synty®

Base Locomotion

Keyframe Animation pack

User Guide

Version: 2.0.0

www.syntystore.com

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1. Introduction

Welcome to Base Locomotion, a specialised animation pack engineered for seamless integration across various platforms, ensuring swift implementation into your preferred development environment. The pack comes with animations curated to accelerate your animation workflow, providing a collection of seamlessly integrated motions that elevate the performance of humanoid characters to a new standard. Witness your characters come to life with a fluidity that not only enhances realism but also serves as a catalyst for boundless creative exploration and precise character navigation.

From all of us at Synty,
We thank you for the support!

2. Installation and set up

Requirements

Animation component files

- Unity supports fbx imports across all current LTS versions

Sample content

- Unity Version 2021 LTS+ or later
- Input System Package 1.5.1 or later
- Basic Locomotion is a collection of fbx animation files that have a wider compatibility across engines and animation tools, however to function correctly with the Animation Controller, Character Controller and Input System please ensure you follow the system requirements and the instructions in the relevant sections below that cover those topics.

3. Animation Pack Components

The Animation Pack features 205 purpose built animations, an ideal base for building a seamless humanoid animation system. With comprehensive coverage, it includes movements such as crouching, running, walking, sprinting, and standing, ensuring fluid transitions between states.

Key features

- Animation Sets:
    - 100 Masculine Animations and 100 Feminine Animations, designed for smooth blending, allowing for uninterrupted transitions between various states. Additionally, there are 4 Neutral additive animations that work with both sets.
- Animation formats:
    - Two different formats of animation have been provided. One format called Polygon, works with Synty's Polygon characters and the other

called Modular is designed to work best with Synty's Modular characters.

- Humanoid Character Avatar:
    - These animations seamlessly integrate with Unity's Mecanim system, providing a foundation for easy to integrate character animations across different characters.
- Sample Animation Controller:
    - Animation Controller's state-based system to organize and sequence character actions. Achieve a structured and modular approach to animation sequencing, allowing for seamless transitions between states and ensuring a fluid and responsive character experience.
- Sample Animation Controller Script:
    - Organize character parameters in a single script, enabling a structured and clear approach to tuning character movement. Transition seamlessly between states for fluid character movements.
- Demo Scene:
    - Scene built with various parts of the character connected as a sample of how a user could potentially use the content for a playable character
- Gallery Scene:
    - Scene of all the animations as separate assets for users to view clearly as individual animations.

List of Polygon Animations

Neutral *
A_Lean_Additive_Neut
A_BodyLook_Additive_Neut
A_HeadLook_Additive_Neut
A_TPose_Neut

Idle
A_Idle_Crouching
A_Idle_Standing

InAir
A_Jump_Idle
A_Jump_Idle_RootMotion
A_Jump_Running
A_Jump_Running_RootMotionVertical
A_Jump_Running_RootMotion
A_Jump_Sprinting
A_Jump_Sprinting_RootMotionVertical
A_Jump_Sprinting_RootMotion
A_Jump_Walking
A_Jump_Walking_RootMotionVertical
A_Jump_Walking_RootMotion
A_Land_IdleHard
A_Land_IdleHard_RootMotion
A_Land_IdleMedium
A_Land_IdleMedium_RootMotion
A_Land_IdleSoft
A_Land_IdleSoft_RootMotion

Locomotion
A_Crouch_BckStrafeBL
A_Crouch_BckStrafeBL_RootMotion
A_Crouch_BckStrafeBR
A_Crouch_BckStrafeBR_RootMotion
A_Crouch_BckStrafeB
A_Crouch_BckStrafeB_RootMotion
A_Crouch_BckStrafeFL
A_Crouch_BckStrafeFL_RootMotion
A_Crouch_BckStrafeL
A_Crouch_BckStrafeL_RootMotion
A_Crouch_BckStrafeR
A_Crouch_BckStrafeR_RootMotion
A_Crouch_FwdStrafeBR
A_Crouch_FwdStrafeBR_RootMotion
A_Crouch_FwdStrafeFL
A_Crouch_FwdStrafeFL_RootMotion
A_Crouch_FwdStrafeFR
A_Crouch_FwdStrafeFR_RootMotion
A_Crouch_FwdStrafeF
A_Crouch_FwdStrafeF_RootMotion
A_Crouch_FwdStrafeL
A_Crouch_FwdStrafeL_RootMotion
A_Crouch_FwdStrafeR
A_Crouch_FwdStrafeR_RootMotion
A_Run_BckStrafeBL
A_Run_BckStrafeBL_RootMotion
A_Run_BckStrafeBR
A_Run_BckStrafeBR_RootMotion
A_Run_BckStrafeB
A_Run_BckStrafeB_RootMotion
A_Run_BckStrafeFL
A_Run_BckStrafeFL_RootMotion
A_Run_BckStrafeL
A_Run_BckStrafeL_RootMotion
A_Run_BckStrafeR
A_Run_BckStrafeR_RootMotion
A_Run_Down25F
A_Run_Down25F_RootMotion
A_Run_FwdStrafeBR
A_Run_FwdStrafeBR_RootMotion
A_Run_FwdStrafeFL
A_Run_FwdStrafeFL_RootMotion
A_Run_FwdStrafeFR
A_Run_FwdStrafeFR_RootMotion
A_Run_FwdStrafeF
A_Run_FwdStrafeF_RootMotion
A_Run_FwdStrafeL
A_Run_FwdStrafeL_RootMotion
A_Run_FwdStrafeR
A_Run_FwdStrafeR_RootMotion
A_Run_F
A_Run_F_RootMotion
A_Run_Up25F
A_Run_Up25F_RootMotion

A_Walk_BckStrafeBL
A_Walk_BckStrafeBL_RootMotion
A_Walk_BckStrafeBR
A_Walk_BckStrafeBR_RootMotion
A_Walk_BckStrafeB
A_Walk_BckStrafeB_RootMotion
A_Walk_BckStrafeFL
A_Walk_BckStrafeFL_RootMotion
A_Walk_BckStrafeL
A_Walk_BckStrafeL_RootMotion
A_Walk_BckStrafeR
A_Walk_BckStrafeR_RootMotion
A_Walk_Down25F
A_Walk_Down25F_RootMotion
A_Walk_FwdStrafeBR
A_Walk_FwdStrafeBR_RootMotion
A_Walk_FwdStrafeFL
A_Walk_FwdStrafeFL_RootMotion
A_Walk_FwdStrafeFR
A_Walk_FwdStrafeFR_RootMotion
A_Walk_FwdStrafeF
A_Walk_FwdStrafeF_RootMotion
A_Walk_FwdStrafeL
A_Shuffle_Crouching_B
A_Shuffle_Crouching_B_RootMotion
A_Shuffle_Crouching_F
A_Shuffle_Crouching_F_RootMotion
A_Shuffle_Crouching_L
A_Shuffle_Crouching_L_RootMotion
A_Shuffle_Crouching_R
A_Shuffle_Crouching_R_RootMotion
A_Shuffle_Standing_B
A_Shuffle_Standing_B_RootMotion
A_Shuffle_Standing_F
A_Shuffle_Standing_F_RootMotion
A_Shuffle_Standing_L
A_Shuffle_Standing_L_RootMotion
A_Shuffle_Standing_R
A_Shuffle_Standing_R_RootMotion

A_Turn_Crouching_90LRootMotion
A_Turn_Crouching_90L
A_Turn_Crouching_90RRootMotion
A_Turn_Crouching_90R
A_Turn_Standing_180LRootMotion
A_Turn_Standing_180L
A_Turn_Standing_180RRootMotion
A_Turn_Standing_180R
A_Turn_Standing_90LRootMotion
A_Turn_Standing_90L
A_Turn_Standing_90RRootMotion
A_Turn_Standing_90R

Transitions
A_Crouch_ToStand
A_Idle_ToRun180LRootMotion
A_Idle_ToRun180L
A_Idle_ToRun180RRootMotion
A_Idle_ToRun180R
A_Idle_ToRun90LRootMotion
A_Idle_ToRun90L
A_Idle_ToRun90RRootMotion
A_Idle_ToRun90R
A_Idle_ToRunFRootMotion
A_Idle_ToRunF
A_Idle_ToWalk180LRootMotion
A_Idle_ToWalk180L
A_Idle_ToWalk180RRootMotion
A_Idle_ToWalk180R
A_Idle_ToWalk90LRootMotion
A_Idle_ToWalk90L
A_Idle_ToWalk90RRootMotion
A_Idle_ToWalk90R
A_Idle_ToWalkFRootMotion
A_Idle_ToWalkF
A_Run_ToIdleF_LFootRootMotion
A_Run_ToIdleF_LFoot

A_Sprint_Down25F A_Sprint_Down25F_RootMotion A_Sprint_F A_Sprint_F_RootMotion A_Sprint_Up25F A_Sprint_Up25F_RootMotion	A_Walk_FwdStrafeL_RootMotion A_Walk_FwdStrafeR A_Walk_FwdStrafeR_RootMotion A_Walk_F A_Walk_F_RootMotion A_Walk_Up25F A_Walk_Up25F_RootMotion	A_Run_ToIdleF_RFootRootMotion A_Run_ToIdleF_RFoot A_Sprint_ToCrouchRootMotion A_Sprint_ToCrouch A_Stand_ToCrouch A_Walk_ToIdleF_LFootRootMotion A_Walk_ToIdleF_LFoot A_Walk_ToIdleF_RFootRootMotion A_Walk_ToIdleF_RFoot

