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Axis Unreal Live Link Plugin Handbook

1. Introduction

Axis Studio not only allows the export of motion capture data but also be able to stream motion capture data in real-time to third party applications, making the data available to drive characters in animation.

Axis studio act as a server on a network and stream motion capture data live to a client PC running a client application. In this document specifically go through the process about streaming data to UE4 from Axis Studio with the NeuronLiveLink Plugin.

1.1 Features

- Support UE4 version 4.25 4.26
- Support to receive and process the props (PWR-tracker) motion capture data (refer to our VPS project)
- Support to drive a skeleton that is not using T-pose based model, such as A-pose based model.
- Support to receive and process the displacement data from Axis Studio
- Update Studio Robot in NeuronLinveLinkContent (Notiom sample FBX skeletal mesh and sample Animation Blueprint)

1.2 Known Issues

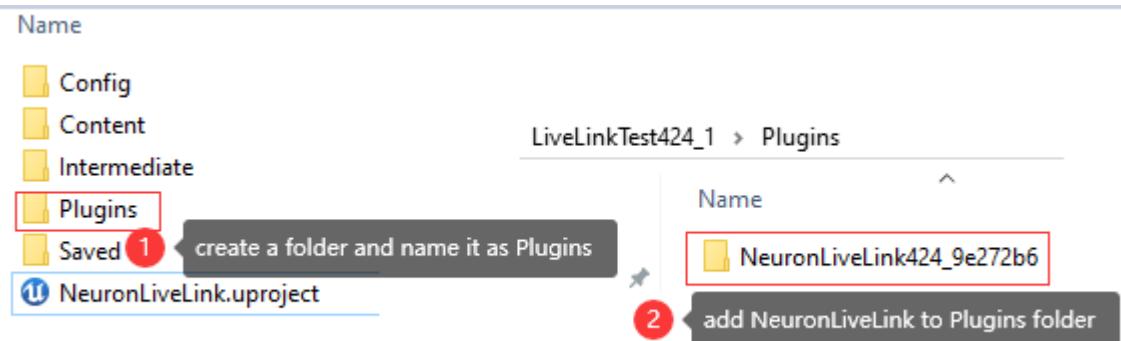
- Error may occur when run executable after packaging.

1.3 About

1. Supported Development Platforms: Win64
2. Supported UE4 Version: 4.25.0 4.26.0

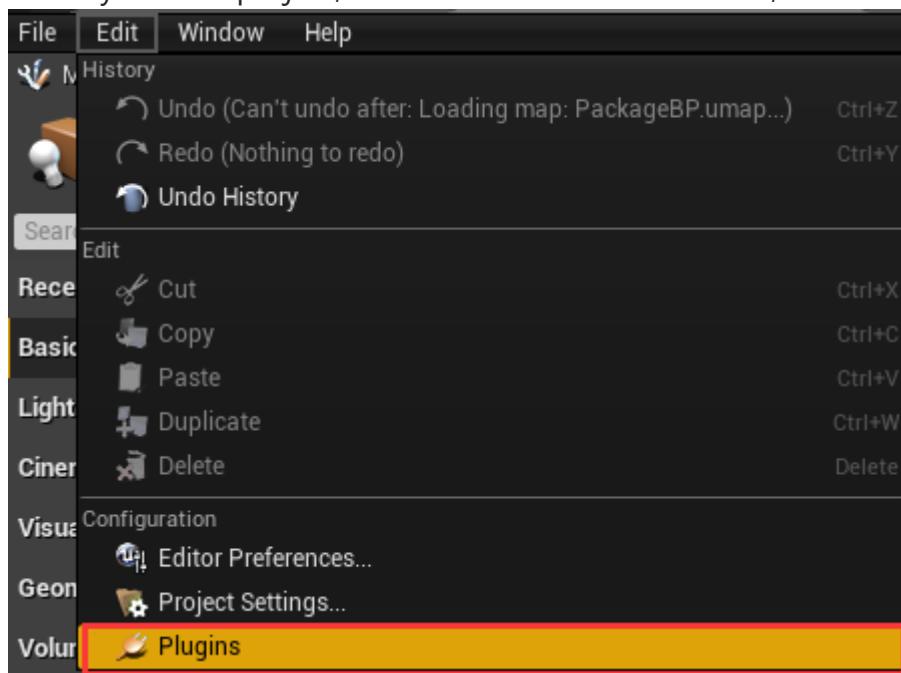
2. Installation

1. Create a Plugins folder in your Unreal Engine Project if not exist
2. Extract **NeuronLiveLink** plugin zip file to the Plugins folder you created.

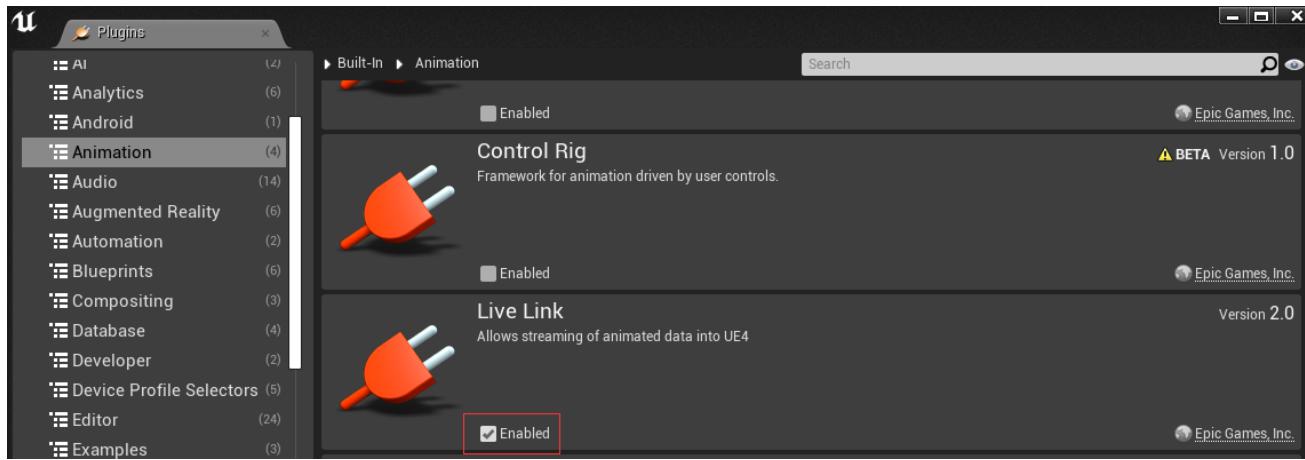


3. UE4 Project Setup

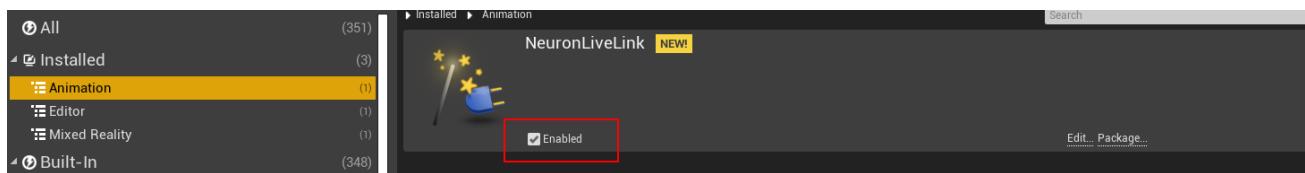
1. Inside your UE4 project, from the Menu Bar under Edit, select Plugins.



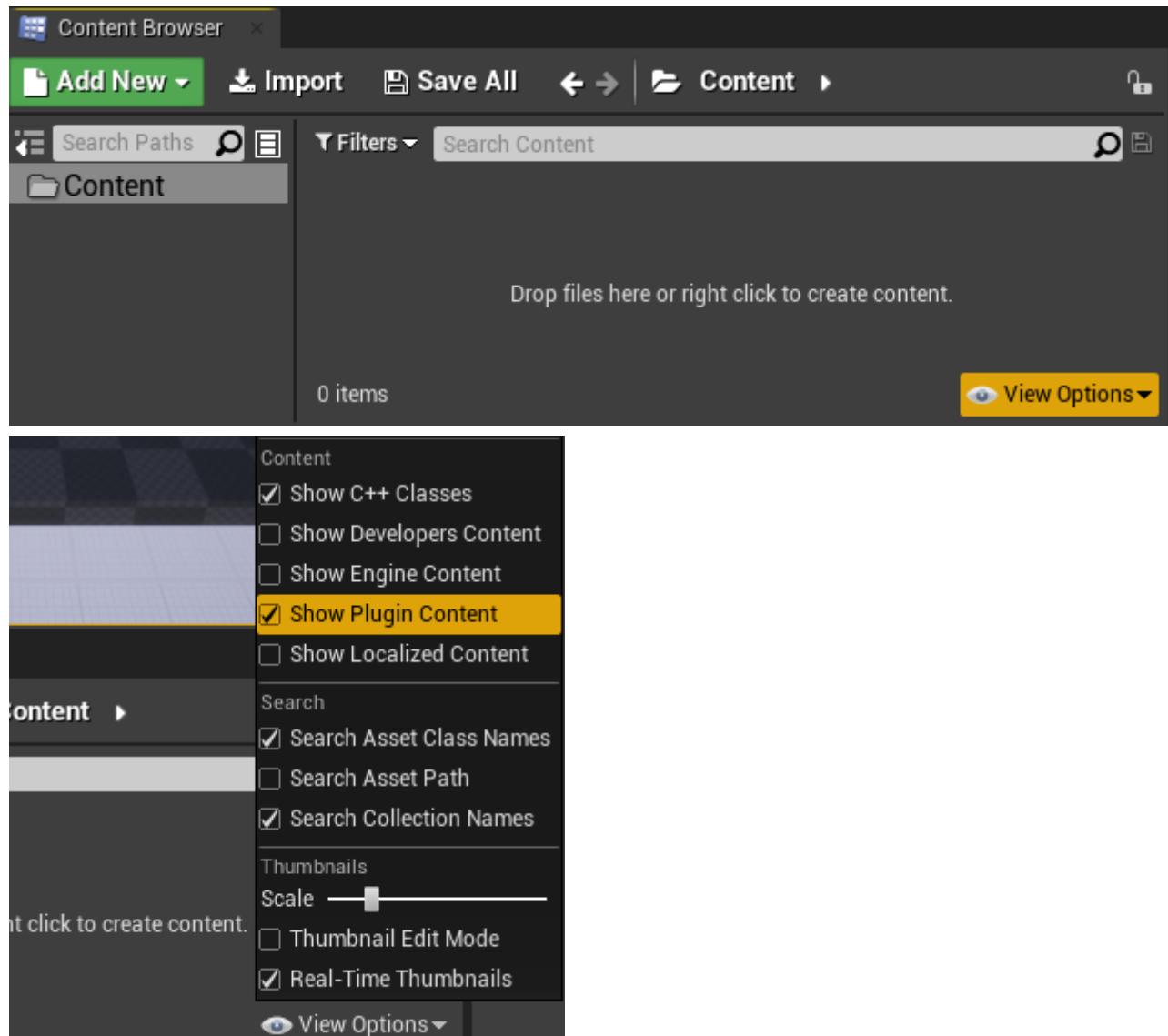
2. Under the Animation section, click Enabled for Live Link.



Under the Installed section, click Enabled for NeuronLiveLink then restart the Editor.



