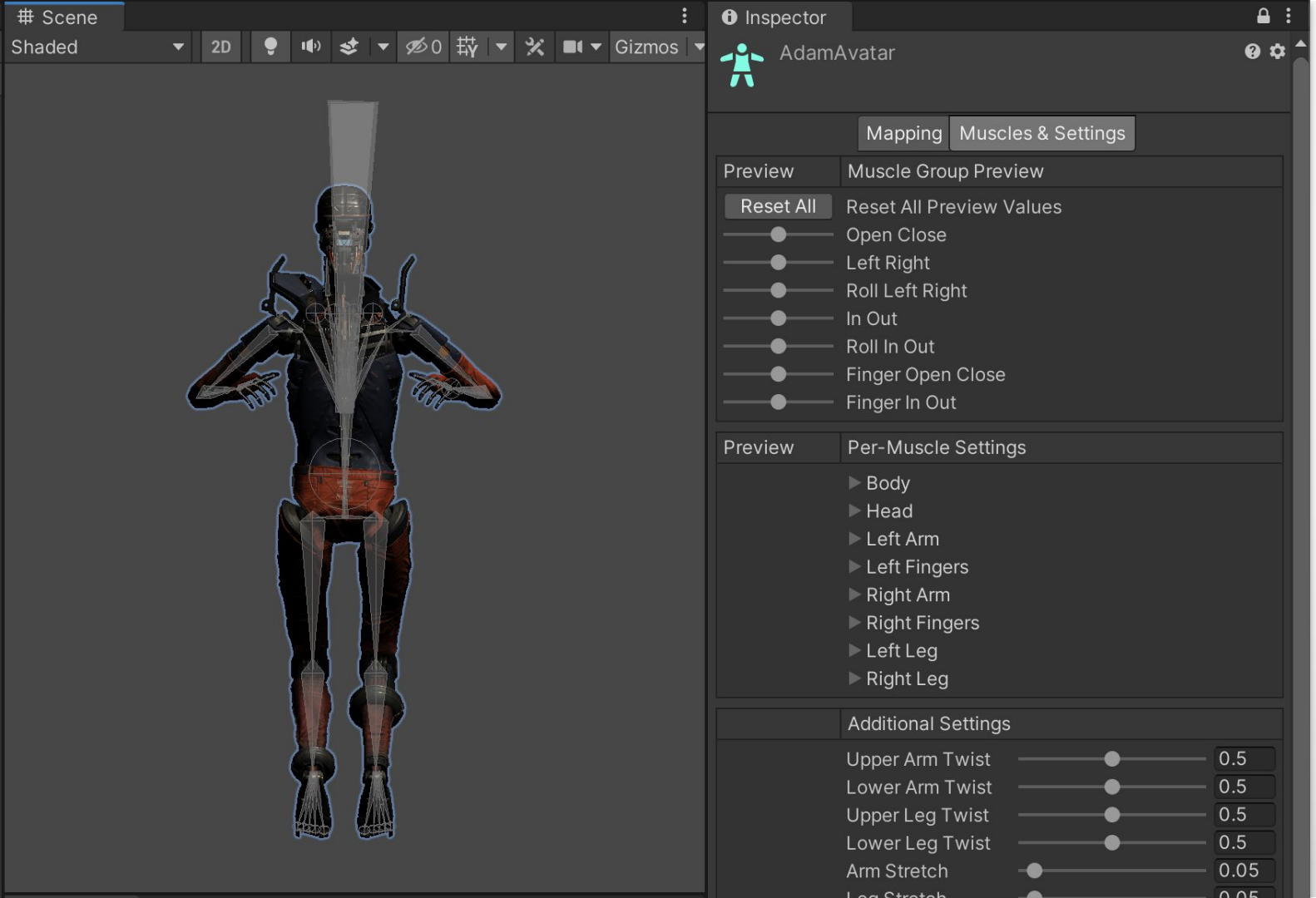
(DEMO)

Avatar


Hierarchy
All
Avatar Configuration
Main Camera
Directional Light
Adam(Clone)
Adam_Reference
Bip01
Bip01 Pelvis
Bip01 L Thigh
Bip01 L Calf
Bip01 L Foot
Bip01 L Toe0
Bip01 L Toe1
Bip01 L Toe2
Bip01 L Toe3
Bip01 L Toe4
Bip01 R Thigh
Bip01 R Calf
Bip01 R Foot
Bip01 R Toe0
Bip01 R Toe1
Bip01 R Toe2
Bip01 R Toe3
Bip01 R Toe4
Bip01 Spine
Adam_RigCables_Front_03
Adam_RigCables_Front_05
Adam_RigCables_Front_06
Adam_RigCables_Front_08
Bip01 Spine1
Adam_monitor_front
Bip01 L Clavicle
Bip01 L UpperArm
Bip01 L Forearm
Bip01 L ForeTwist
Bip01 L ForeTwist1
Inspector
AdamAvatar
Mapping
Muscles & Settings
Body
Head
Left Hand
Right Hand
Optional Bone
Body
Hips
Bip01 Pelvis (Transform
Spine
Bip01 Spine (Transform
Chest
Bip01 Spine1 (Transform
Upper Chest
None (Transform)
Left Arm


Scene
Shaded
2D
Gizmos
Inspector
AdamAvatar
Mapping
Muscles & Settings
Body
Head
Left Hand
Right Hand
Optional Bone
Body
Hips
Bip01 Pelvis (Transform)
Spine
Bip01 Spine (Transform)
Chest
Bip01 Spine1 (Transform)