List of Modular Animations

Neutral *
A_MOD_BL_Lean_Additive_Neut.fbx
A_MOD_BL_BodyLook_Additive_Neut.fbx
A_MOD_BL_HeadLook_Additive_Neut.fbx
A_MOD_BL_TPose_Neut.fbx

Idle
A_MOD_BL_Idle_Crouching
A_MOD_BL_Idle_Standing

InAir
A_MOD_BL_InAir_FallShort
A_MOD_BL_InAir_FallLarge
A_MOD_BL_Jump_Idle
A_MOD_BL_Jump_Idle_RM
A_MOD_BL_Jump_Running
A_MOD_BL_Jump_Running_RMV
A_MOD_BL_Jump_Running_RM
A_MOD_BL_Jump_Sprinting
A_MOD_BL_Jump_Sprinting_RMV
A_MOD_BL_Jump_Sprinting_RM
A_MOD_BL_Jump_Walking
A_MOD_BL_Jump_Walking_RMV
A_MOD_BL_Jump_Walking_RM
A_MOD_BL_Land_IdleHard
A_MOD_BL_Land_IdleHard_RM
A_MOD_BL_Land_IdleMedium
A_MOD_BL_Land_IdleMedium_RM
A_MOD_BL_Land_IdleSoft
A_MOD_BL_Land_IdleSoft_RM

Locomotion
A_MOD_BL_Crouch_BckStrafeL_RM
A_MOD_BL_Crouch_BckStrafeB
A_MOD_BL_Crouch_BckStrafeB_RM
A_MOD_BL_Crouch_BckStrafeBL
A_MOD_BL_Crouch_BckStrafeBL_RM
A_MOD_BL_Crouch_BckStrafeBR
A_MOD_BL_Crouch_BckStrafeBR_RM
A_MOD_BL_Crouch_BckStrafeFL
A_MOD_BL_Crouch_BckStrafeFL_RM
A_MOD_BL_Crouch_BckStrafeR
A_MOD_BL_Crouch_BckStrafeR_RM
A_MOD_BL_Crouch_FwdStrafeBR
A_MOD_BL_Crouch_FwdStrafeBR_RM
A_MOD_BL_Crouch_FwdStrafeF
A_MOD_BL_Crouch_FwdStrafeF_RM
A_MOD_BL_Crouch_FwdStrafeFL
A_MOD_BL_Crouch_FwdStrafeFL_RM
A_MOD_BL_Crouch_FwdStrafeFR
A_MOD_BL_Crouch_FwdStrafeFR_RM
A_MOD_BL_Run_BckStrafeL
A_MOD_BL_Run_BckStrafeL_RM
A_MOD_BL_Run_F
A_MOD_BL_Run_F_RM
A_MOD_BL_Run_FwdStrafeBR
A_MOD_BL_Run_FwdStrafeBR_RM
A_MOD_BL_Run_FwdStrafeF
A_MOD_BL_Run_FwdStrafeF_RM
A_MOD_BL_Run_FwdStrafeFR
A_MOD_BL_Run_FwdStrafeFR_RM
A_MOD_BL_Run_FwdStrafeL
A_MOD_BL_Run_FwdStrafeL_RM
A_MOD_BL_Run_BckStrafeBL
A_MOD_BL_Run_BckStrafeBL_RM
A_MOD_BL_Run_BckStrafeBR
A_MOD_BL_Run_BckStrafeBR_RM
A_MOD_BL_Run_BckStrafeB
A_MOD_BL_Run_BckStrafeB_RM
A_MOD_BL_Run_BckStrafeFL
A_MOD_BL_Run_BckStrafeFL_RM
A_MOD_BL_Run_BckStrafeR
A_MOD_BL_Run_BckStrafeR_RM
A_MOD_BL_Run_Down25F
A_MOD_BL_Run_Down25F_RM
A_MOD_BL_Run_FwdStrafeFL
A_MOD_BL_Run_FwdStrafeFL_RM
A_MOD_BL_Run_FwdStrafeR
A_MOD_BL_Run_FwdStrafeR_RM
A_MOD_BL_Run_Up25F
A_MOD_BL_Run_Up25F_RM

A_MOD_BL_Walk_BckStrafeB
A_MOD_BL_Walk_BckStrafeB_RM
A_MOD_BL_Walk_BckStrafeBL
A_MOD_BL_Walk_BckStrafeBL_RM
A_MOD_BL_Walk_BckStrafeBR
A_MOD_BL_Walk_BckStrafeBR_RM
A_MOD_BL_Walk_BckStrafeFL
A_MOD_BL_Walk_BckStrafeFL_RM
A_MOD_BL_Walk_BckStrafeL
A_MOD_BL_Walk_BckStrafeL_RM
A_MOD_BL_Walk_BckStrafeR
A_MOD_BL_Walk_BckStrafeR_RM
A_MOD_BL_Walk_Down25F
A_MOD_BL_Walk_Down25F_RM
A_MOD_BL_Walk_F
A_MOD_BL_Walk_F_RM
A_MOD_BL_Walk_FwdStrafeBR
A_MOD_BL_Walk_FwdStrafeBR_RM
A_MOD_BL_Walk_FwdStrafeFL
A_MOD_BL_Walk_FwdStrafeFL_RM
A_MOD_BL_Shuffle_Standing_F
A_MOD_BL_Shuffle_Standing_F_RM
A_MOD_BL_Shuffle_Standing_L
A_MOD_BL_Shuffle_Standing_L_RM
A_MOD_BL_Shuffle_Standing_R
A_MOD_BL_Shuffle_Standing_R_RM
A_MOD_BL_Shuffle_Standing_B
A_MOD_BL_Shuffle_Standing_B_RM
A_MOD_BL_Shuffle_Crouching_F
A_MOD_BL_Shuffle_Crouching_F_RM
A_MOD_BL_Shuffle_Crouching_L
A_MOD_BL_Shuffle_Crouching_L_RM
A_MOD_BL_Shuffle_Crouching_R
A_MOD_BL_Shuffle_Crouching_R_RM
A_MOD_BL_Shuffle_Crouching_B
A_MOD_BL_Shuffle_Crouching_B_RM

A_MOD_BL_Turn_Standing_90L
A_MOD_BL_Turn_Standing_90L_RM
A_MOD_BL_Turn_Standing_90R
A_MOD_BL_Turn_Standing_90R_RM
A_MOD_BL_Turn_Standing_180L
A_MOD_BL_Turn_Standing_180L_RM
A_MOD_BL_Turn_Standing_180R
A_MOD_BL_Turn_Standing_180R_RM
A_MOD_BL_Turn_Crouching_90L
A_MOD_BL_Turn_Crouching_90L_RM
A_MOD_BL_Turn_Crouching_90R
A_MOD_BL_Turn_Crouching_90R_RM

Transitions
A_MOD_BL_Crouch_ToStand
A_MOD_BL_Stand_ToCrouch
A_MOD_BL_Sprint_ToCrouch
A_MOD_BL_Sprint_ToCrouch_RM
A_MOD_BL_Idle_ToRun_180L
A_MOD_BL_Idle_ToRun_180L_RM
A_MOD_BL_Idle_ToRun_180R
A_MOD_BL_Idle_ToRun_180R_RM
A_MOD_BL_Idle_ToRun_90L
A_MOD_BL_Idle_ToRun_90L_RM
A_MOD_BL_Idle_ToRun_90R
A_MOD_BL_Idle_ToRun_90R_RM
A_MOD_BL_Idle_ToRun_B
A_MOD_BL_Idle_ToRun_B_RM
A_MOD_BL_Idle_ToRun_F
A_MOD_BL_Idle_ToRun_F_RM
A_MOD_BL_Run_ToIdle_LFoot
A_MOD_BL_Run_ToIdle_LFoot_RM
A_MOD_BL_Run_ToIdle_RFoot
A_MOD_BL_Run_ToIdle_RFoot_RM

A_MOD_BL_Crouch_FwdStrafeL A_MOD_BL_Crouch_FwdStrafeL_RM A_MOD_BL_Crouch_FwdStrafeR A_MOD_BL_Crouch_FwdStrafeR_RM A_MOD_BL_Crouch_BckStrafeL A_MOD_BL_Sprint_Down25F A_MOD_BL_Sprint_Down25F_RM A_MOD_BL_Sprint_F A_MOD_BL_Sprint_F_RM A_MOD_BL_Sprint_Up25F A_MOD_BL_Sprint_Up25F_RM	A_MOD_BL_Walk_FwdStrafeFR A_MOD_BL_Walk_FwdStrafeFR_RM A_MOD_BL_Walk_FwdStrafeF A_MOD_BL_Walk_FwdStrafeF_RM A_MOD_BL_Walk_FwdStrafeL A_MOD_BL_Walk_FwdStrafeL_RM A_MOD_BL_Walk_FwdStrafeR A_MOD_BL_Walk_FwdStrafeR_RM A_MOD_BL_Walk_Up25F A_MOD_BL_Walk_Up25F_RM	A_MOD_BL_Idle_ToWalk_90L A_MOD_BL_Idle_ToWalk_90L_RM A_MOD_BL_Idle_ToWalk_90R A_MOD_BL_Idle_ToWalk_90R_RM A_MOD_BL_Idle_ToWalk_180L A_MOD_BL_Idle_ToWalk_180L_RM A_MOD_BL_Idle_ToWalk_180R A_MOD_BL_Idle_ToWalk_180R_RM A_MOD_BL_Idle_ToWalk_F A_MOD_BL_Idle_ToWalk_F_RM A_MOD_BL_Walk_ToIdleF_LFoot A_MOD_BL_Walk_ToIdleF_LFoot_RM A_MOD_BL_Walk_ToIdleF_RFoot A_MOD_BL_Walk_ToIdleF_RFoot_RM

**** Note:** The Neutral 'Neut' animations work with both 'Masc' and 'Femn' sets as additive animations for body leaning, head looks, and body looks.*

Understanding Animation Naming Conventions

Synty has moved to a new naming convention for animation packs since the original release of Base Locomotion. The new convention includes which character type the animation is for (e.g. Modular) and which pack the animation is associated with (e.g. Base Locomotion).