3. In the Content Browser Click View Option and enable Show Plugin Content.

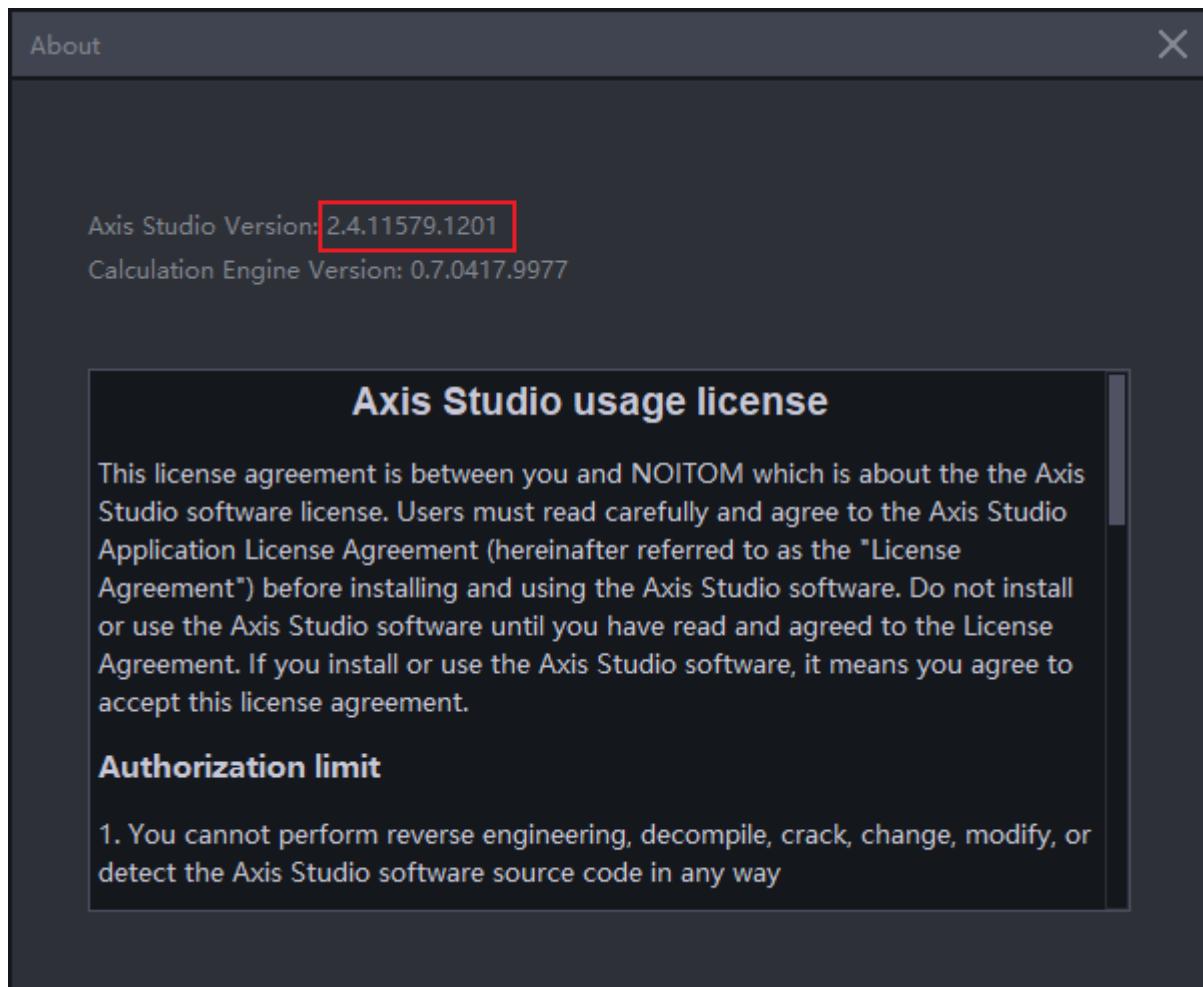


This will enable the Live Link Plugin, which can be used to connect to external Digital Content Creation (DCC) tools. In order for your DCC tool to connect to UE4, you will need to enable the corresponding plugin. In this section, we are establishing a connection with Axis Studio.

4. Quick Start

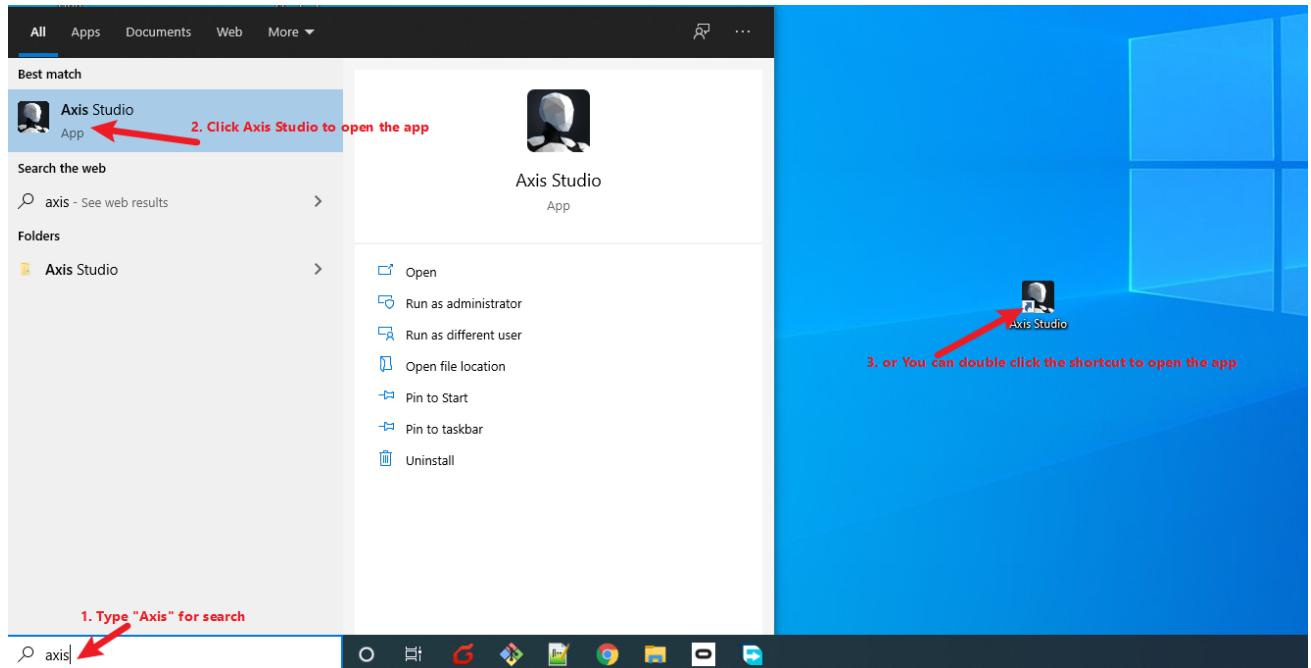
4.1 Open Axis Studio and Replay A file

The operation step is base on Axis Studio2.4.11579.1201,.for operation on other version it is probably the same,Please check the manual of Axis Studio for further information.

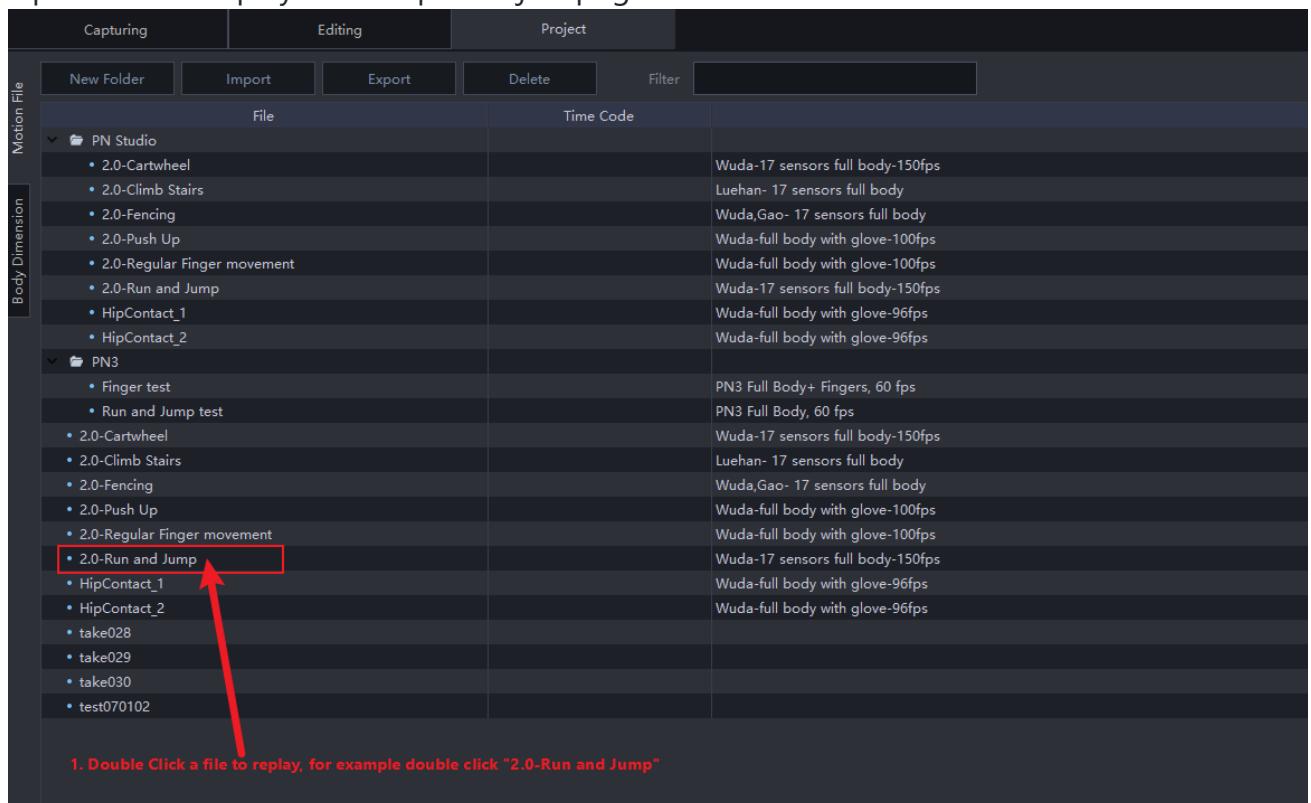


You can also send realtime captured data through Axis Studio in this case, you should edit setting in BVH capture.

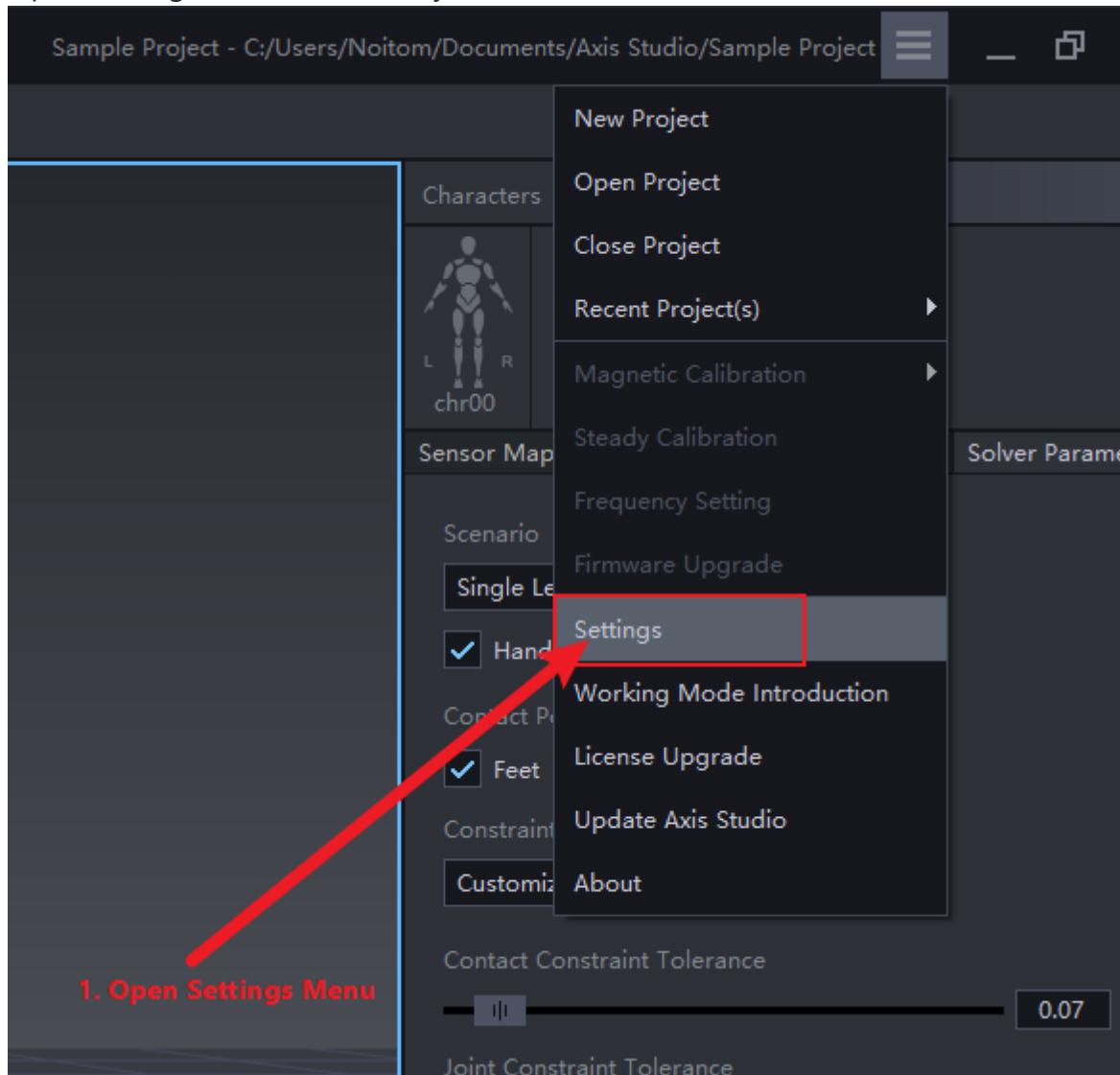
- Follow the steps in the following picture to open "Axis Studio"