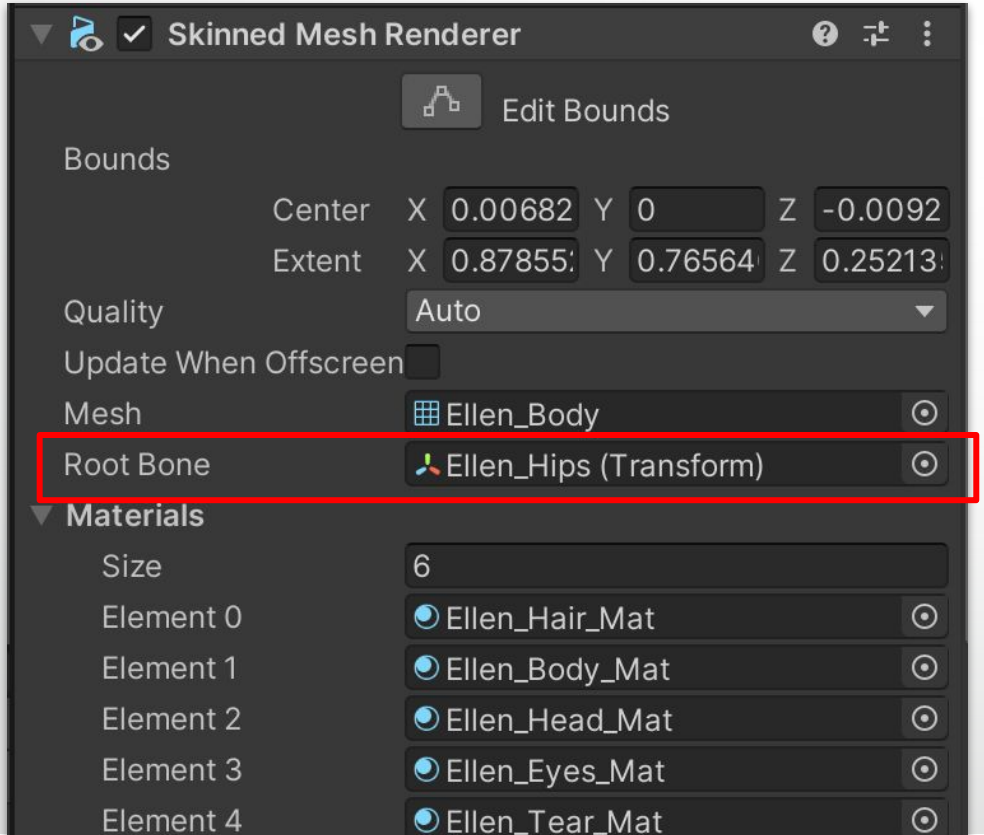
FeisStu

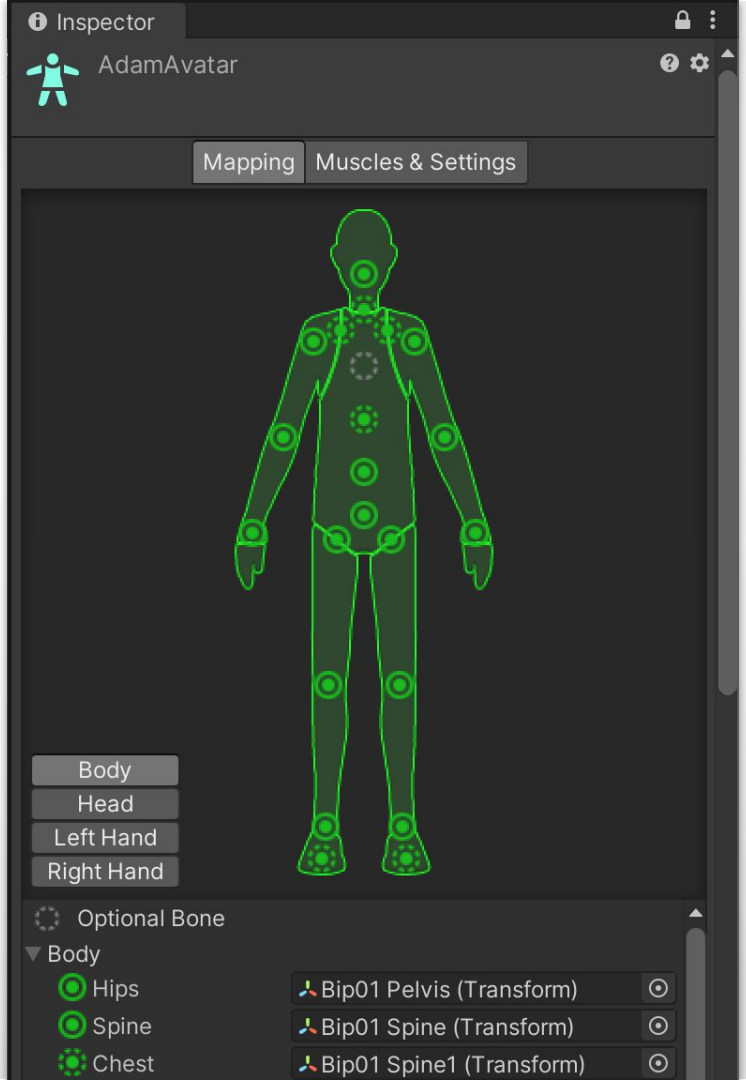

Scene
Shaded
2D
Gizmos
Inspector
AdamAvatar
Mapping
Muscles & Settings
Preview
Muscle Group Preview
Reset All
Reset All Preview Values
Open Close
Left Right
Roll Left Right
In Out
Roll In Out
Finger Open Close
Finger In Out
Preview
Per-Muscle Settings
Body
Head
Left Arm
Left Fingers
Right Arm
Right Fingers
Left Leg
Right Leg
Additional Settings
Upper Arm Twist 0.5
Lower Arm Twist 0.5
Upper Leg Twist 0.5
Lower Leg Twist 0.5
Arm Stretch 0.05