While the new Modular character animations in this pack will follow this newer convention, the Polygon character animations still follow the old convention in order to cause as little disruption as possible within existing projects.

Polygon (old naming convention)

Order:

`<Filetype>_<AnimationType>_<Description>_<RootMotion>_<Gender>`

Examples:

- `A_Run_BckStrafeBL_Masc`
- `A_Jump_Running_RootMotion_Femn`
- `A_Lean_Additive_Neut`

Modular (new naming convention)

Order:

`<Filetype>_<SyntyCharacter>_<AnimationPack>_<AnimationType>_<Direction/Description>_<Action>_<Section>_<RootMotion>_<Gender>`

Examples:

- `A_MOD_BL_Run_BckStrafeBL_Masc.fbx`
- `A_MOD_BL_Jump_Running_RM_Femn.fbx`
- `A_MOD_BL_Lean_Additive_Neut.fbx`

Categories:

- **Filetype:** The broad-scope prefix. Here ‘A’ stands for ‘Animation’
- **SyntyCharacter:** Which character this animation is for. E.g. Polygon or Modular.
- **AnimationPack:** Here ‘BL’ indicates that the animation belongs to the ‘Base Locomotion’ Pack.
- **AnimationType:** The general category of animation, Run, walk, crouch animation.
- **Direction/Description:** ‘BckStrafe’ specifies that this animation uses a ‘backwards strafe’ running cycle, and the last ‘BL’ indicates that it is in the specific direction ‘Back-Left’ (i.e. at a diagonal).
- **Action:** Explains the motion with more specificity.
- **Section:** Describes what part of the animation this is, e.g. Enter, Exit, Loop
- **RootMotion:** If this is the root-motion version of an animation, it is indicated with an extra tag, shortened to ‘RM’ in the new naming convention. ‘Vertical-only’ and ‘Horizontal-only’ root motion is indicated with the tag ‘RMV’ or ‘RMH’.
- **Gender:** Either masculine, (Masc), feminine, (Femn) or Neutral, (Neut).

Tips for working with Animations

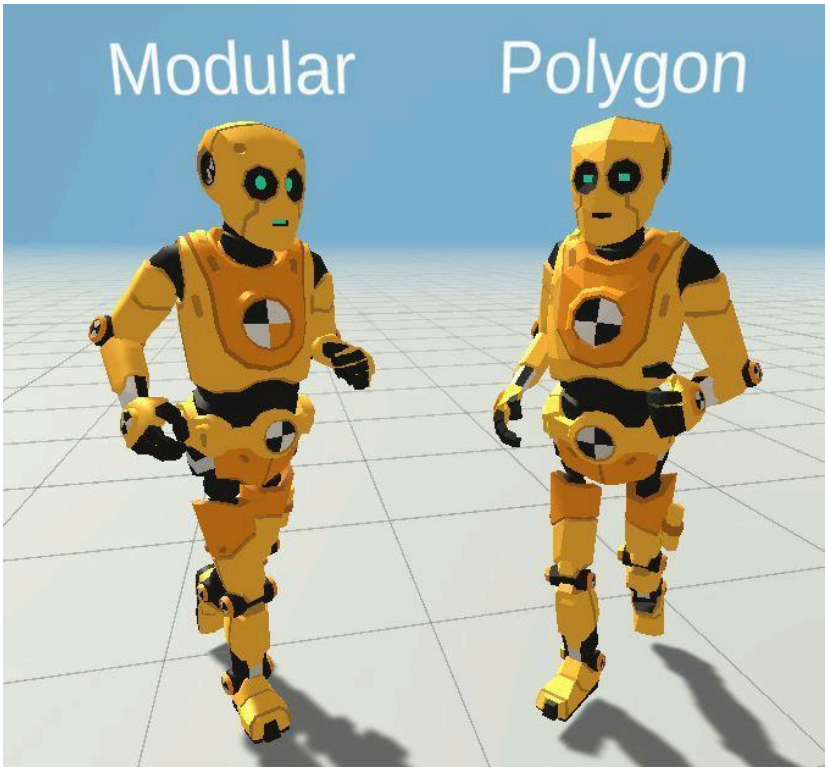
Modular and **Polygon** animations

The Base Locomotion pack is designed to work with two main Synty character types: Polygon, and Modular.

These two character types have different skeletons and proportions, so the Base Locomotion animation pack has been adapted for both character types via two different sets of animations, for maximum compatibility.

Any animations with the prefix **‘A_MOD_’** are designed for use with Synty Modular characters, whereas animations without this prefix are designed for use with Synty Polygon characters. The animations are split into respective Modular and Polygon folders under:

Assets/Synty/AnimationBaseLocomotion/Animation/



Masculine and **Feminine** animations

The Base Locomotion pack also has two subsets of animation with different posing to make the animation set more masculine or feminine, giving the user

an even broader range of choice. Any animations with the suffix **'_Femn'** are using more feminine posing, and with the suffix **'_Masc'** are using more masculine posing.

These animations are split into 'Masculine' and 'Feminine' subfolders beneath each character type. For example:

Assets/Synty/AnimationBaseLocomotion/Animation/Polygon/Masculine

Optimizing Animation Performance

Unity has numerous options to help optimize performance when using animations. These options are within the animation tab for each fbx animation asset.

Import Settings:

- Use the "Rig" tab to configure Avatar Definition and Animation Type settings.
- Enable "Optimize Game Objects" to remove redundant Transform components.
- Consider enabling "Import Blend Shapes" if needed.

Animation Compression:

- Utilize Unity's animation compression options.
- Use "Optimal" for keyframe reduction without sacrificing visual quality.
- Experiment with different compression ratios to find the right balance between performance and quality.

Remove Scale Curves:

- If not needed, consider removing scale curves from animations.
- Scale curves can impact performance, and removing them can streamline the animation data.

4. Quick Start

Demo Scenes

We have provided a Demo scene for both Polygon and Modular Synty characters. This section describes the demo and gallery scene and what they demonstrate.

You will find the scenes in:
Assets/Synty/AnimationBaseLocomotion/Samples/Scenes

Demo_01_Polygon

Demo_01_Modular

Gallery_01_Polygon

Gallery_01_Modular

Demo_01_Polygon/Modular

This scene demonstrates the use of the various systems in combination to create an animated moving character. The scene demonstrates:

- Mecanim-compatible Avatar using the Character Controller Component
- Modular State Machine driven Animation Controller
- Versatile Input options for control via Mouse/Keyboard or Gamepad
- Movement Toggle to choose between 'Always Strafing' or 'Input Direction'
- Simple lock-on system for targeted interactions

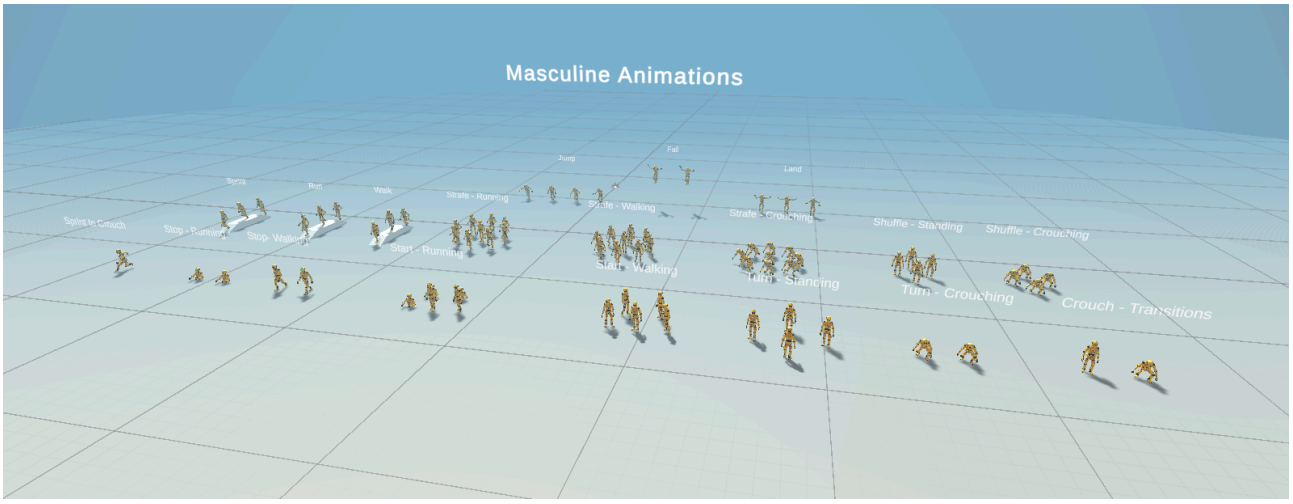
As seen in the image is the compound space for a user to run around as the character dummy to test various movements like walking, running, sprinting, strafing, jumping, crouching/sliding under objects and locking on to targets.

This scene can be used to test animations or other characters on the Synty Locomotion system as a quick start to getting a character moving.