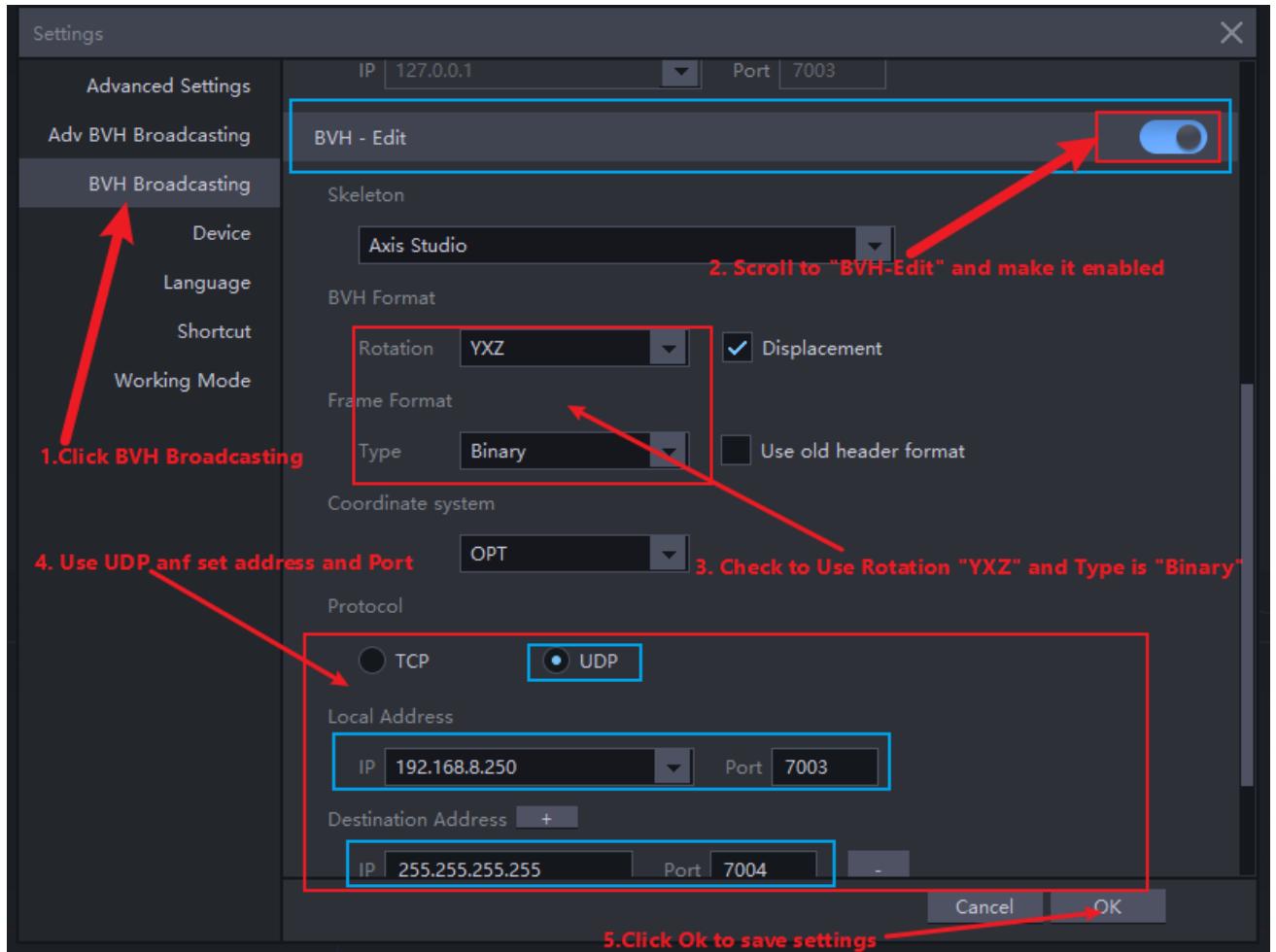


- Open a file to replay

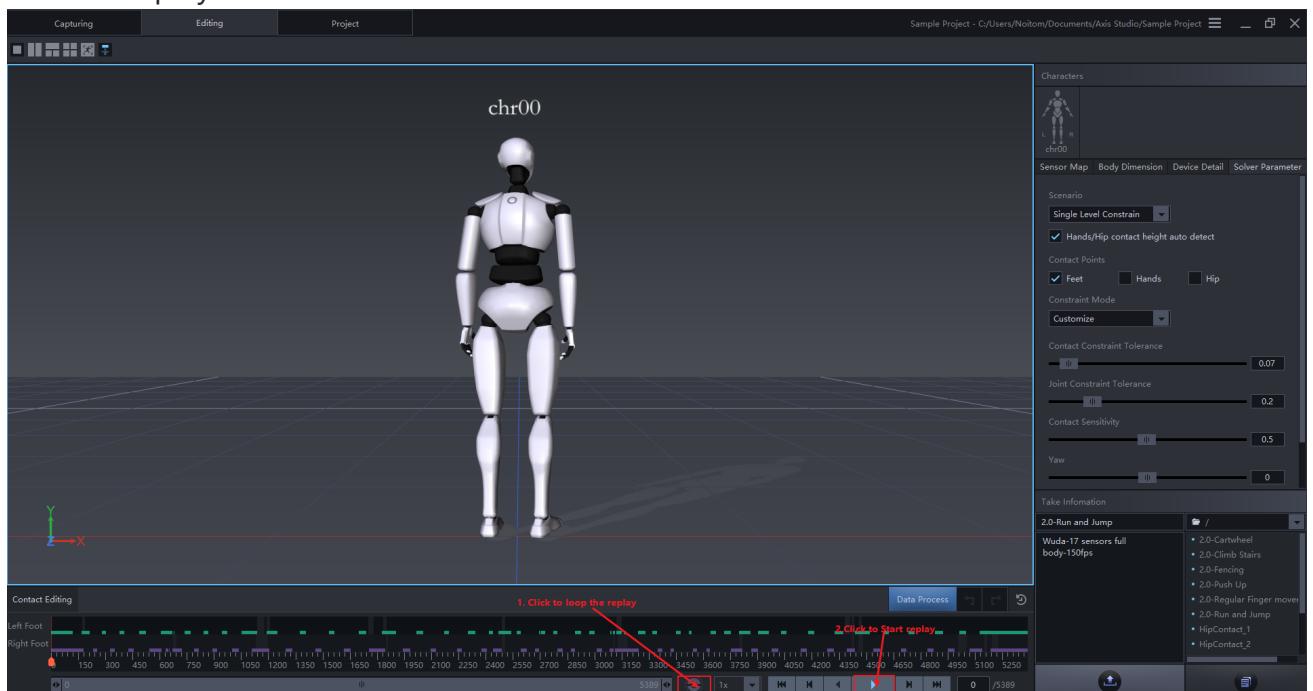


- Open Settings Menu and modify





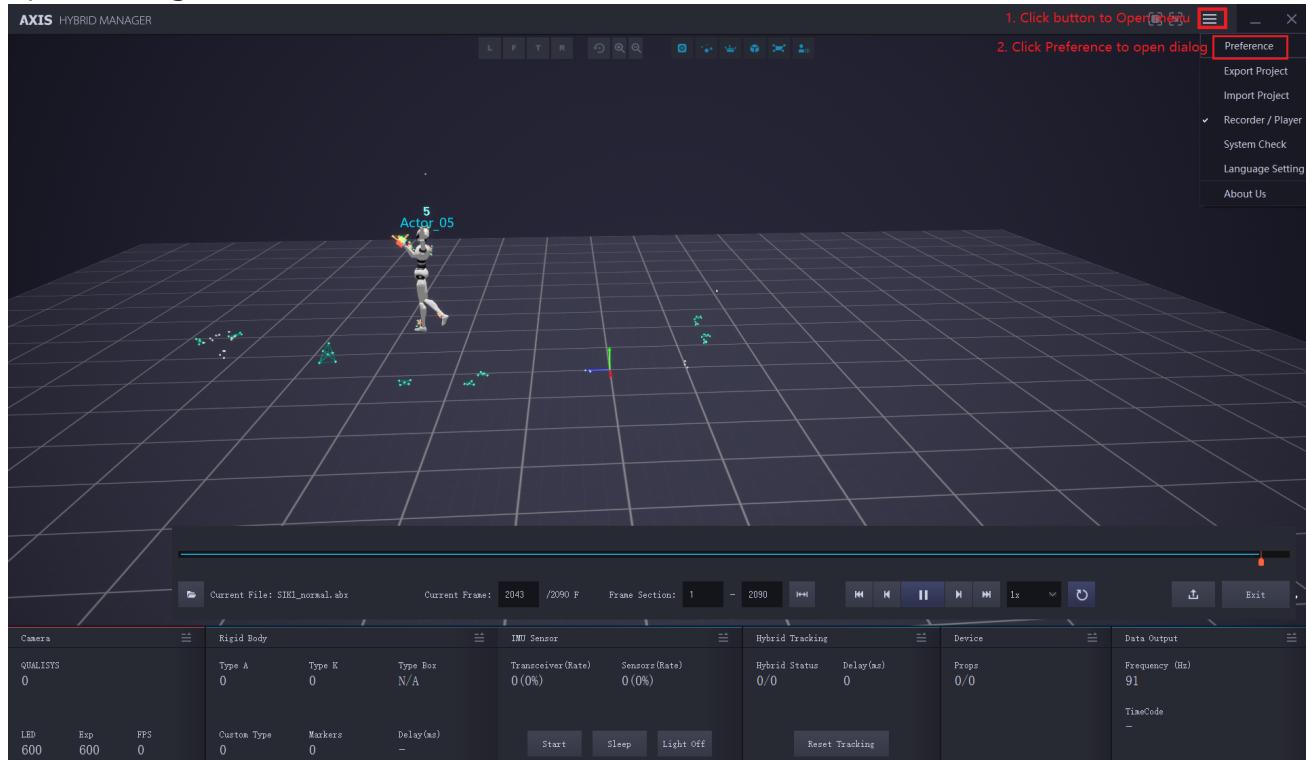
- Start to Replay



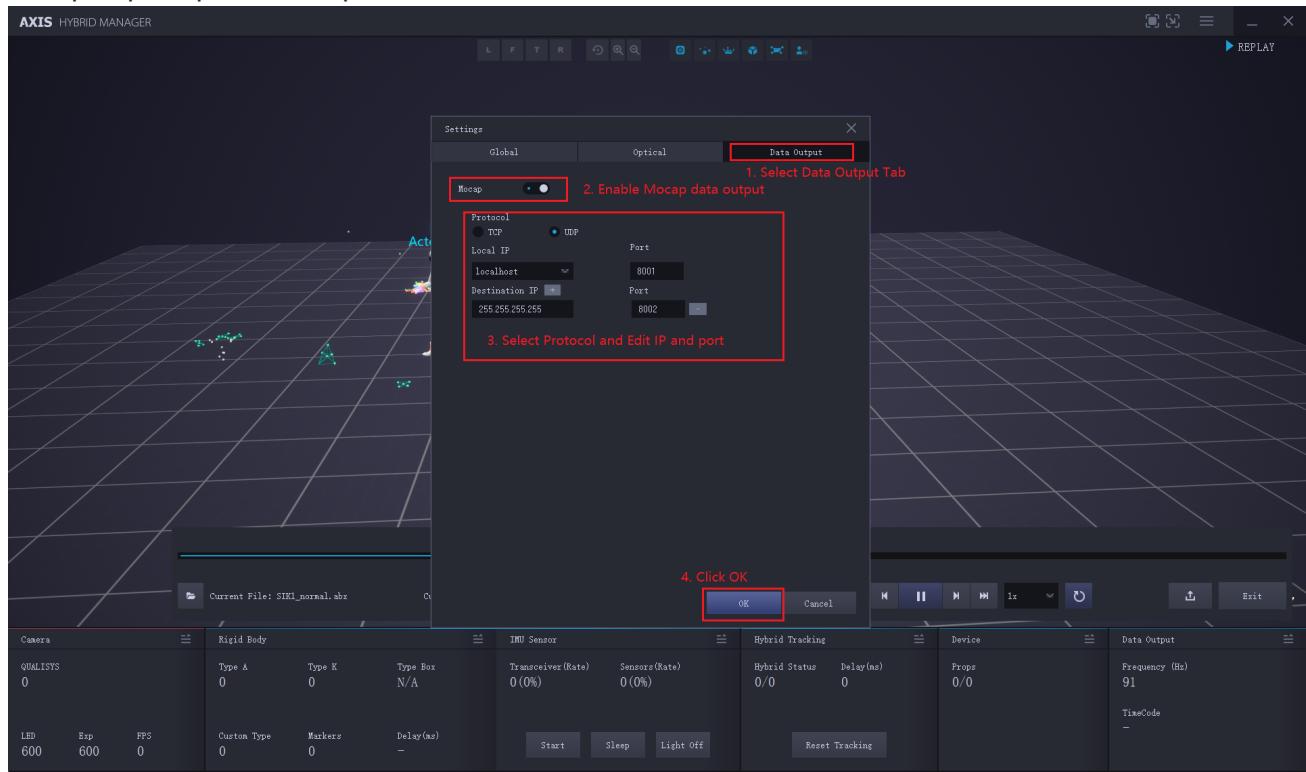
4.2 For Axis Hybrid Manager User, Setup Data Output

Foe Axis Hybrid Manager Users, Please follow the steps to setup mocap data output, or you can refer to Axis Hybrid Manager user manual data output management section.

- open Setting Window

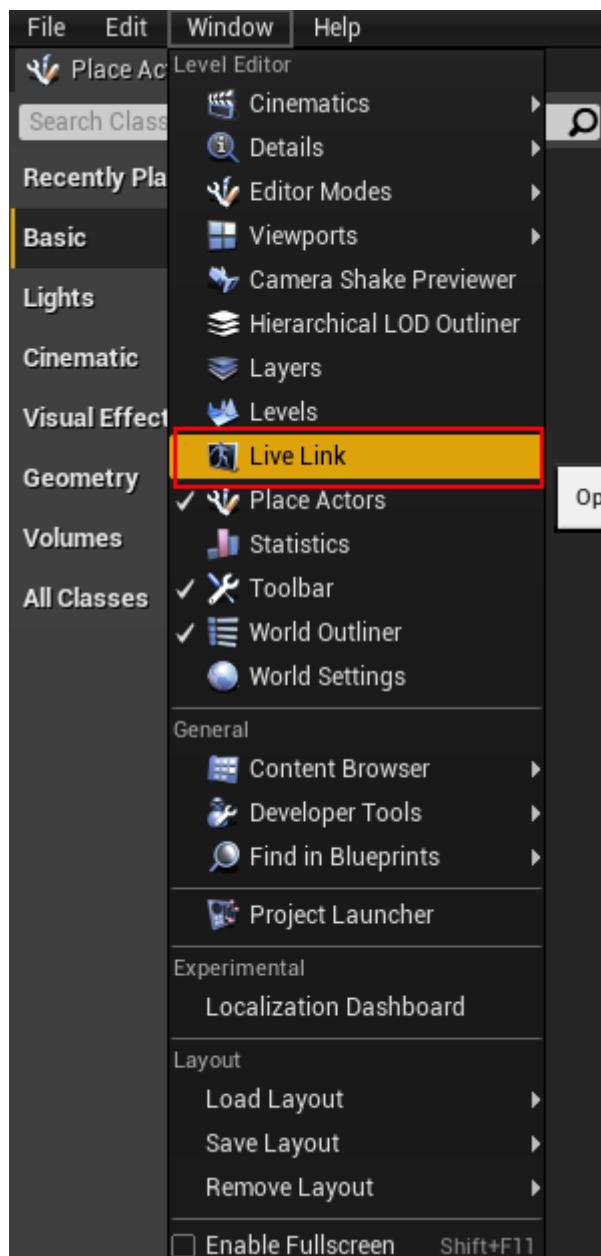