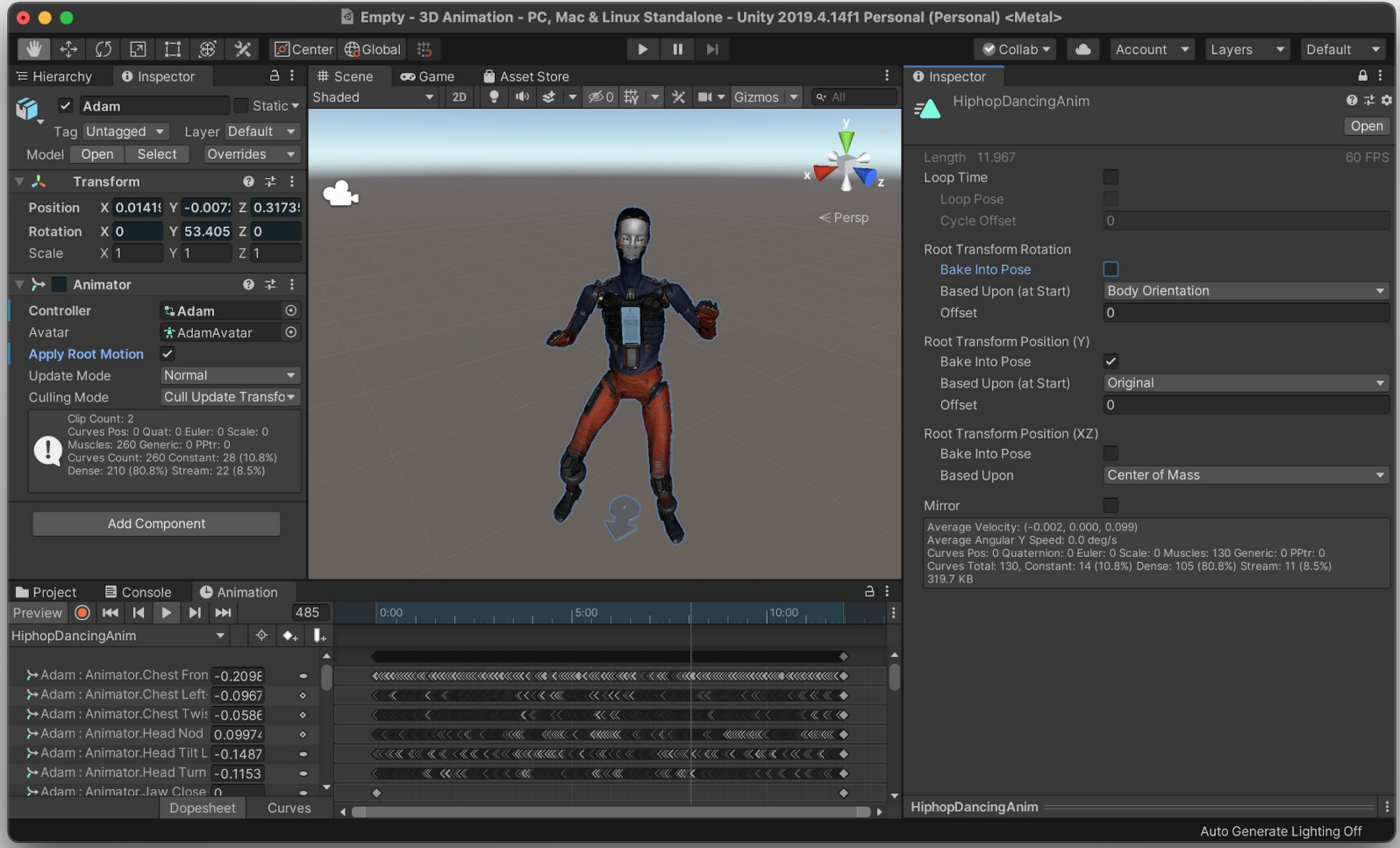
FeisStu

(DEMO)