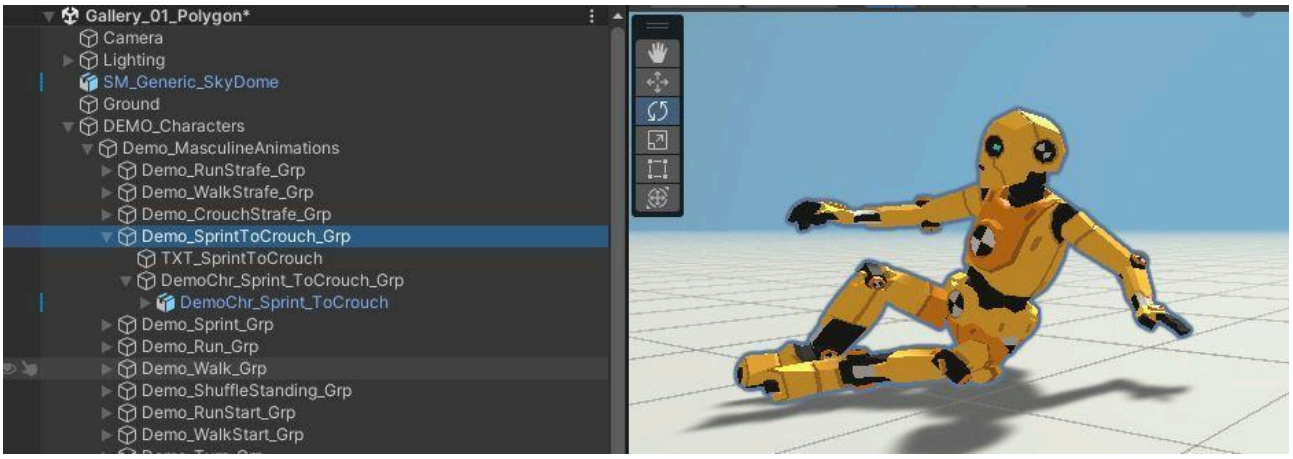
Gallery_01_Polygon/Modular

This scene demonstrates the various animations in this pack as a virtual gallery/library so users can break down how the animations work in isolation, to understand further how they work in tandem:

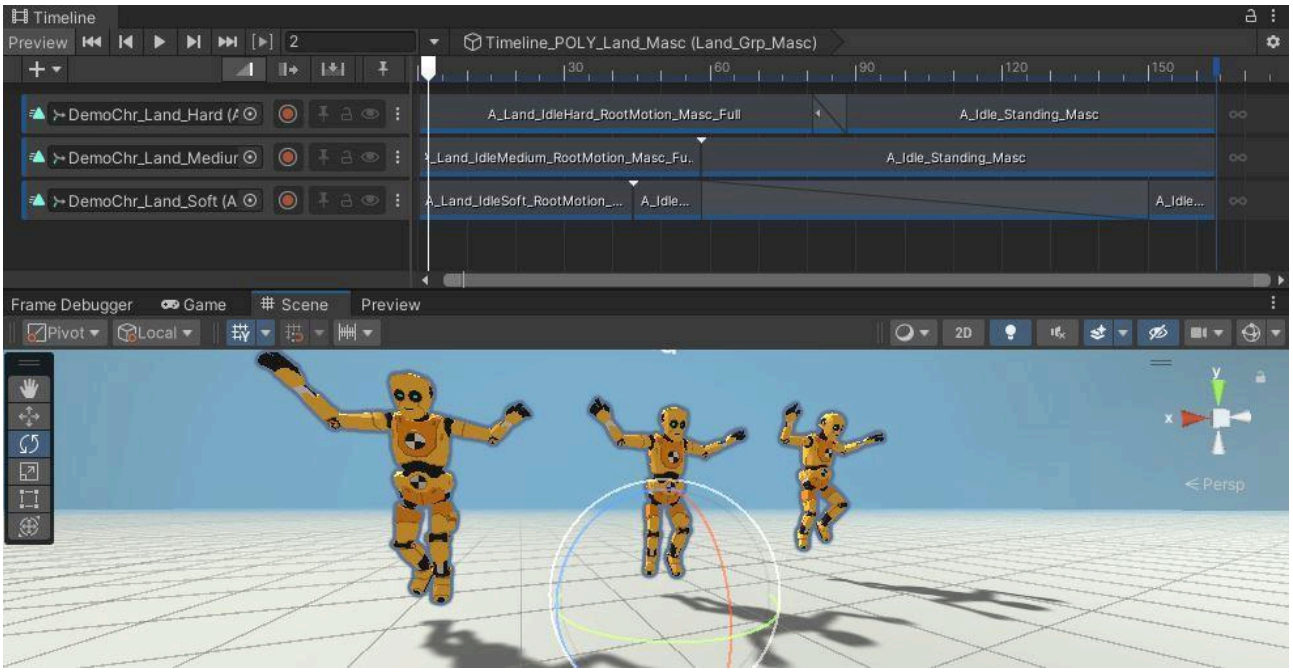
- Labelled groups of animations to quickly track down specific animations
- Looped to see timing/length of animation



The virtual gallery constitutes a controlled environment designed for the presentation and examination of a collection of animations shaping the character animator's work. Within this space, users can assess the full spectrum of animations in a clear and uncomplicated manner.



You will find all the animations in their Base Locomotion groups, under Demo_MasculineAnimations or Demo_FeminineAnimations in the scene Hierarchy.



Those motion groups, (e.g. Walk, Run, Turn…), have either a Timeline, or an Animator that demonstrates how the animations cycle or blend (e.g. to and from idle).

Build your own - Polygon Synty Character Setup

The following example will walk you through a typical use case of **Base Locomotion** as a means to guide your experimentation further to find your own use cases. This assumes you have installed it correctly and starting from a new scene.

We will focus on the Polygon Character setup in Unity, but if you wish to setup using the Modular character, simply use the Modular Synty character when it refers to Polygon Synty character.

Applying Animations to Characters

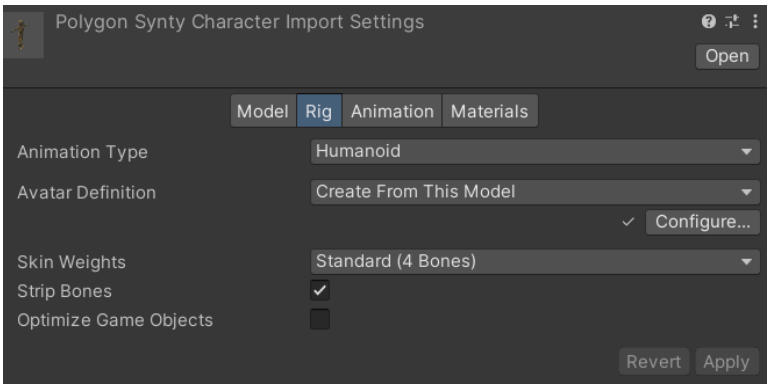
In Unity, a developer can import the animation package into a new scene and reference the `PolygonSyntyCharacterAvatar` to retarget the animation to their own character. This character can be a Synty character or a completely different biped, however the animations will work the best with Synty characters as the animations were created with their proportions in mind.

Import Characters:

- Import Base Locomotion package into project for access to the animations and the `PolygonSyntyCharacterAvatar`
- Import new character that will be the target for Base Locomotion animations

Create a Humanoid Avatar on new Polygon character:

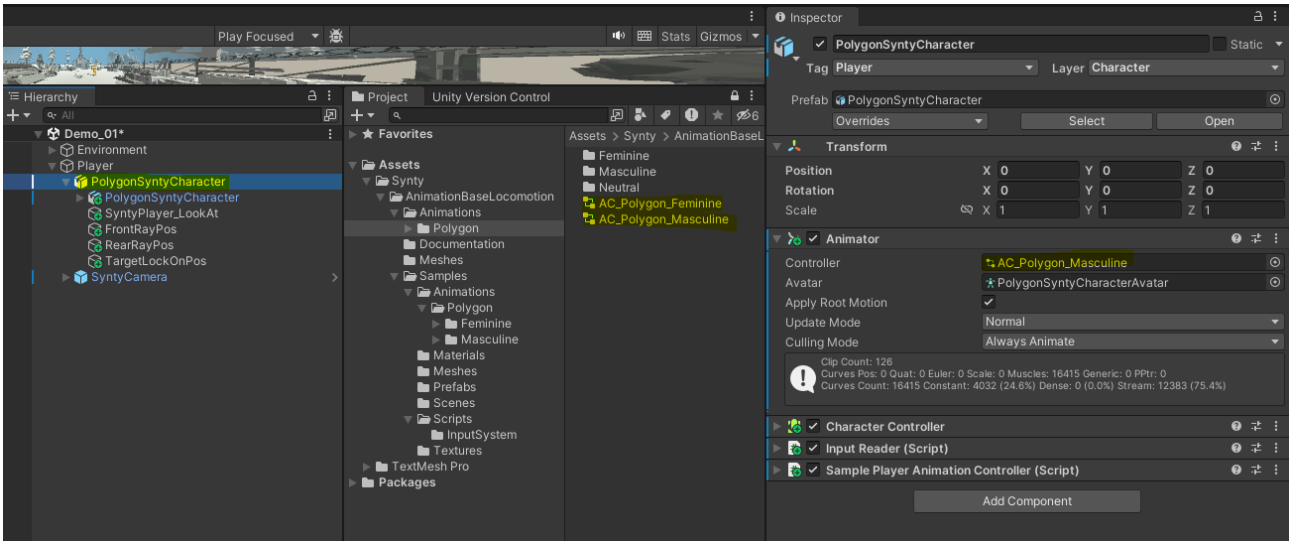
- On the new character, create a new Avatar and configure bone mappings