- Setup Mocap data output



4.3 Open Unreal Project and Play an animation

- Open your Unreal Project with Neuron Live Link Plugin

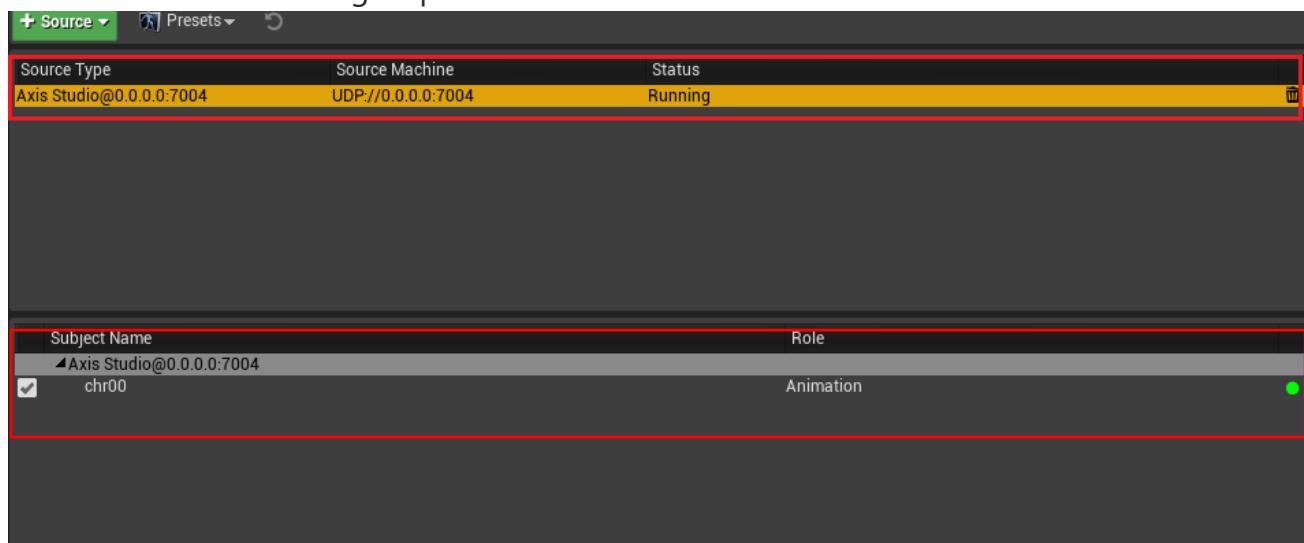


- Open Live Link Window
- In Live Link Window, follow the steps to add Axis Neuron Live Source

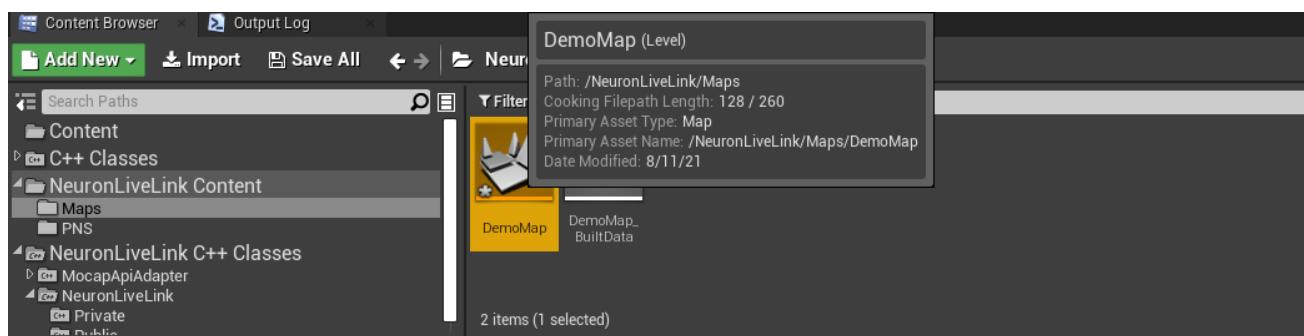


If the source is ready you will see Live link Subject(s) on the window, in the picture it is `chr00` you will use

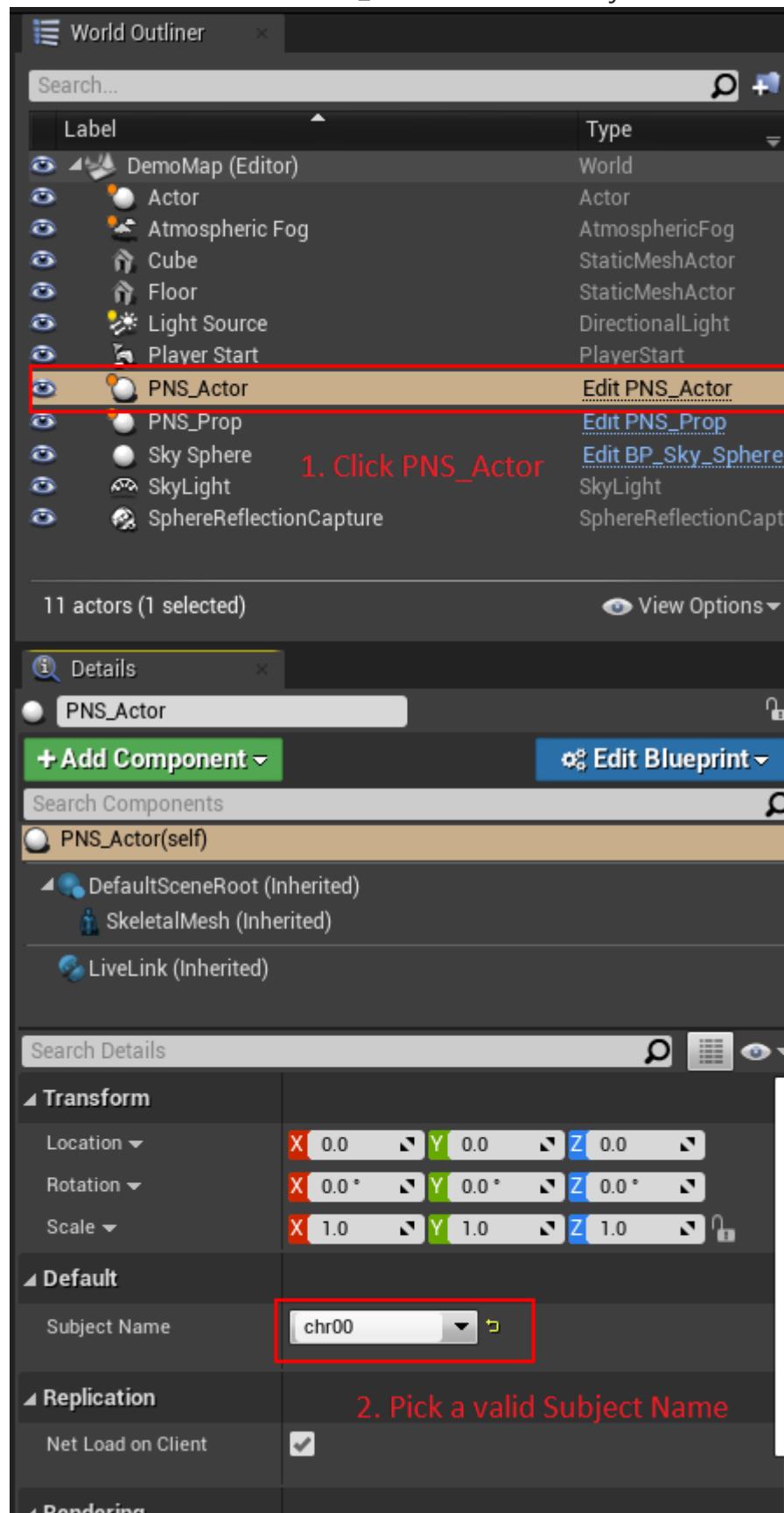
the name in the following steps.