Root motion

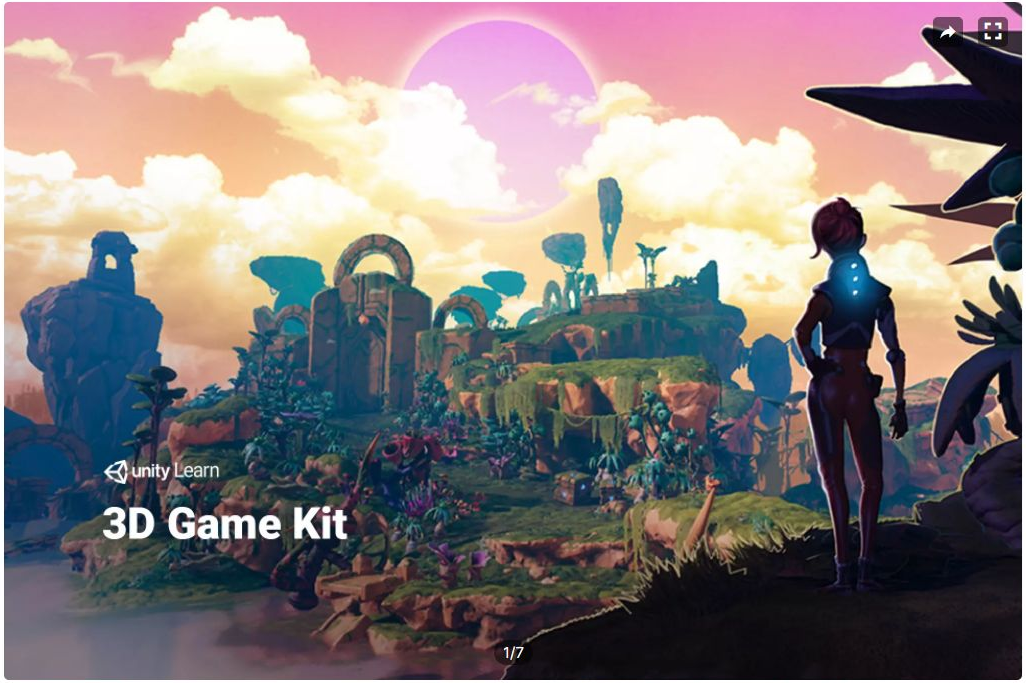

Skinned Mesh Renderer
Edit Bounds
Bounds
Center X 0.00682 Y 0 Z -0.0092
Extent X 0.87855 Y 0.76564 Z 0.25213
Quality Auto
Update When Offscreen
Mesh Ellen_Body
Root Bone Ellen_Hips (Transform)
Materials
Size 6
Element 0 Ellen_Hair_Mat
Element 1 Ellen_Body_Mat
Element 2 Ellen_Head_Mat
Element 3 Ellen_Eyes_Mat
Element 4 Ellen_Tear_Mat


Inspector
AdamAvatar
Mapping
Muscles & Settings
Body
Head
Left Hand
Right Hand
Optional Bone
Body
Hips Bip01 Pelvis (Transform)
Spine Bip01 Spine (Transform)
Chest Bip01 Spine1 (Transform)


Empty - 3D Animation - PC, Mac & Linux Standalone - Unity 2019.4.14f1 Personal (Personal) <Metal>
Hierarchy
Inspector
Adam
Static
Tag Untagged
Layer Default
Model Open Select Overrides
Transform
Position X 0.0141 Y -0.007 Z 0.3173
Rotation X 0 Y 53.405 Z 0
Scale X 1 Y 1 Z 1
Animator
Controller Adam
Avatar AdamAvatar
Apply Root Motion
Update Mode Normal
Culling Mode Cull Update Transfo
Clip Count: 2
Curves Pos: 0 Quat: 0 Euler: 0 Scale: 0
Muscles: 260 Generic: 0 PPtr: 0
Curves Count: 260 Constant: 28 (10.8%)
Dense: 210 (80.8%) Stream: 22 (8.5%)
Add Component
Scene
Game
Asset Store
Shaded
2D
Gizmos
Persp
Inspector
HiphopDancingAnim
Open
Length 11.967
60 FPS
Loop Time
Loop Pose
Cycle Offset 0
Root Transform Rotation
Bake Into Pose
Based Upon (at Start) Body Orientation
Offset 0
Root Transform Position (Y)
Bake Into Pose
Based Upon (at Start) Original
Offset 0
Root Transform Position (XZ)
Bake Into Pose
Based Upon Center of Mass
Mirror
Average Velocity: (-0.002, 0.000, 0.099)
Average Angular Y Speed: 0.0 deg/s
Curves Pos: 0 Quaternion: 0 Euler: 0 Scale: 0 Muscles: 130 Generic: 0 PPtr: 0
Curves Total: 130, Constant: 14 (10.8%) Dense: 105 (80.8%) Stream: 11 (8.5%)
319.7 KB
Project
Console
Animation
Preview
485
0:00
5:00
10:00
HiphopDancingAnim
Adam : Animator.Chest Fron -0.2098
Adam : Animator.Chest Left -0.0967
Adam : Animator.Chest Twis -0.0586
Adam : Animator.Head Nod 0.0997
Adam : Animator.Head Tilt L -0.1487
Adam : Animator.Head Turn -0.1153
Dopesheet
Curves
HiphopDancingAnim
Auto Generate Lighting Off

FeisStu

(DEMO)