Test that the mappings are correct (optional)

- In the **`Demo_01_Polygon`** scene within the Base Locomotion pack, **`(Assets\Synty\AnimationBaseLocomotion\Samples\Scenes)`** drag the new character into the hierarchy of the **`Project`** tab, under **`Player/PolygonSyntyCharacter`** and delete the **`Player/PolygonSyntyCharacter/PolygonSyntyCharacterMesh`** asset
- In the Inspector for the **`Player/PolygonSyntyCharacter`** in the **`Project`** tab, apply the Avatar of the new character to the Avatar in the Animator Component

Swapping Animation sets between Masculine and Feminine

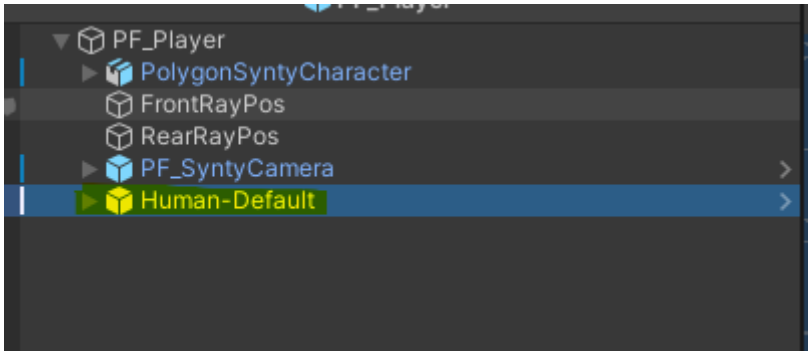


- Navigate to the Inspector window on the **`PolygonSyntyCharacter`**
- Drag in **`AC_Polygon_Feminine`** or **`AC_Polygon_Masculine`** into the Controller on **`PolygonSyntyCharacter`**

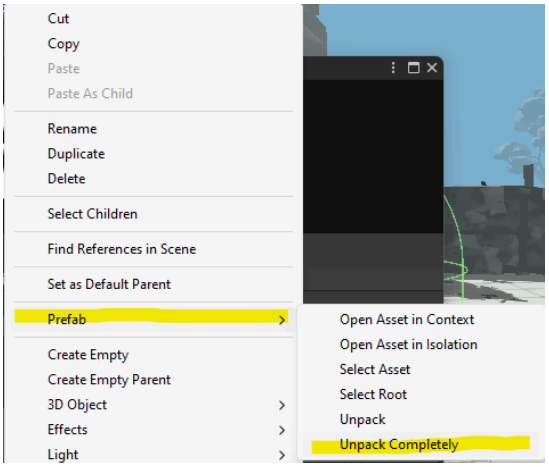
Swapping Meshes on Player Prefab

(Version 2021 and older)

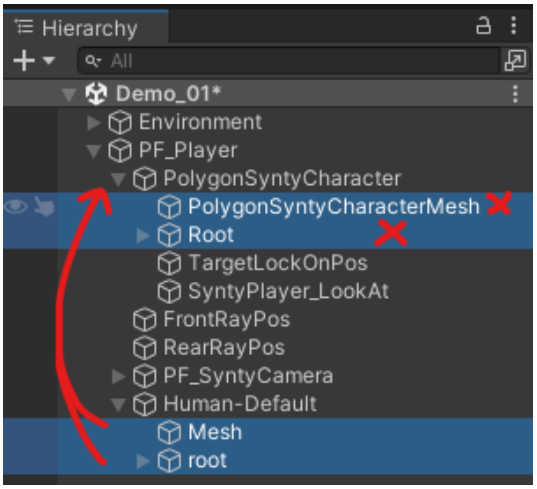
1. Open the PF_Player asset in **Synty\AnimationBaseLocomotion\Samples\Prefabs**
2. Drag your prefab asset into the player prefab under PF_Player



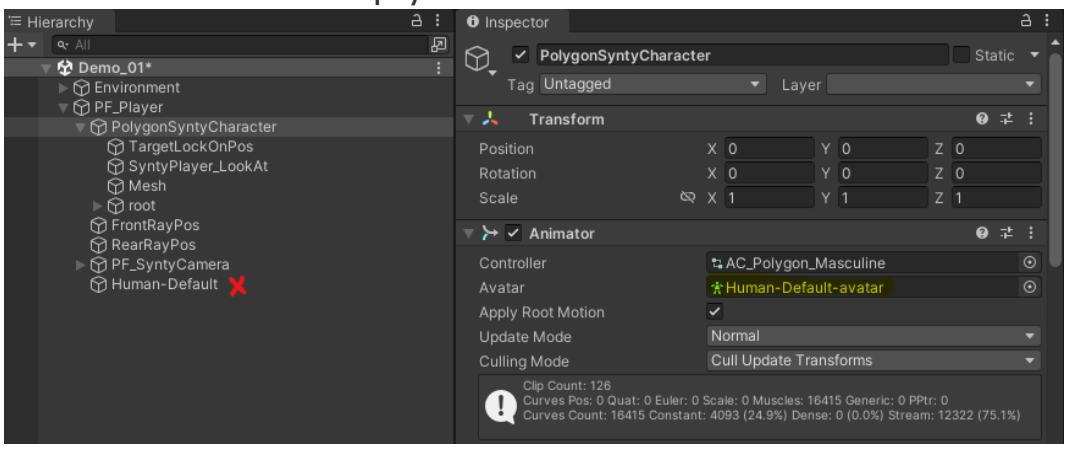
3. In the scene, right click on your prefab and select unpack your character Prefab, and then do the same to the PF_Player Prefab



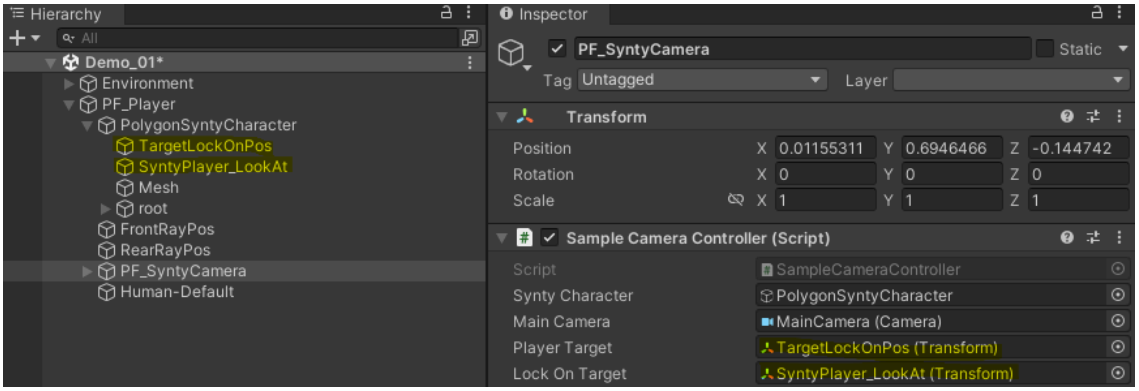
4. Delete the **PolygonSyntyCharacterMesh** and the **Root** under the **PolygonSyntyCharacter** node, and replace them with the Mesh and root from your Sidekick prefab



5. Assign the avatar of your prefab to the Avatar tab in the Animator on the PolygonSyntyCharacter, and delete the other prefab node from your character that is now empty



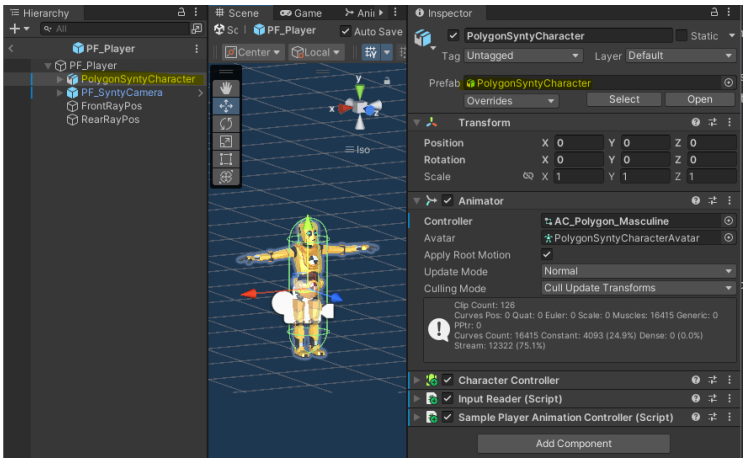
6. Check that your PF_SyntyCamera settings point to your Prefab, hit the small circle on the right of any that say missing to find the correct asset to aim at.



7. Hit Play to run around the scene as your newly created character with Override applied to retain all the set up for the character controller to be able to run around as your character.

(version 2022 onwards)

1. Once the package is installed, drag the PF_Player prefab into your scene
2. Select the PF_Player asset and in the inspector select Open in the Prefab section and drag in the prefab of the character you have made with the Character Creator Tool into the Prefab PF_Player and select Replace and Keep Overrides



Creating a new Avatar

Animation Type:

- Navigate to the Inspector window in Unity of the Character.
- Click on the **`Rig`** tab to access the Avatar Configuration tab.

Avatar Definition:

- Set the Animation Type to **`Humanoid`**
- Set the Avatar Definition to **`Create From This Model`** to generate a humanoid avatar based on the character's rig.

Modifying existing Avatar

Access Avatar Configuration:

- Click on **`Configure...`** to access the Avatar Configuration tab.