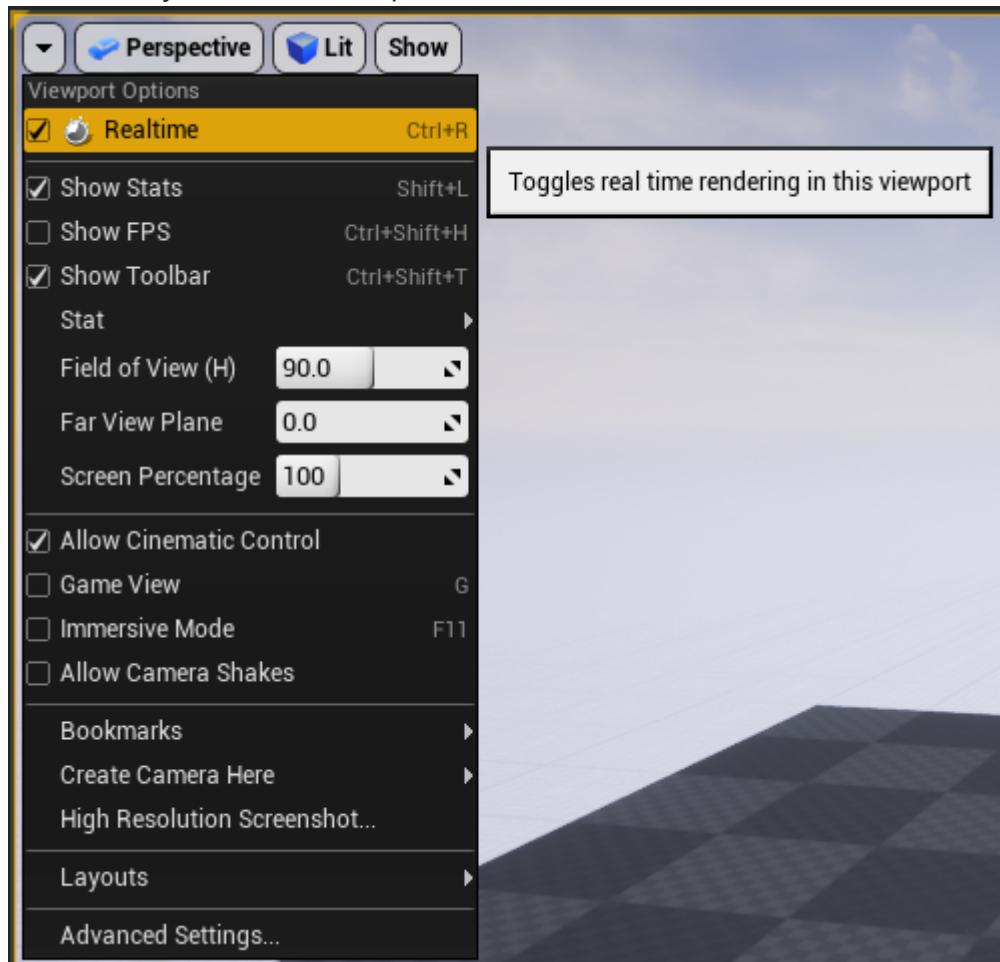
- Go to Content browser, Open DemoMap(World'/NeuronLiveLink/Maps/DemoMap.DemoMap') in Neuron Live Link Plugin



- In World Outliner Click "PNS_Actor" and edit Subject name



- Make sure your editor viewport is realtime

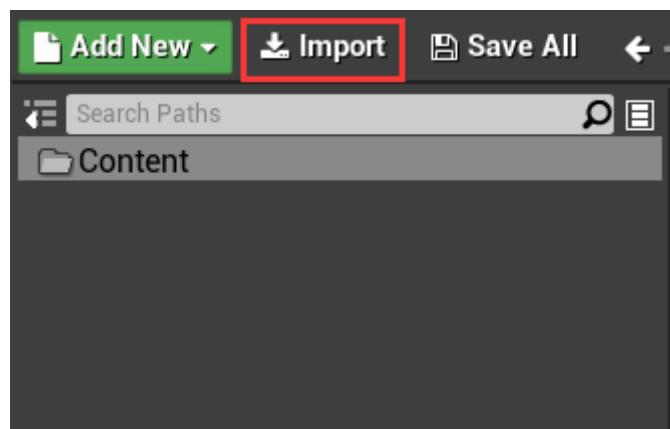


- You will see a robot character move in the viewport



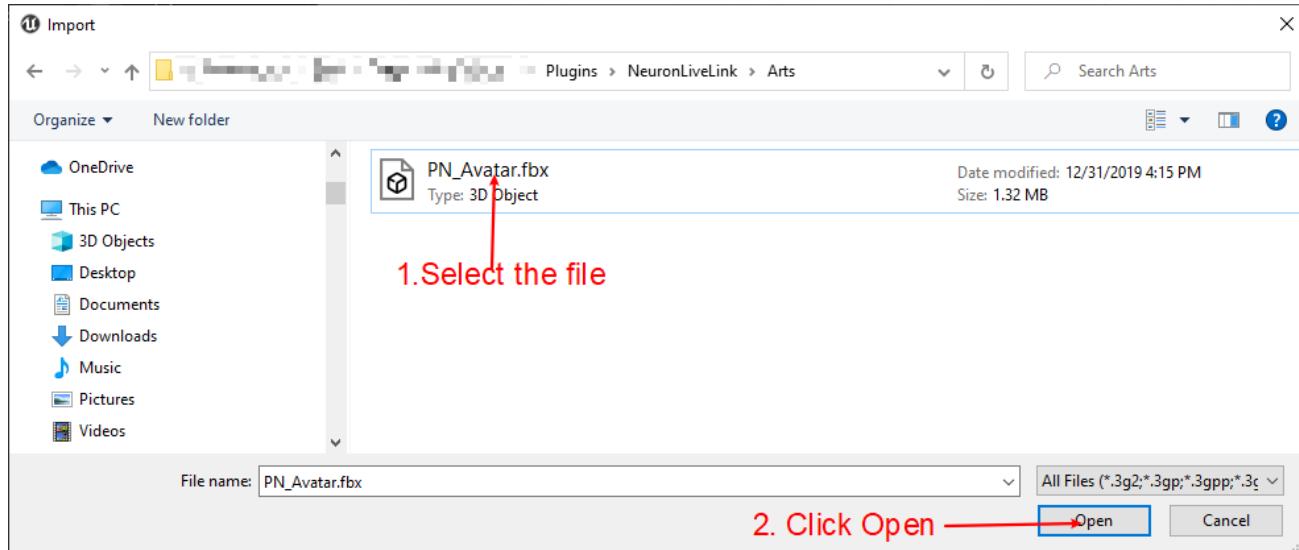
5. Import a new Skeletal Mesh

You can Import skeletal meshes from FBX file into Unreal engine. In this tutorial, A FBX file named [PN_Avatar.fbx](#) will be imported to Unreal Engine, you can find the file in the [PluginBaseFolder/Arts/PN_Avatar.fbx](#)

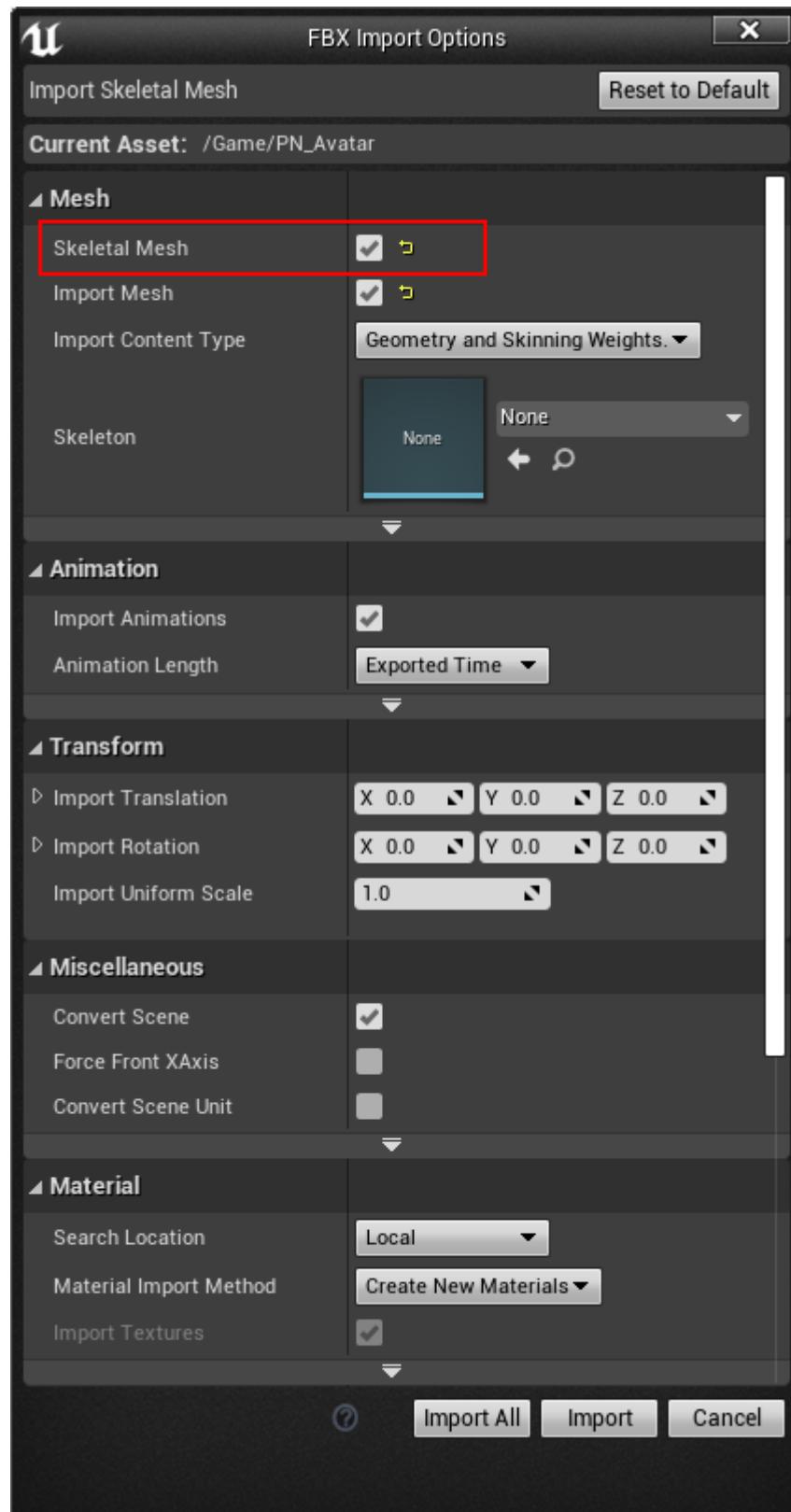


- In Content browser, Click Import Button

- Locate to the FBX file you want to import, and Click Open

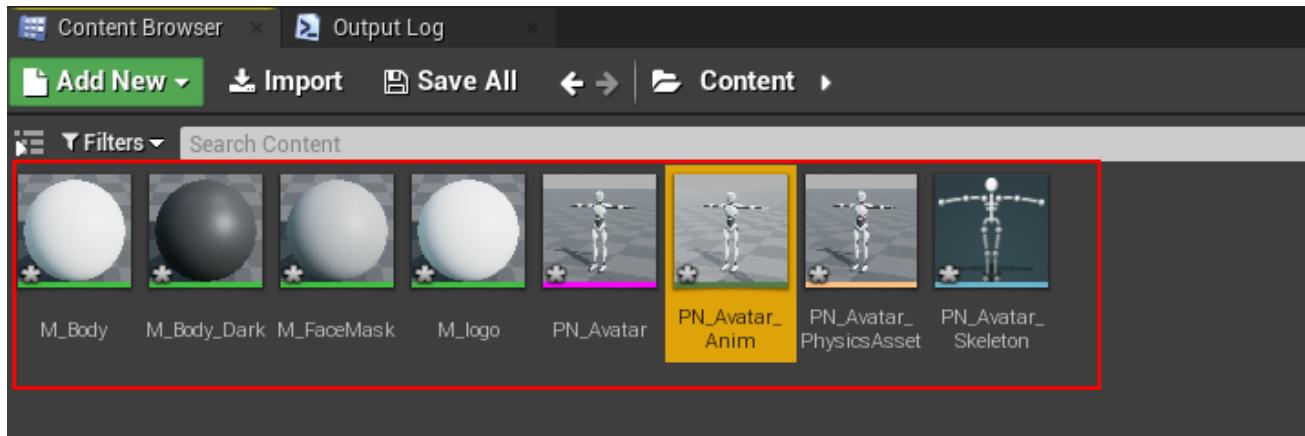


- In the **FBX Import Options** dialog box, choose the appropriate settings, making sure that the **Skeletal Mesh** option is enabled.