3D Game Kit

Unity Technologies ★★★★☆ 4 | 484 Reviews

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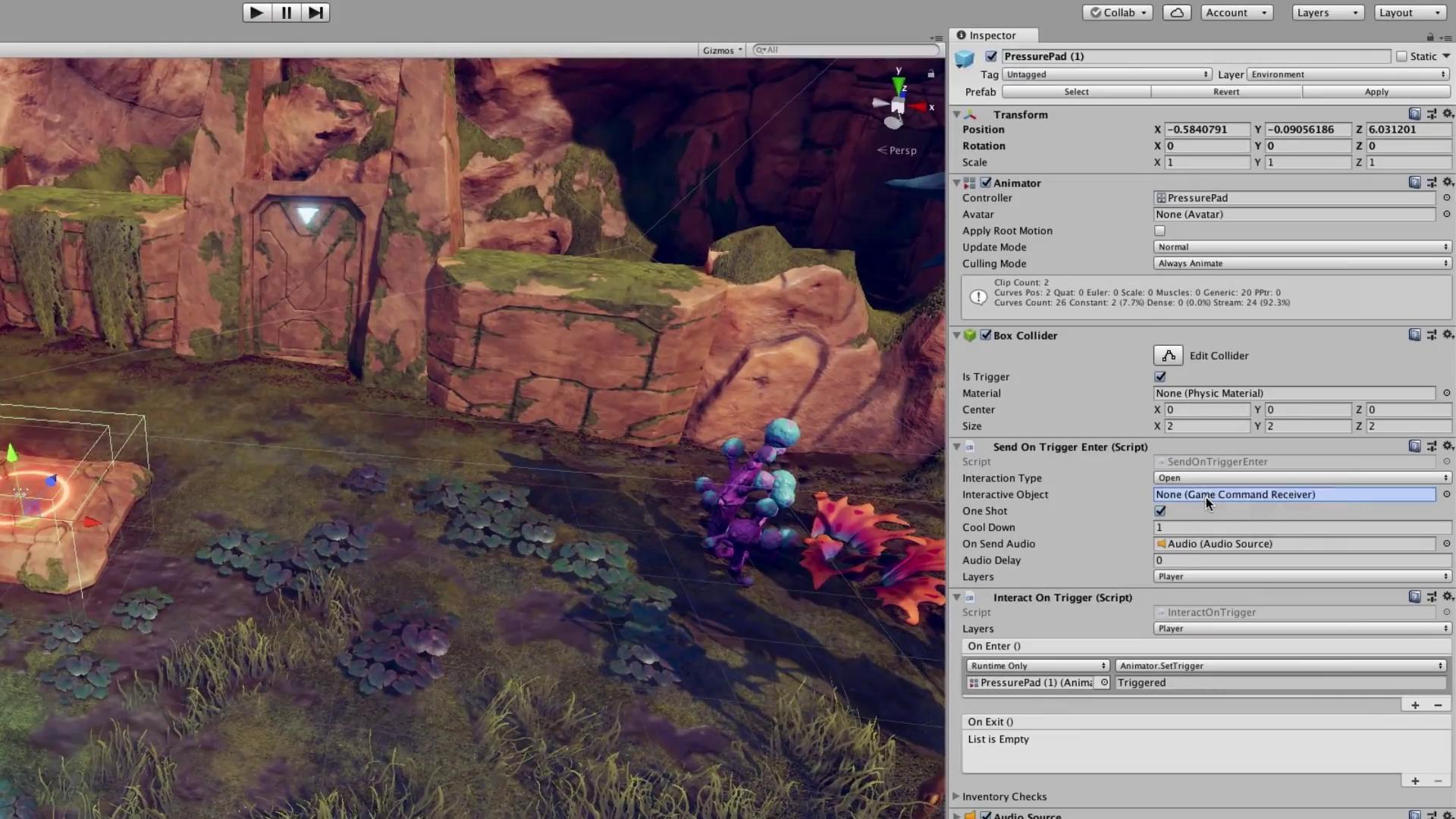
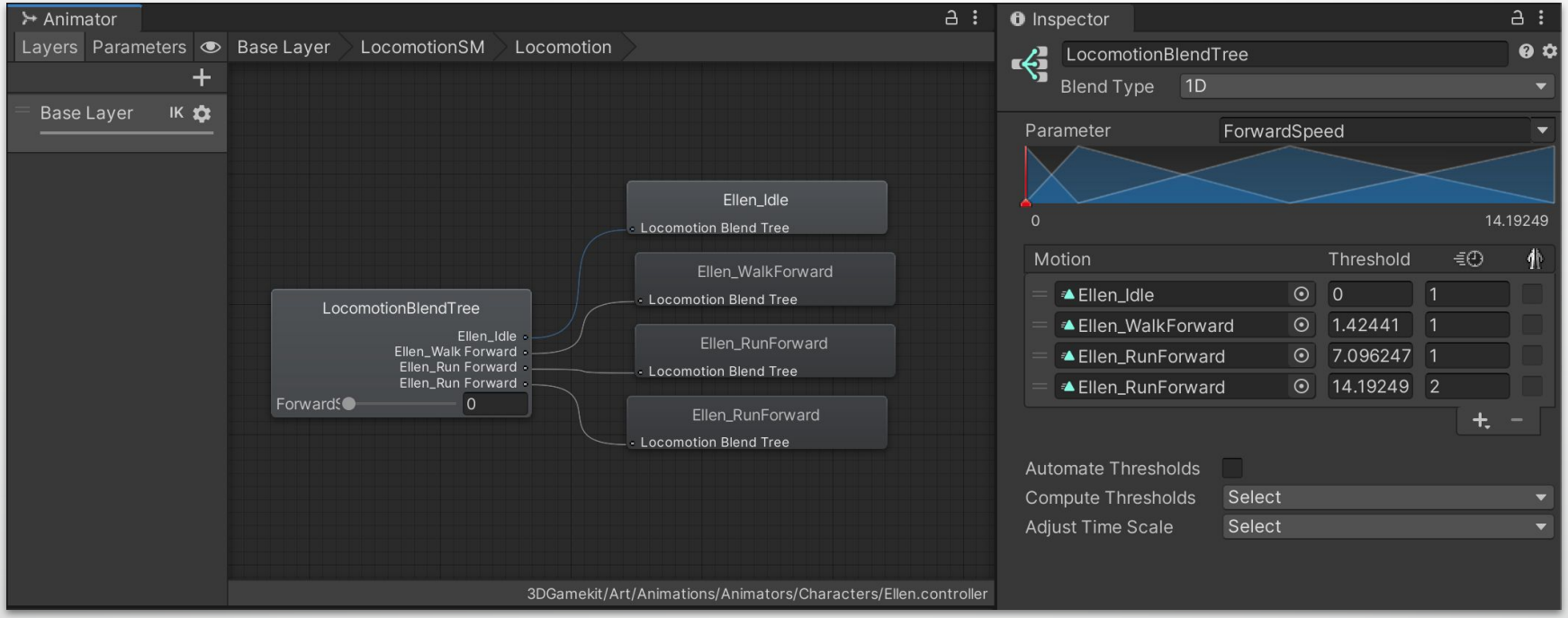