Bone Mapping:

- Review and adjust bone mappings to ensure precise alignment with the character's skeletal structure.

Preview and Apply:

- Check for any errors that occur or if you are using the same bone in two definitions in the skeletal mapping
- Apply changes to update the avatar properties.

Control Mapping

Although fully customisable using the **`Controls`** asset inside the

Synty\AnimationBaseLocomotion\Samples\Scripts\InputSystem directory, the demo mapping is listed below.

Keyboard:

- Move: WASD or ↑ ← ↓ →
- Look: Mouse Input
- Jump: Space
- Crouch: Ctrl
- Sprint: Shift
- Toggle Walk: CAPS
- Toggle Lock-On: Middle Mouse Button

Gamepad:

- Move: Left Stick
- Look: Right Stick
- Jump: Button South
- Crouch: Button East
- Sprint: Right Shoulder
- Toggle Walk: Left Stick Press
- Toggle Lock-On: Right Stick Press

Naming conventions

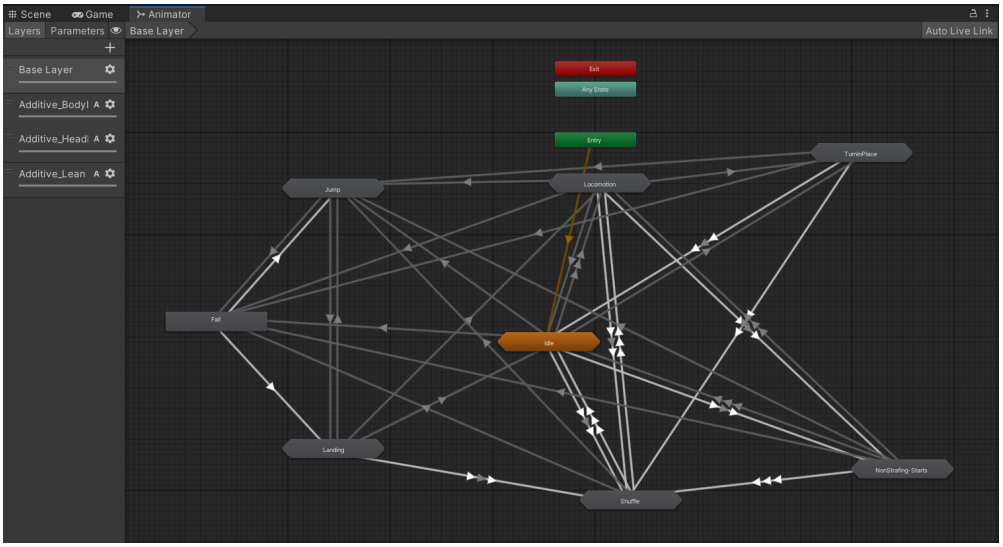
A_	Animation
AC_	Animation Controller
M_	Material
PM_	Physics Material
SK_	Skeletal Mesh
SM_	Static Mesh
T_	Texture

Scripts are contained in the **Synty.ProductName** namespace.

5. Sample Animation Controller

The Animation Controller serves as the orchestrator of dynamic character movements within Unity. This sample component within the Animation Pack offers an example of the framework for controlling and sequencing animations. Further reading for reference can be found in the Unity User Manual ([Manual: Animator Controller](#))

Otherwise here is a concise overview of the Animation Controller in context with the sample provided:



State-Based System:

- Organizes animations into states, allowing for seamless transitions between different character actions, from idle stances to complex movement sequences.

Transitions:

- Manages transitions between states, providing a smooth and clear approach to changes in the animation being played. Transitions can be triggered by conditions such as user input, script events, or animation completion.

Blend Trees:

- Introduce flexibility through Blend Trees, enabling smooth interpolation between animations based on parameters like speed, direction, or any custom variable.

Layers:

- Supports layering, allowing the overlay of animations for added complexity. This is particularly useful for simultaneous actions like upper body movement during locomotion.

Parameters:

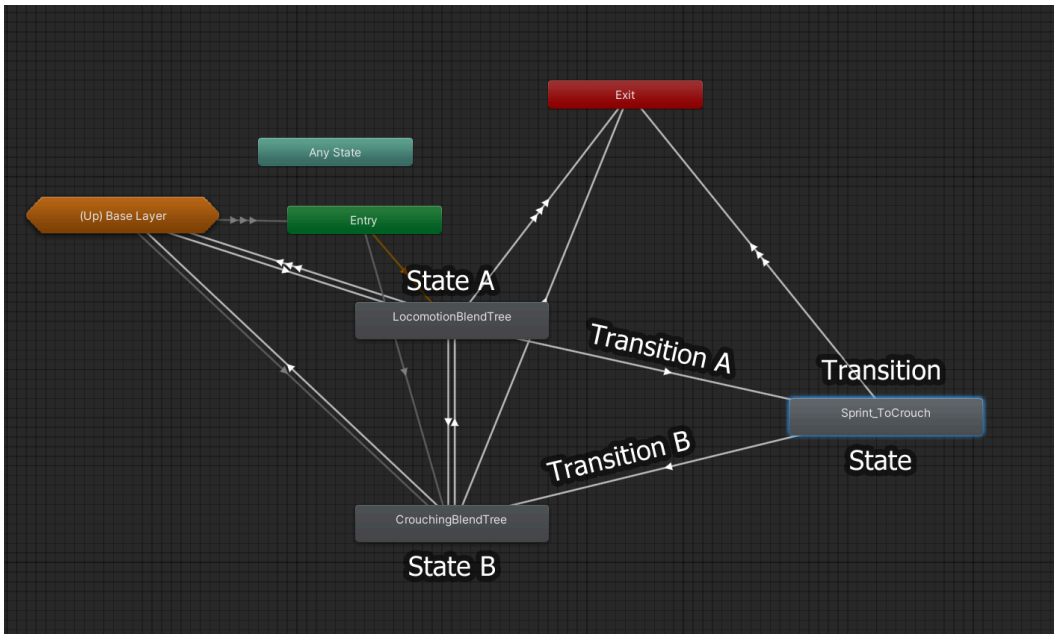
- Utilizes parameters and triggers to dynamically influence animation states, offering a versatile means to adapt character animations to varying in-game conditions.

Animation Transition Logic

In Unity's Animation Controller, transitions between animation states are managed by right-clicking a state and choosing 'Make Transition'. These transitions are governed by specified conditions set in the Inspector window, using parameters (booleans, floats, integers etc) from the Animation Controller. ([Manual: Animation transitions])

State A -(*TransitionA*)> Transition State -(*TransitionB*)> State B

Example: Adding a slide in between sprinting and crouching.



Transition from Locomotion to Sprint_ToCrouch, and another from Sprint_ToCrouch to Crouch

- *TransitionA* Conditions:
- **`CurrentGait`** Equals 3 (Integer)
- **`IsCrouching`** true (boolean)
- **`Has Exit Time`** (unchecked)
- *TransitionB* Conditions:
- **`IsGrounded`** true (boolean)
- **`IsJumping`** false (boolean)
- **`Has Exit Time`** (checked)

In *TransitionA*, both conditions must be met (**`CurrentGait`** is 3 and **`IsCrouching`** is true). ***`Has Exit Time`*** is unchecked, allowing interruption of the Locomotion state animation (*StateA*). *TransitionB*, with **`Has Exit Time`** checked, transitions to the Crouch state (*StateB*) only when specific conditions are met after the Sprint_ToCrouch animation completes.

Blend Trees

Blend trees are a tool within the Animation Controller that supports smooth transitioning between different animations based on the values of specified parameters. It's often used to seamlessly blend animations, like transitioning from walking to running based on the character's speed.

Unity has a variety of blend types within a blend tree that a user can modify or switch to depending on the purpose of the animation they wish to implement. (Manual: Blend Trees)

Animation Layers

Animation layers are a robust tool that allows developers to control and blend multiple animations on a GameObject independently. These layers operate on a priority system, ensuring smooth transitions between different sets of animations with higher priority layers taking precedence. This helps with structuring animations by isolating specific groups of animations that can then

be driven dynamically through the parameters across each layer universally or individually. Accessing the Layers Widget allows a user to set and define a mask for that layer, and the blending type for how the animations in that layer are applied. ‘Override’ replaces animations on previous layers with those on the current layer, ‘Additive’ will superimpose the animations on top with the previous layers to dynamically calculate the new animation to be players.
(Manual: Animation Layers)

Animation Parameters and Triggers

Animation parameters are variables that are defined within an animation controller. These dynamic values can access and change the state machines behavior. These parameters can be updated by animation curves and/or accessed from scripts, allowing control over various aspects, animation, blending, or even other peripherals like sound effects or interactions. Scripted modifications to parameters are necessary for interactions with Mecanim, where a parameter set by a script can control a blend tree, providing precise control of the animation output. Parameters can be

- Integer (whole numbers)
- Float(numbers with fractions)
- Bool (true/false)
- Trigger(a bool reset by the controller)

The values for parameters are set in the Animator window’s Parameters section, allowing animators to customize the default settings.
(Manual: Animation Parameters)

Examples for Mapping Animations to States

The following information is with the **`SamplePlayerAnimationController`** in mind as an example of how to create and implement animations and states within Unity, but these are merely suggestions of ways someone could implement content from this pack, it is not the only way to do so.