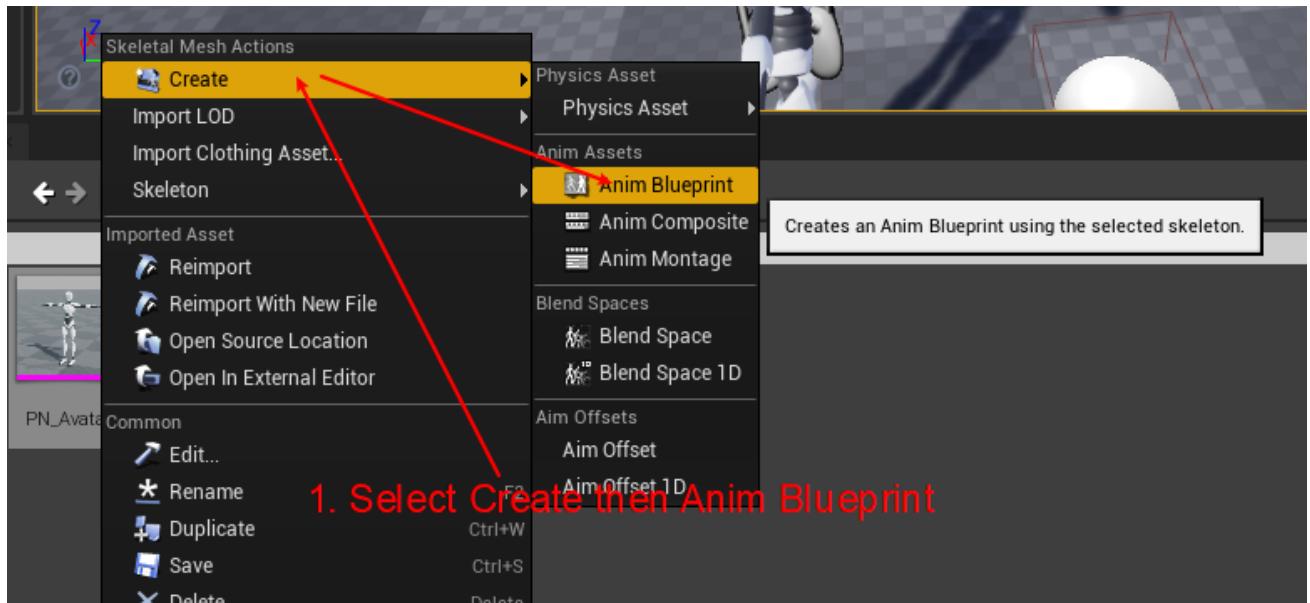
Note: If no existing Skeleton is selected, a new one will be created from the Skeletal Mesh being imported. The new Skeleton's name will be that of the Skeletal Mesh with *Skeleton* appended.

- Click **Import All** or **Import** button on the above picture to import the FBX file to Unreal Engine, the following Picture shows the assets import from the FBX file. Click **Save All** button on Content browser to save the assets.

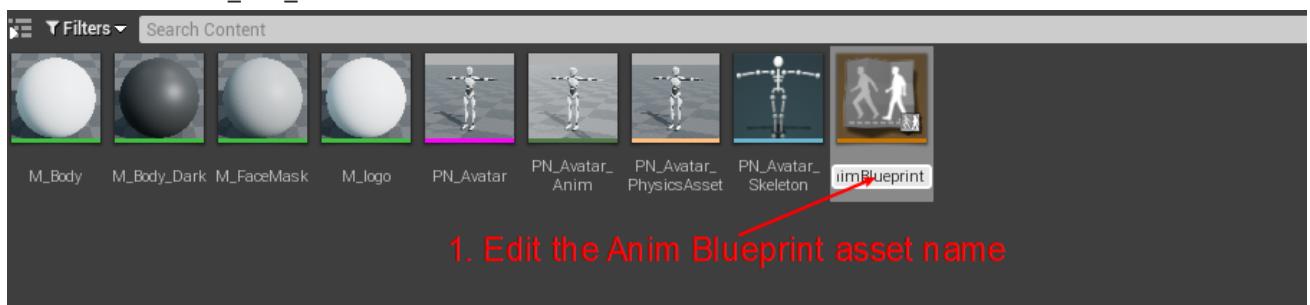


6. Manipulate Animation Blueprint Asset to driven the skeleton

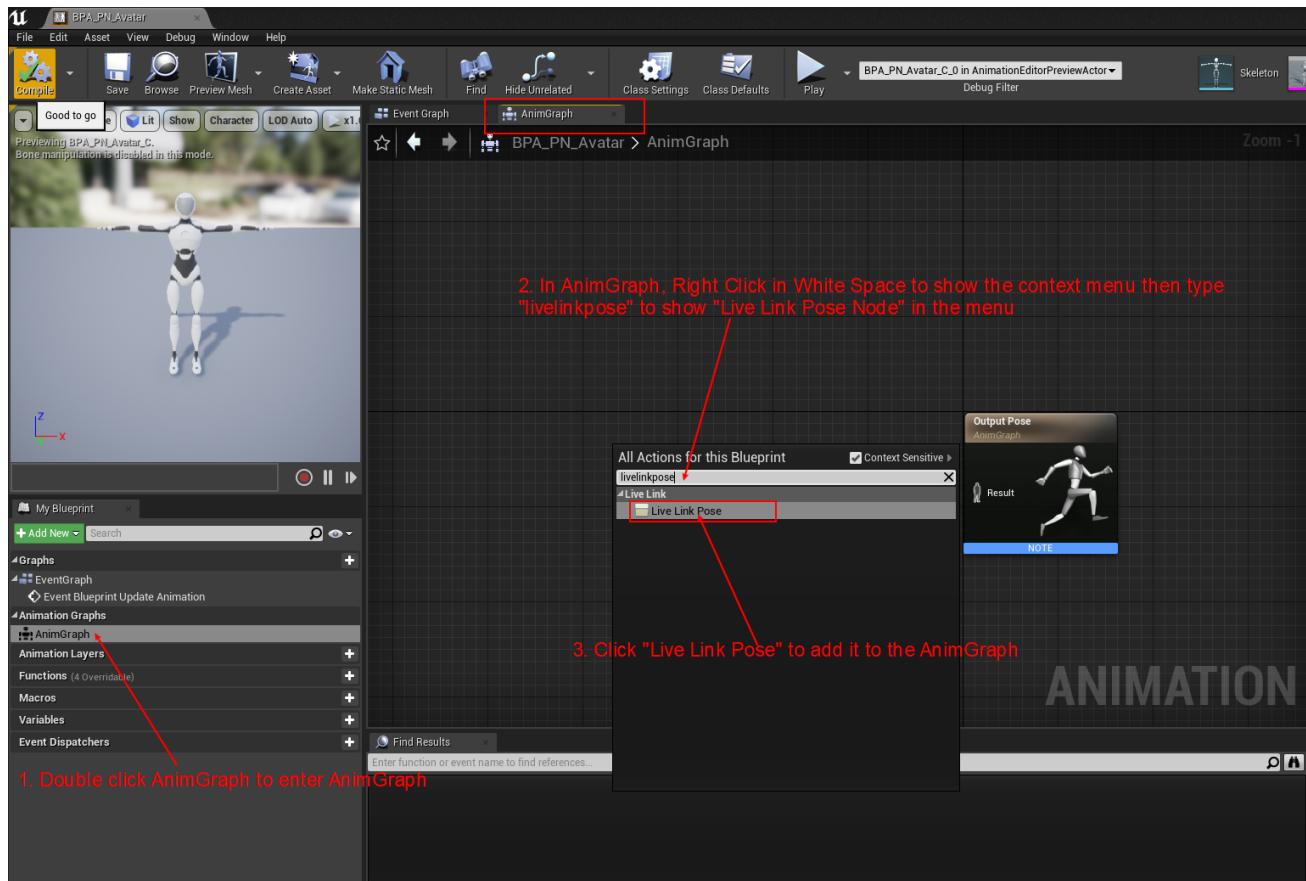
- Right-click on the Skeletal Mesh you want the Animation Blueprint to target and click Create > Amin Assets > Amin Blueprint.



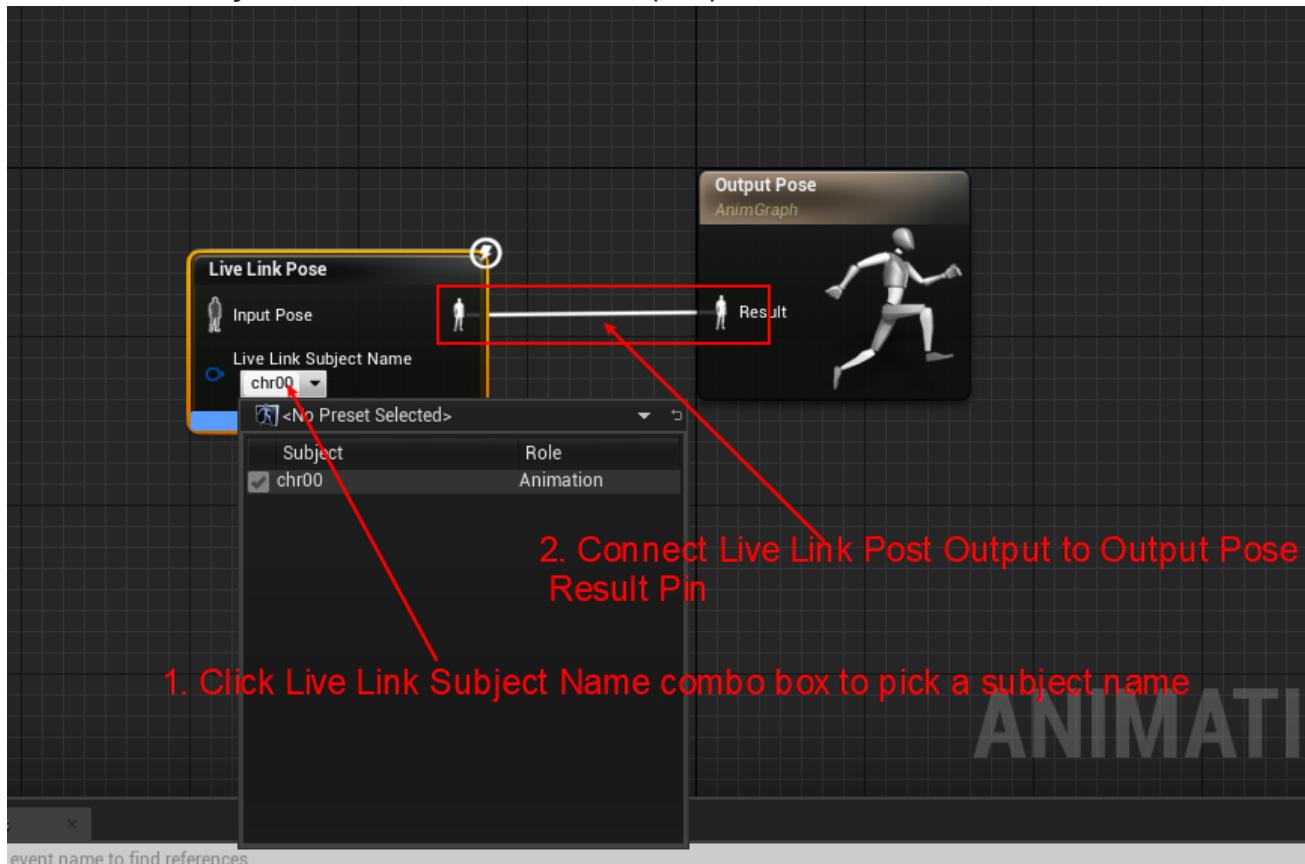
- The Animation Blueprint is created in the same folder as the target Skeletal Mesh asset, with the name ready to be edited. you can edit its name or use the default name, in this tutorial we name it **BPA_PN_Avatar**