Collab
Account
Layers
Layout
Gizmos
Persp
Inspector
PressurePad (1)
Static
Tag
Untagged
Layer
Environment
Prefab
Select
Revert
Apply
Transform
Position
X -0.5840791
Y -0.09056186
Z 6.031201
Rotation
X 0
Y 0
Z 0
Scale
X 1
Y 1
Z 1
Animator
Controller
PressurePad
Avatar
None (Avatar)
Apply Root Motion
Update Mode
Normal
Culling Mode
Always Animate
Clip Count: 2
Curves Pos: 2 Quat: 0 Euler: 0 Scale: 0 Muscles: 0 Generic: 20 PPtr: 0
Curves Count: 26 Constant: 2 (7.7%) Dense: 0 (0.0%) Stream: 24 (92.3%)
Box Collider
Edit Collider
Is Trigger
Material
None (Physic Material)
Center
X 0
Y 0
Z 0
Size
X 2
Y 2
Z 2
Send On Trigger Enter (Script)
Script
SendOnTriggerEnter
Interaction Type
Open
Interactive Object
None (Game Command Receiver)
One Shot
Cool Down
1
On Send Audio
Audio (Audio Source)
Audio Delay
0
Layers
Player
Interact On Trigger (Script)
Script
InteractOnTrigger
Layers
Player
On Enter ()
Runtime Only
Animator.SetTrigger
PressurePad (1) (Anima
Triggered
On Exit ()
List is Empty
Inventory Checks

(DEMO)

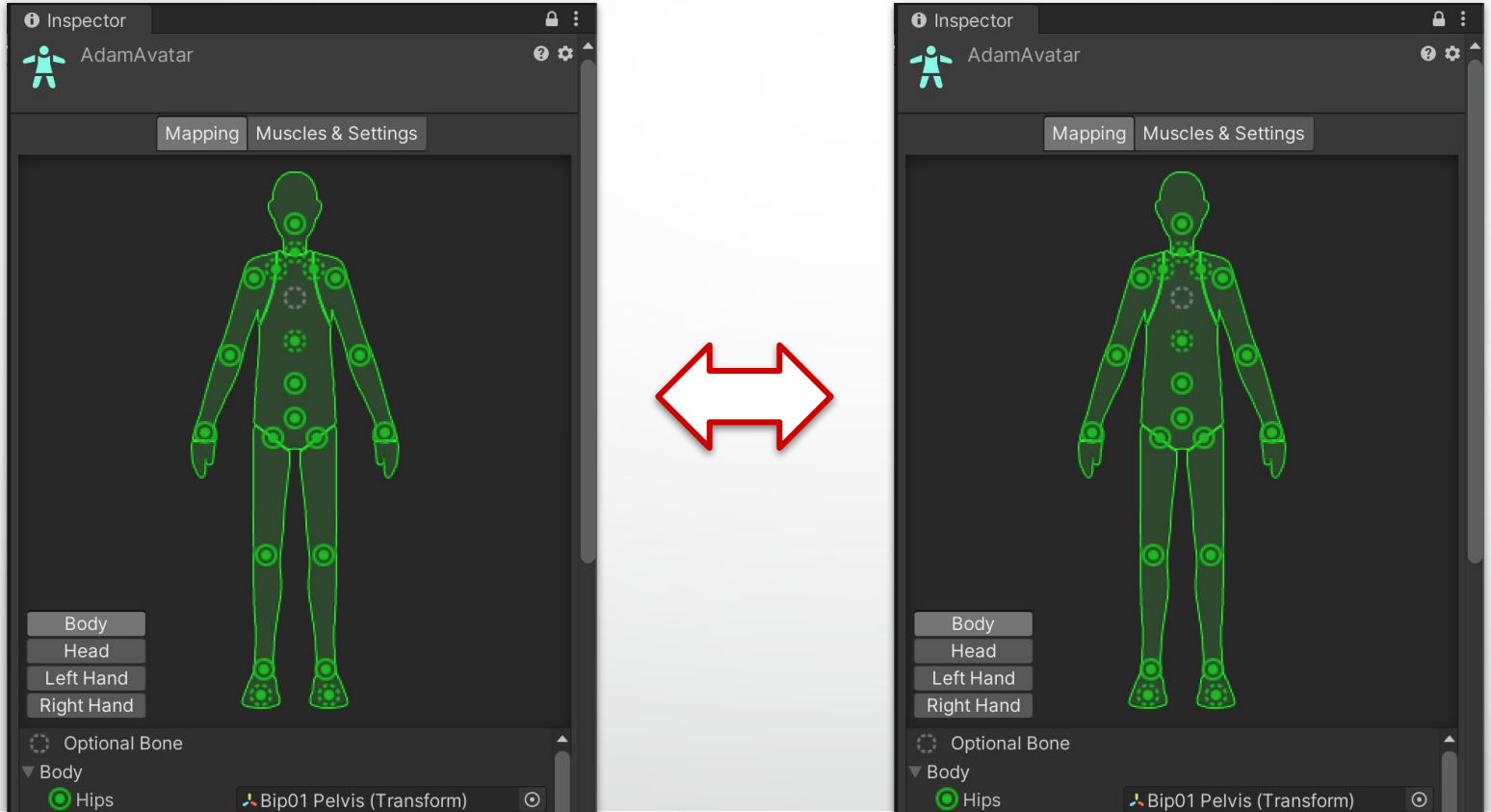
BlendTree



FeisStu

(DEMO)

Retargeting



FeisStu

Tutorial
Working with Animation Clips

Tutorial
Working with Animations and Animation Curves

Tutorial
Challenge: Re-Using Animation Clips

Tutorial
Rigging Edge Cases

Tutorial
Challenge: Re-targeting Animations

Tutorial
Retargeting and Reusing Animations Between Rigs - Recorded Learn Live Session

Tutorial
Learn Live Submissions - Reusing and Retargeting Animations

Retargeting and Reusing Animation

Project • Beginner • +300 XP • 2 Hours 40 Mins • 402

Overview Live

Summary

This project will take us through the process of reusing Animation Clips, both imported and custom. We will also review how to retarget imported animation clips on different biped, humanoid models.