States

The **`SamplePlayerAnimationController`**script is responsible for managing the Player's states and values. The current active state is stored in the **`CurrentState`** variable, and using a State's **`SwitchState`** method, different behaviours can be implemented.
For example, the character is in the **`LocomotionState`** most of the time, but whenever it is no longer grounded, it enters the **`FallState`**, which applies an additional **`ApplyGravity`** method via **`Update()`**. Similarly, **`JumpingState`** allows for custom behaviour during the ascending part of a jump before it becomes a **`FallState`**, and **`CrouchingState`** allows for control over behaviour during crouching.

This setup gives you the flexibility to create new states and behaviours to suit the needs of your project.
All variables which need to persist consistently across state changes live within the **`SamplePlayerAnimationController`**script script. These can be tweaked in the inspector as the script is a component of the **`SyntyCharacter`** game object.

Locomotion

There are 3 different locomotion speeds or 'gaits' with their own animation sets:

- Walk (1.4 m/s)
- Run (2.5 m/s)
- Sprint (6 m/s)

The default speeds can be modified on the **`SamplePlayerAnimationController`** in the Inspector when it is attached to a game object.

Crouching

Crouching uses the same locomotion speed as 'Walk'. There is a custom slide

animation that is set up to trigger from a ‘Sprint’ speed when the ‘Crouch’ key is pressed as a transition animation, ending in the Crouch pose.

Crouching also reduces the capsule height so the player can pass underneath lower objects. There is a ‘CeilingHeightCheck’ method in ‘PlayerBaseState’ which is used to check if the player is able to stand up from a crouch. If not, the crouching state is maintained.

Slope Detection

The controller has basic slope-detection which allows an ‘uphill’ or ‘downhill’ version of locomotion to be played inside a blend tree in the animator, controlled by the parameter ‘InclineAngle’. This angle is calculated using two empty game object positions under the player hierarchy: FrontRayPos and RearRayPos. These two points (which can be moved around and customised) are used as the origin positions for ray casts by the ‘CheckInclineAngle’ method in the ‘PlayerBaseState’ script. The angle between where the two rays collide with the ground gives the angle of the ground, relative to the player’s forward vector.

Strafing

The ‘Sprint’ gait does not include strafing. However, Walks, Crouch, and Run locomotion all have two 8-directional blend trees setup for strafing:

- **`StrafeBackwards_BlendTree`**
- **`StrafeForwards_BlendTree`**

In the animator, the parameter **`ForwardStrafe`** is a float that blends between 0 and 1 to smooth the transition between blend trees.

This setup serves to minimise any problems when the player input could sit at a strafing direction that is halfway between two animations which have opposing (Forward vs Backward) animation cycle directions (for example, between ‘Strafe R’ and ‘Strafe BR’) . Typically a 50% blend between two such animations can result in legs intersecting each other.

For this reason, this pack includes (for example) two of each ‘Strafe R’ and ‘Strafe BR’ animations, one with forwards locomotion and one with backwards locomotion.

Any player locomotion taking place at an angle between R and BR will thus look correct regardless of whether it is using the Forward or Backward blend trees in a given moment. This window allows time for the BaseState logic to check the strafing angle, and when a threshold is passed it can switch to the Backward or Forward blend tree.
Additionally, there are two L and FL strafe animations (Forward and Backward) to create an overlap window on the other left directional side of the blend trees.

Lock-On

The demo controller includes a simple 'lock-on' feature which will focus the player on an object in the world and keep it centred, allowing the player to strafe around and always be aiming at the object.
The demo also includes an example target object **`PF_LockOnTarget`** This has an **`SampleObjectLockOn`** script that can be used to make any game object a viable lock-on option to the player.
When the player (with Tag 'Player') enters the object's collider area, the **`SampleObjectLockOn`** script adds the parent object to the player's list of viable targets. Then the player state machine has logic that determines the best viable target from all those within range, and allows locking-on to be toggled.

Starts/Shuffles

The animator uses the variable **`InputTapped`** to trigger a start animation from idle. If the player is strafing, the controller uses the 'Shuffle' animations (a blend tree between the directions: L R F B). If the player is not strafing, the controller plays a 'Start' animation ranging from a 180 degree turn, to a directly forward start.

Note: **`InputHeld`** is a variable used to indicate that the input/key is still held and the start animation should transition to locomotion.

In Air

You can control the feel of the jump by adjusting the 'JumpForce' value in the Inspector on the **`SamplePlayerAnimationController`** script (a higher value results in a larger jump). You can also control the **`GravityMultiplier`** value to make the falling faster or slower.

This pack includes custom jump animations for each gait (idle, walk, run, sprint) animated fully from start to end (i.e. a run, flowing into a jump, a land, and back to a run). These are then broken into separate clips, so each has a specific 'jump' and a 'land' clip to be utilised by the animator.

Depending on what speed the player is travelling, the 'CurrentGait' integer variable on the **`SamplePlayerAnimationController`** keeps track of which gait the player is closest to. In the animator, this variable is then used within transition rules to select which 'jump' and which 'land' animations to play, so a running character will always play the running jump and landing, for example.
There is also a 'FallingDuration' variable which is used to determine whether a 'soft', 'medium' or 'hard' landing animation should play. The more time spent in-air, the harder the landing.
The 'FallingDuration' also controls a blend tree for the 'InAir' animation, to gradually transition from a 'Short' distance falling animation loop to a 'Large' distance falling animation loop.

Turn-In-Place

The Demo controller has a 'turn-in-place' blend tree which uses the root motion of the 90 degree turn animations to rotate the player towards the camera's facing direction while strafing is enabled.

The parameter **`CameraRotationOffset`** measures the difference in angle between the player and the camera, and the blend tree uses this value to determine what percentage of a full 90 degree turn should be played.

Additive Layers

The animator uses additive animation layers to enhance the fluidity of the character's locomotion. These layers are:

- **`Lean`**
- **`HeadLook`**
- **`BodyLook`**

The lean additive will offset the player animation so it appears to lean inwards towards the direction that the player is turning, and the body look and head look offsets the rotation of these body parts so it appears the player is anticipating/looking ahead in the direction of the turn.

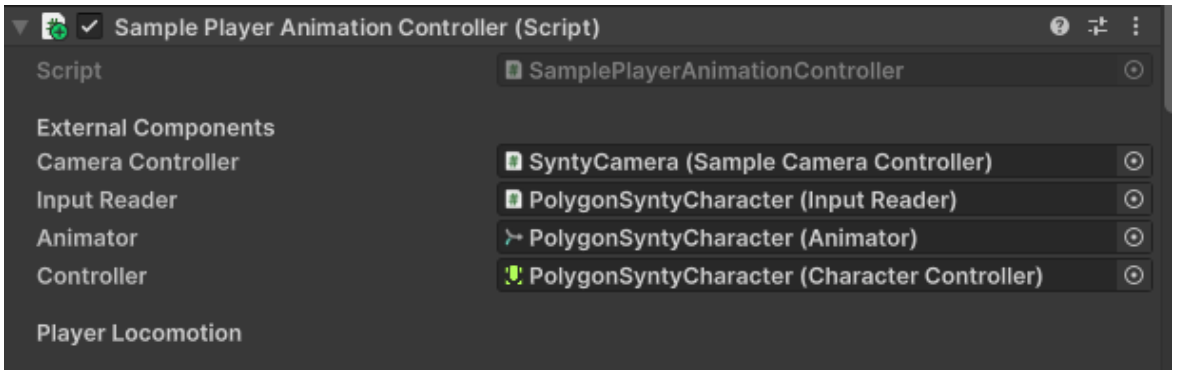
These additive layer weights are driven by the rate at which the player is turning. The faster the turn rate, the more the layer is applied. This relationship is also controlled by a curve in the inspector so the falloff can be fine-tuned. These curves are adjustable on the PlayerStateMachine in the inspector:

- **`LeanCurve`**
- **`HeadLookXCurve`**
- **`BodyLookXCurve`**

The up and down look (Y axis) is driven by the camera angle - if the camera is tilted to look up or down, the additive layers apply a little rotation to make the player look up or down accordingly.

Turns and Leans can be enabled or disabled within a state (e.g. PlayerCrouchingState) with the 'CalculateRotationalAdditives' method, which takes boolean inputs to potentially override Lean, HeadTurn, BodyTurn in that order. For example, in 'PlayerCrouchingState' the method has lean and body turn set to 'false' and thus disabled.

Setup and Integration



This sample is set up to show some potential ways of connecting the various pieces to create an animated character. This is the Unity facing output of the script itself, which is written in C#. Ensure that the script is attached to your game object, and that it is properly configured to handle default values for movement variables for whatever purposes your character movement needs.