- Double click the Animation Blueprint **BPA_PN_Avatar** to edit the anim blueprint



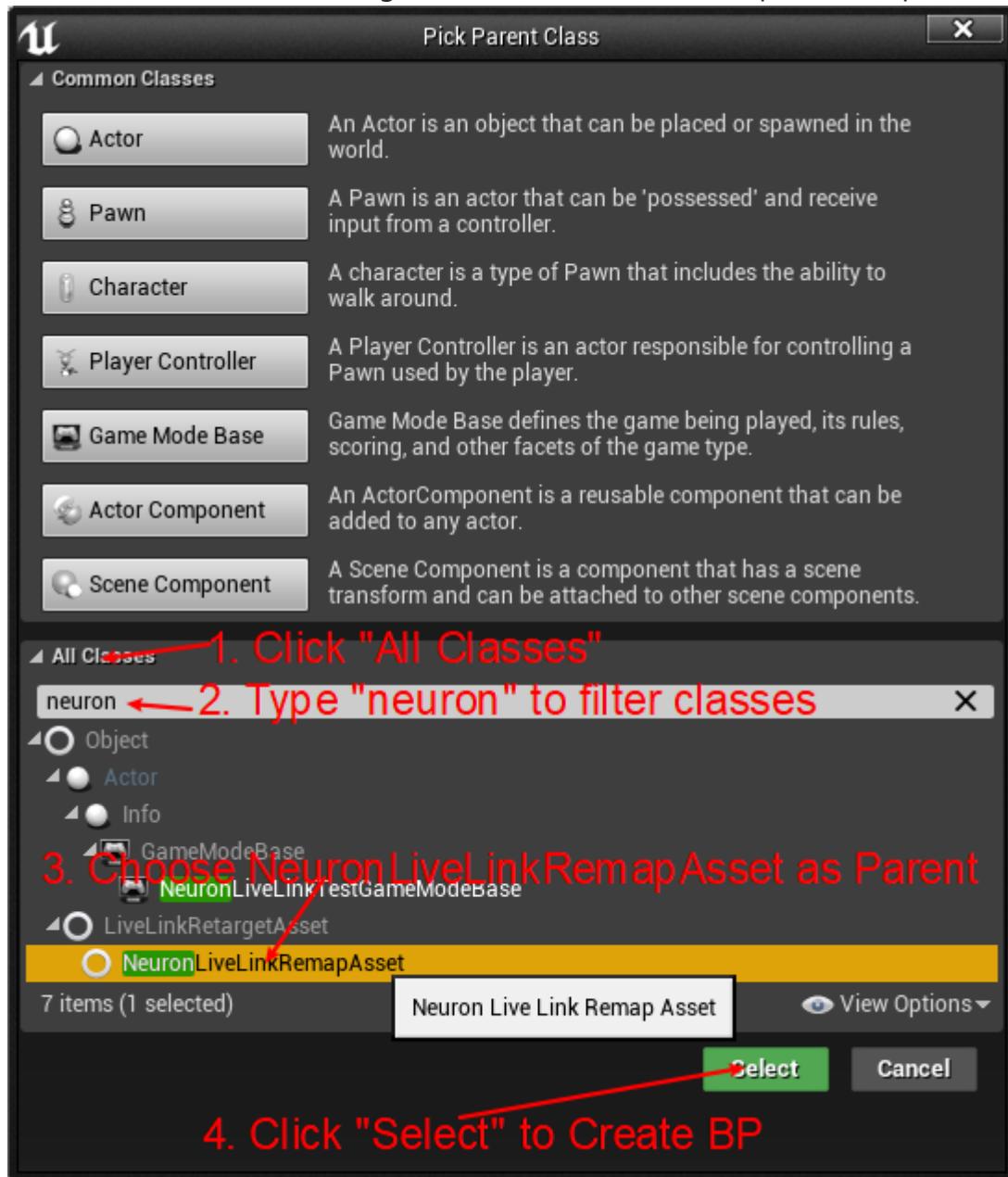
- Pick live link subject name and connect to output pose



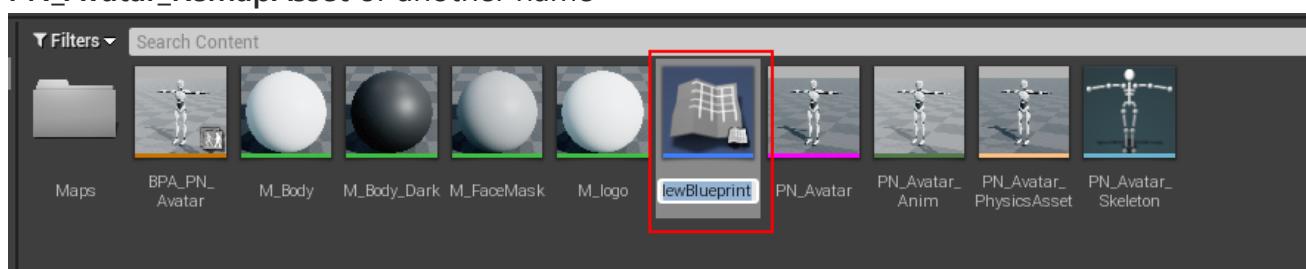
- Go to Content browser, Add NeuronLiveLinkRemapAsset for the skeleton



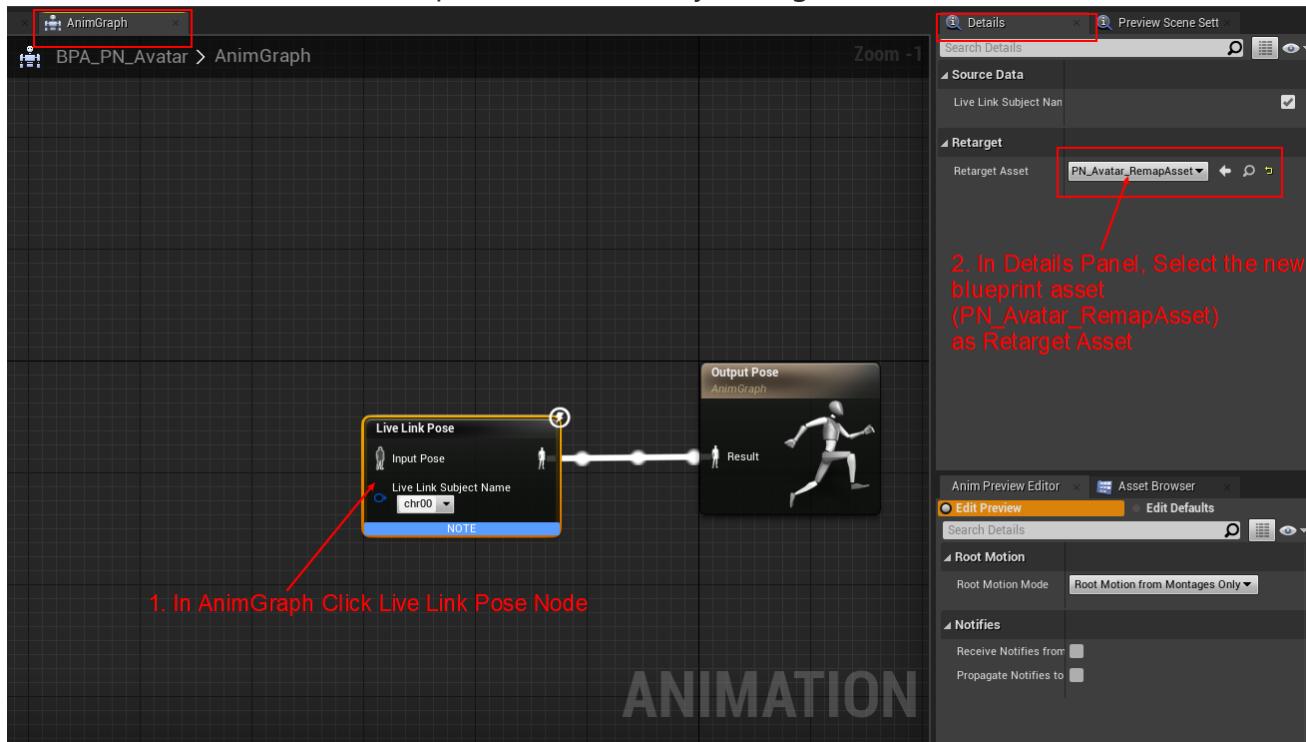
- In the Pick Parent class Dialog, Pick "NeuronLiveLinkRemapAsset" as parent class



- The blueprint will be created in the Content browser, you can rename the asset as PN_Avatar_RemapAsset or another name



- Go back to the animation blueprint editor, modify Retarget Asset for Live Link Pose



- Save the animation blueprint. Next we will edit **PN_Avatar_RemapAsset** to remapping bone names

7. Remapping Bone Name

Your Skeletal Mesh may use different skeleton with Axis standard skeleton. In this situation you cannot apply NeuronLiveLinkRemapAsset to LiveLinkPose for your animation need to create your own retarget asset for your specific skeletal mesh. In this section we go through the setup process to create custom retarget asset. on Part [Manipulate Animation Blueprint Asset to driven the skeleton](#6. Manipulate Animation Blueprint Asset to driven the skeleton) we have already create the remapping BP **PN_Avatar_RemapAsset** now we will start to edit the asset.

Our source bone names

```
Hips = 0,  
RightUpLeg,  
RightLeg,  
RightFoot,  
LeftUpLeg,  
LeftLeg,  
LeftFoot,  
Spine,  
Spine1,  
Spine2,  
Neck,  
Neck1,  
Head,  
RightShoulder,  
RightArm,  
RightForeArm,  
RightHand,  
RightHandThumb1,  
RightHandThumb2,  
RightHandThumb3,  
RightInHandIndex,  
RightHandIndex1,  
RightHandIndex2,  
RightHandIndex3,  
RightInHandMiddle,  
RightHandMiddle1,  
RightHandMiddle2,  
RightHandMiddle3,  
RightInHandRing,  
RightHandRing1,  
RightHandRing2,  
RightHandRing3,  
RightInHandPinky,  
RightHandPinky1,  
RightHandPinky2,  
RightHandPinky3,  
LeftShoulder,  
LeftArm,  
LeftForeArm,  
LeftHand,  
LeftHandThumb1,  
LeftHandThumb2,  
LeftHandThumb3,  
LeftInHandIndex,  
LeftHandIndex1,  
LeftHandIndex2,
```

```

LeftHandIndex3,
LeftInHandMiddle,
LeftHandMiddle1,
LeftHandMiddle2,
LeftHandMiddle3,
LeftInHandRing,
LeftHandRing1,
LeftHandRing2,
LeftHandRing3,
LeftInHandPinky,
LeftHandPinky1,
LeftHandPinky2,
LeftHandPinky3,
Spine3,

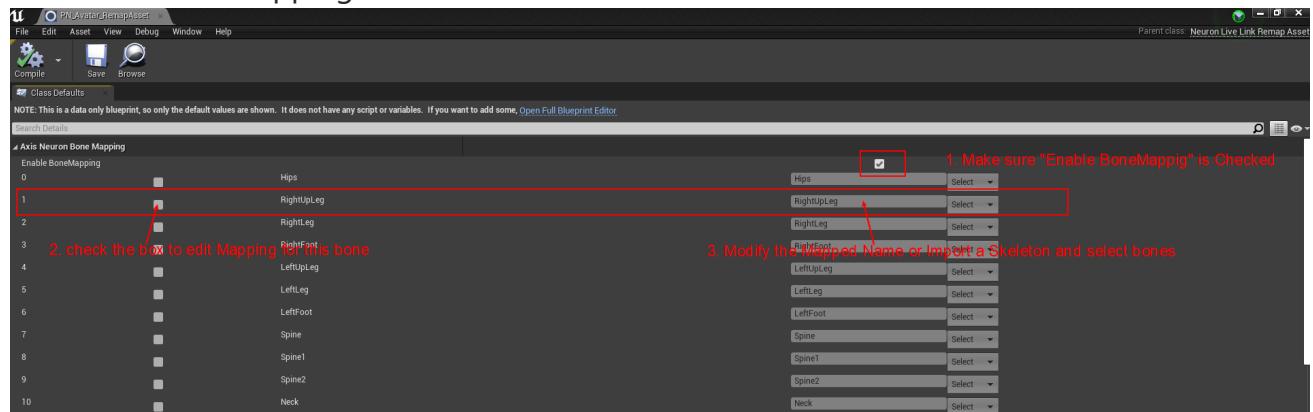
```