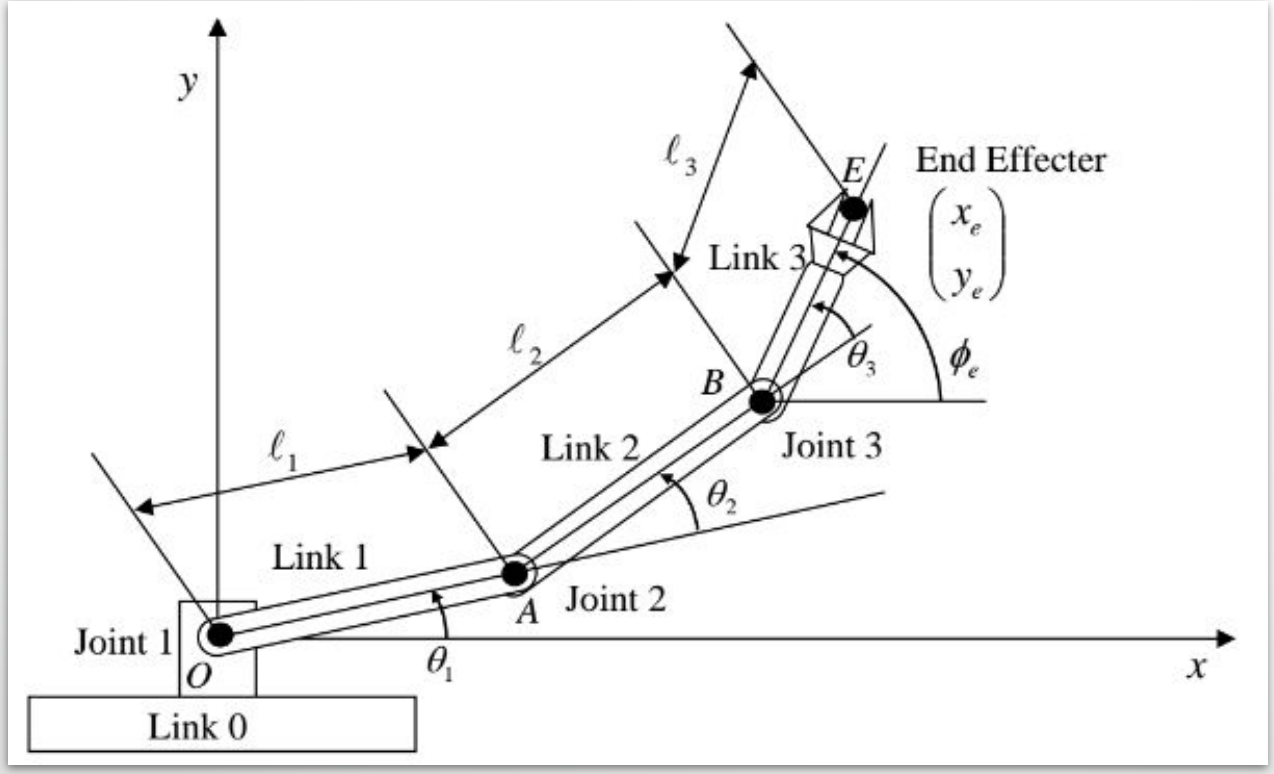
One of the most powerful features of Mecanim is retargeting of humanoid animations. This means that with relative ease, you can apply the same set of animations to various character models. Keep in mind that retargeting is only possible for humanoid models, where an Avatar has been configured, because this gives us a correspondence between the models' bone structure.