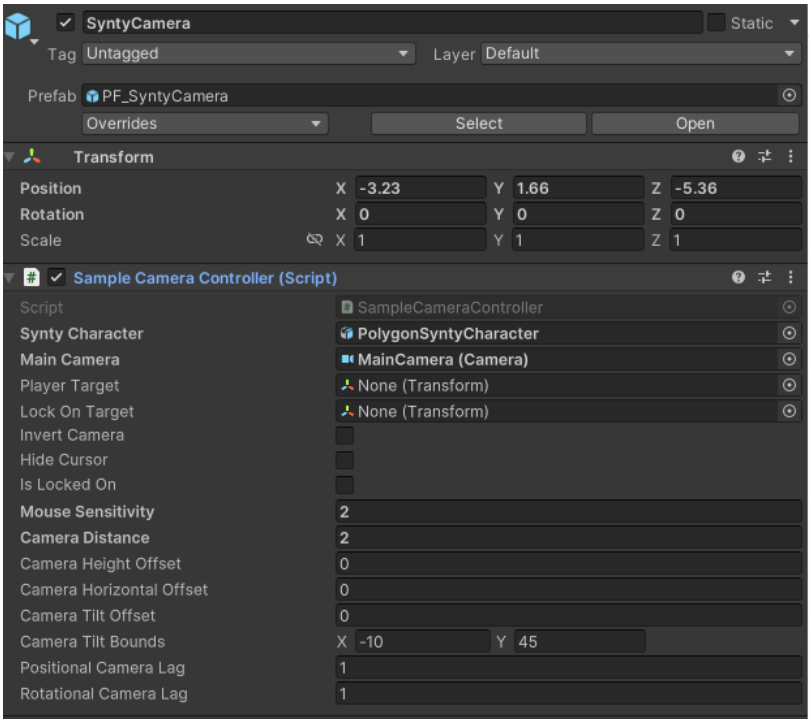
Next, establish connections with the following components:

- Camera Controller: Connect the player animation controller script to the **`Camera`** game object, allowing it to adapt character animations based on camera perspective or movement.
- **`Input Reade`**r Link the player animation controller script to the input reader, enabling the script to interpret and respond to player input effectively.
- **`Animator`** Integrate the script with the Animator component. This involves linking the script to the Animator to control animations seamlessly.
- **`Controller`** Ensure that the player animation controller script is linked to the **`PolygonSyntyCharacter`**, enabling synchronization between animations and character movement.

Any further default values can be added within the script and then set within Unity as well.

Camera Integration

The **`SyntyCamera`** asset in the **`demo_01`** scene is set up to work seamlessly with the demo player controller. The **`SampleCameraController`** script has some simple functionality to alter the feel of the camera, and to handle lock-on targets in tandem with the **`SamplePlayerAnimationController`** script on the player.

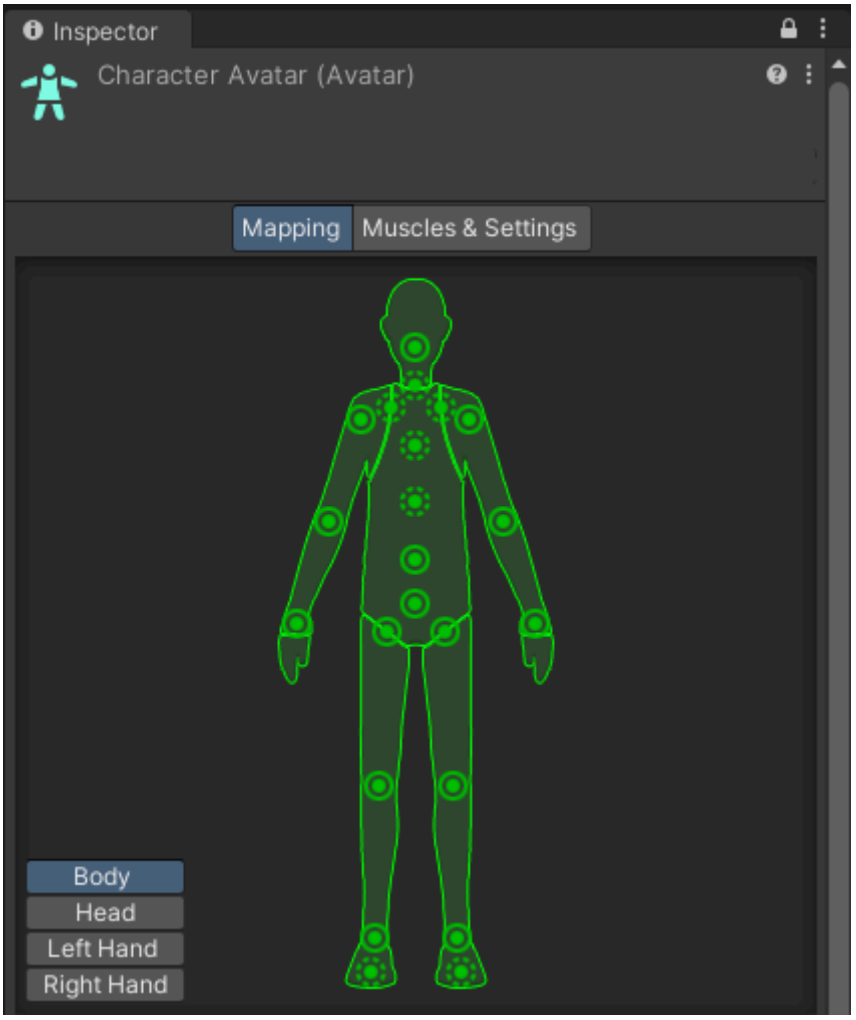


- **`Player Target`** The game object that the camera will follow - i.e. the player
- **`Lock-On Target`** A game object that when 'lock-on' is activated, the camera will aim towards
- **`Invert Camera`** Invert which input direction rotates the camera tilt up or down
- **`Mouse Sensitivity`** Adjust how rapidly rotation occurs mashed on mouse movement
- **`Camera Distance`** How far from the player the camera is positioned
- **`Camera Height Offset`** Offset the camera up and down from the player
- **`Camera Horizontal Offset`** Shift the camera to the left or right of the player
- **`Camera Tilt Offset`** Rotate the default angle of the camera up or down

- **`Camera Tilt Bounds`** Clamp the camera's tilt angle rotations to stop it rotating under the ground or flipping over the top of the player
- **`Positional Camera Lag`** Increase or decrease the positional delay with which the camera moves to follow the player
- **`Rotational Camera Lag`** Increase or decrease the smoothness with which the camera responds to its new target position

6. Character Avatar

Mecanim Humanoid Character Avatar



In Unity, the mecanim Humanoid Character Avatar serves as a fundamental

framework for bipedal character animation. Essentially, an avatar in this context is a digital representation of a character's skeletal structure and body proportions. To access the avatar of a character you can find the mesh that the avatar definition is created from, in the case of the Synty pack, the Avatar is nested in the **`Synty\AnimationBaseLocomotion\Meshes`** as the **`PolygonSyntyCharacterAvatar.`**

Here's a breakdown to clarify its purpose for users:

- Humanoid Structure:
    - Unity's mecanim Humanoid Character Avatar adheres to a bipedal structure, aligning with the standard anatomy of human characters.
- Compatibility Across Characters:
    - Designed to be universally compatible, the avatar allows users to apply animations seamlessly to a variety of humanoid characters, streamlining the animation process.
    - Other character models on different bipedal rigs can be added to the project, with their own Avatar set up to allow the animations from this pack and others to be applied to them, bypassing the issue of compatibility.
- Configurable and Adaptable:
    - Users can configure their own avatars by adjusting the bone mappings and aligning them with Unity's Humanoid Avatar configuration.

Adjusting Avatar Properties

In Unity, within the rig tab of an asset you are able to define the skeleton type to one of the following, **`Humanoid`**, **`Generic`** or **`Legacy`**.
Humanoid is used when working with humanoid characters. It provides a standardized bone structure that makes it easier to work with humanoid animations, retargeting, and blending. The Humanoid rig is particularly useful when using Unity's Mecanim animation system.
Generic is a more flexible option that doesn't adhere to the humanoid bone structure. It allows for more custom setups but may not be as compatible with

certain features like retargeting humanoid animations.
Legacy is used for the older animation system in Unity. It's not recommended for new projects, as Unity has shifted its focus to Mecanim and the Humanoid rig. The content within this pack is set up to be used with the Humanoid skeleton type, to leverage the aforementioned retargeting and blending with the Mecanim animation system.

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9. Glossary

Additive - *In animation, additive blending is a technique where animations are combined or layered on top of each other to produce a final animation. This is often used to add specific motions or details without affecting the underlying animation.*

Animation Controller - *An Animation Controller in Unity is a system that manages the state machine for character animations. It defines how animations transition from one state to another based on conditions.*

Animation Controller Script - *An Animation Controller Script is a script written in a programming language such as C# that provides additional functionality or customization to the Animation Controller in Unity.*

Animation Layer - *Animation Layers in Unity are used for managing complex state machines for different body parts. For example, having a head look layer for turning the head with the camera direction, or having a lower-body layer for walking and jumping and an upper-body layer for throwing objects or shooting.*

Animation State - *Animation States represent individual animation clips or motions within an Animation Controller. These states define the specific animations a character can be in.*

Blend Tree - *A Blend Tree is a Unity mechanism that allows smooth transitions between animations by blending multiple animations based on input parameters, such as Speed or Direction.*

Character Avatar - *In Unity's Mecanim system, the Character Avatar refers to the digital representation of a character's skeletal structure, including bone hierarchy and rigging. It serves as the foundation for applying animations and controlling the character's movements within the game.*

Mecanim - *Mecanim is Unity's animation system, encompassing the Animation Controller, Animator component, and state machine. It provides a visual interface for designing complex character animations and facilitates the integration of character avatars, animation clips, and transitions.*

Parameter - *In Unity's Animation Controller, parameters are variables that can be accessed and assigned values. These parameters are often used to control the flow of the state machine or influence animations.*

State Machine - *In the context of Unity's Animation Controller, a State Machine is a computational model that defines the various states a character or object can inhabit. It manages transitions between states based on specified conditions, influencing the character's behavior and animations.*

Strafe - *In the context of character movement, strafing refers to moving sideways without changing the direction the character is facing.*

Transition - *Transitions in an Animation Controller define how the system moves from one animation state to another. Conditions, such as parameter values, trigger these transitions.*

Trigger - *In Unity's Animation Controller, a Trigger is a boolean parameter that is reset by the controller when consumed by a transition. It is often used to initiate specific animations.*