Language

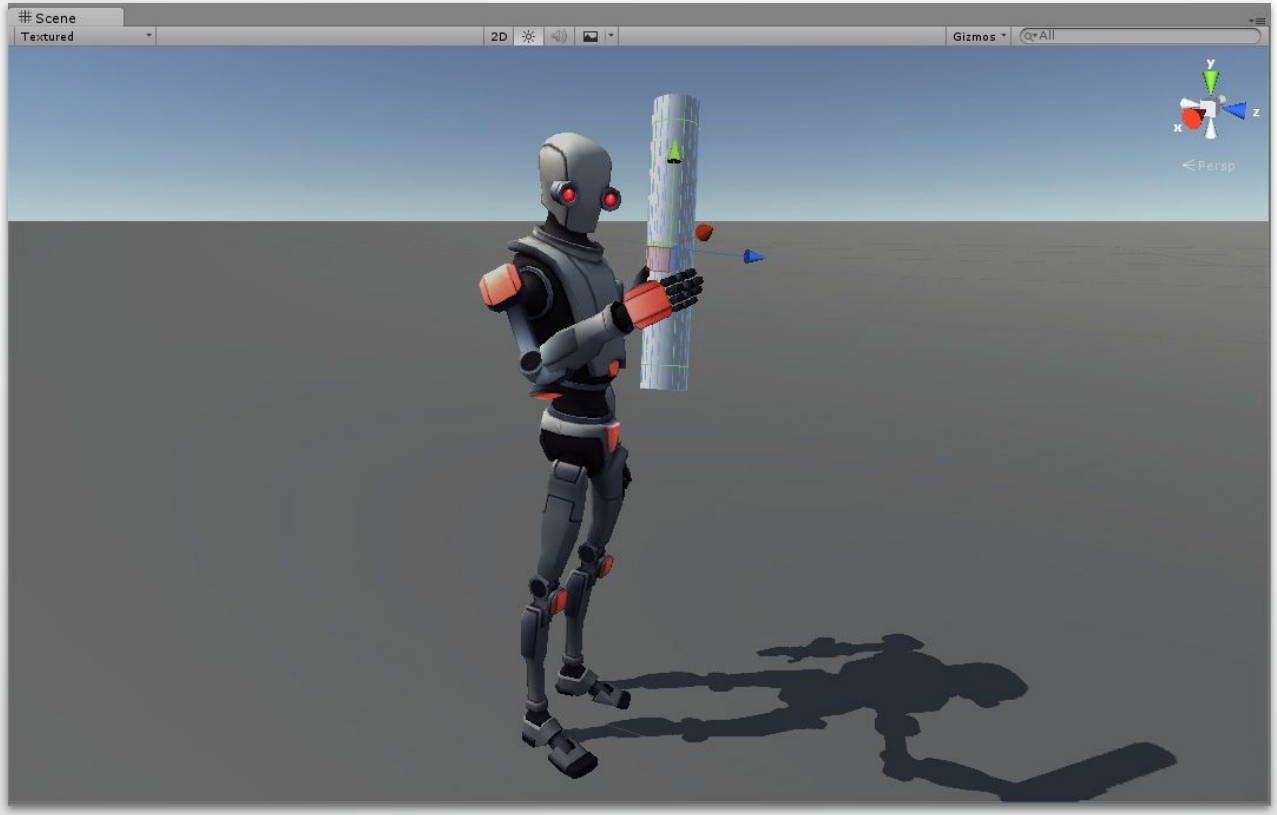
English

(DEMO)

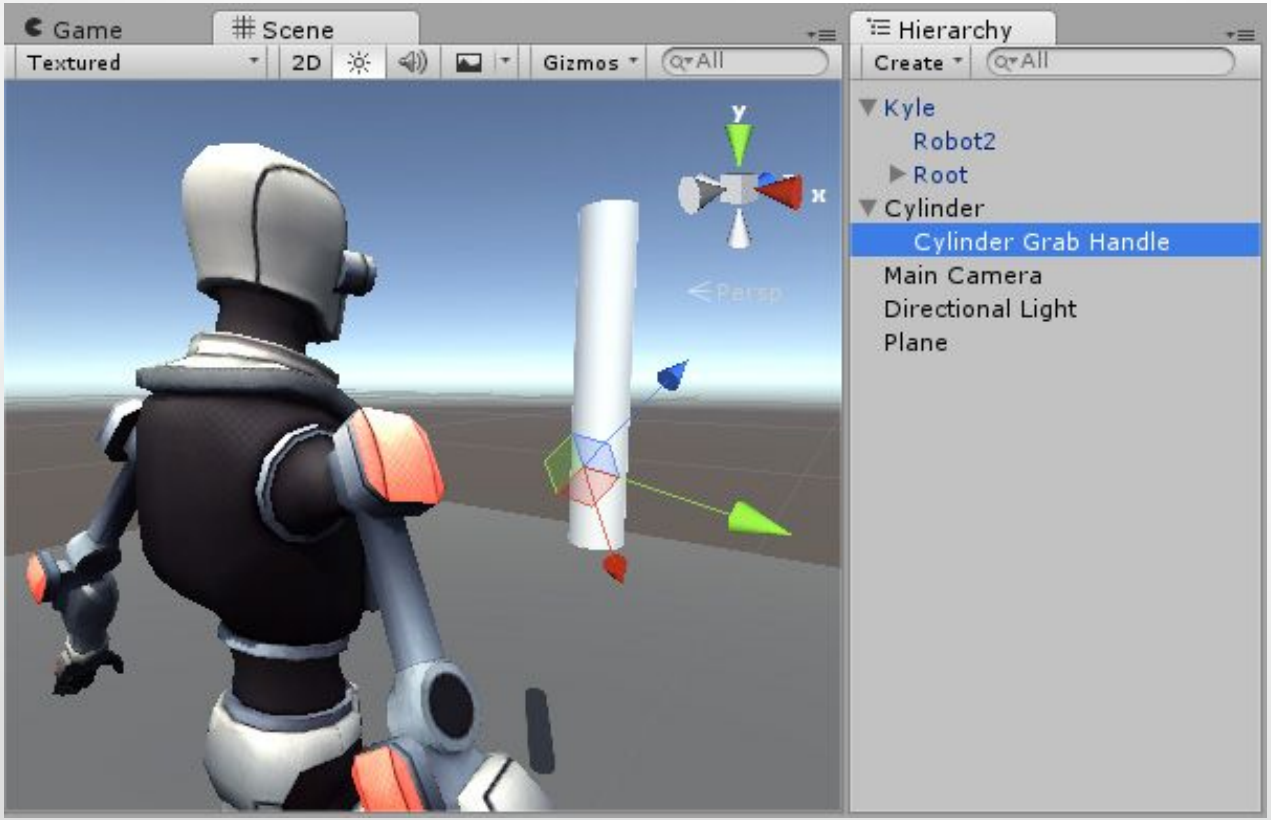
Inverse kinematics (IK)



Inverse kinematics (IK)



Inverse kinematics (IK)



Q & A

References

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