For Axis Neuron we use Hips, Spine2, Spine3, Neck, Head, LeftHandPinky3 as bone names, Neck1 not included

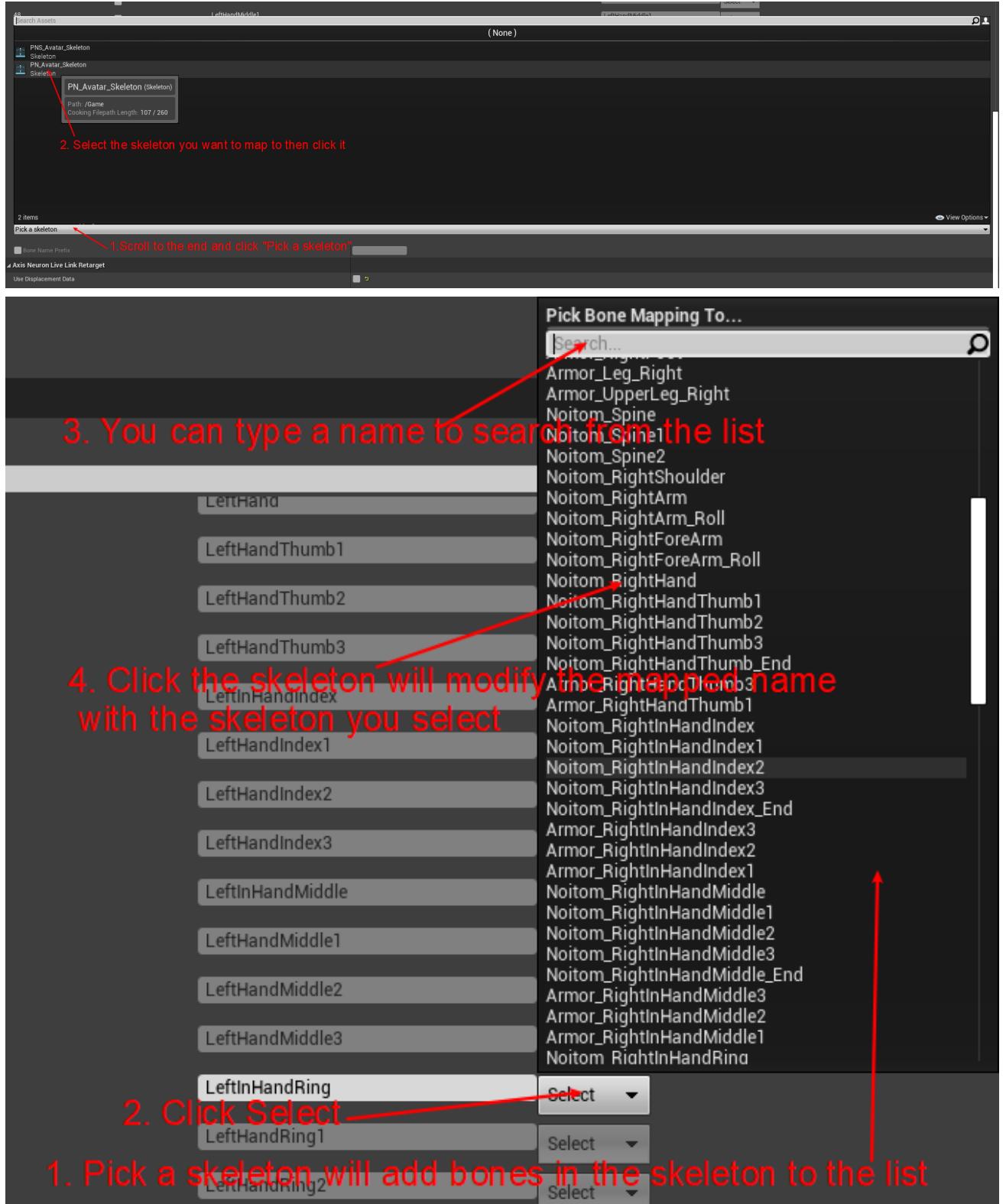
For Axis Studio we use Hips~LeftHandPinky3 as bone names, Spine3 not included

7.1 Remapping bone name by editor

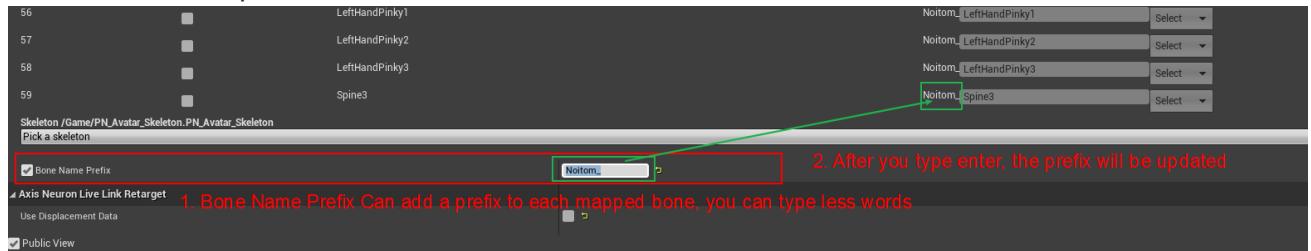
- Double click **PN_Avatar_RemapAsset** in Content Browser to open Blueprint Editor, and make sure **Enable BoneMapping** is checked, and follow step 2-3 in the following picture to edit each bone mapping.



- Import a skeleton for remapping selection



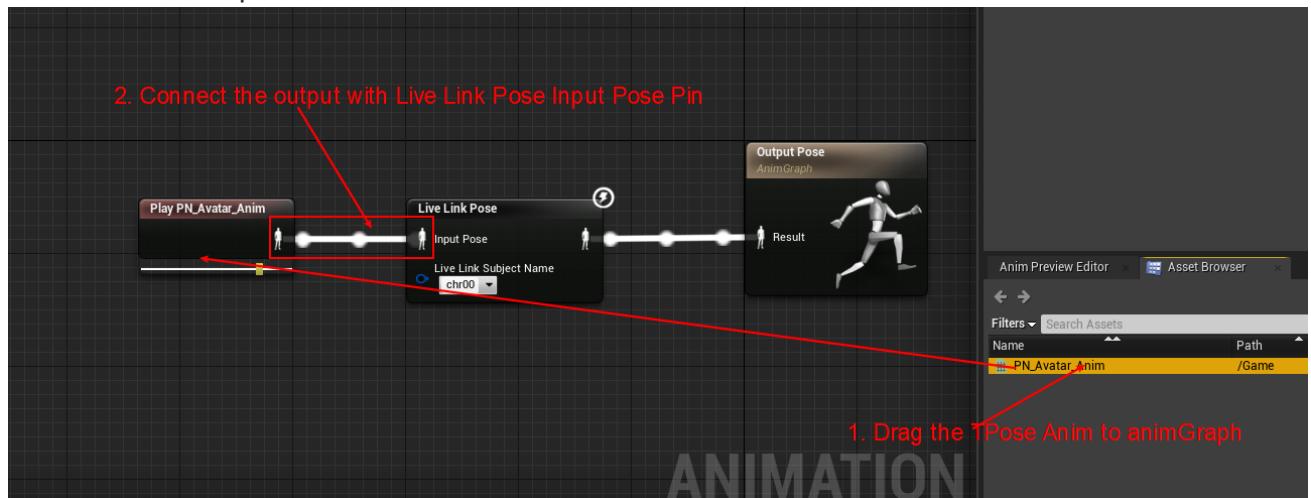
- Edit bone name prefix



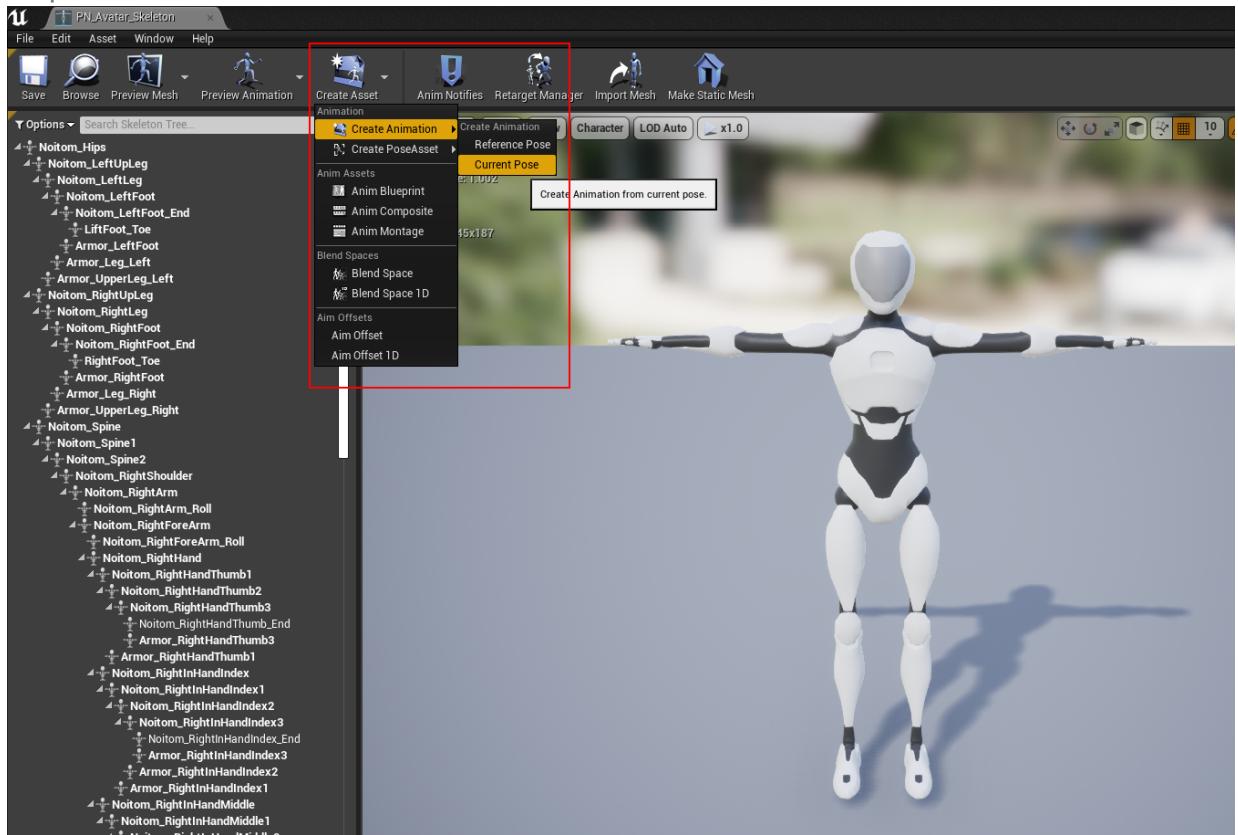
- Edit UseDisplacementData



- If the Skeleton default pose is not T-Pose, You can provide a T-Pose Animation Sequence to Live Link Pose Input Pose

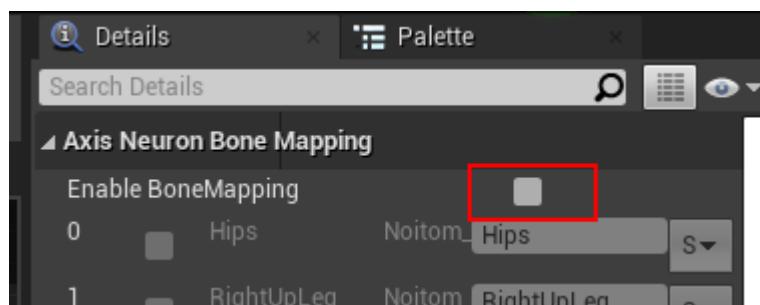


There is a Simple way to add a T-pose animation for the skeleton, open the Skeleton you use, end drag the bone to T-pose, then you can save current pose to an animation sequence



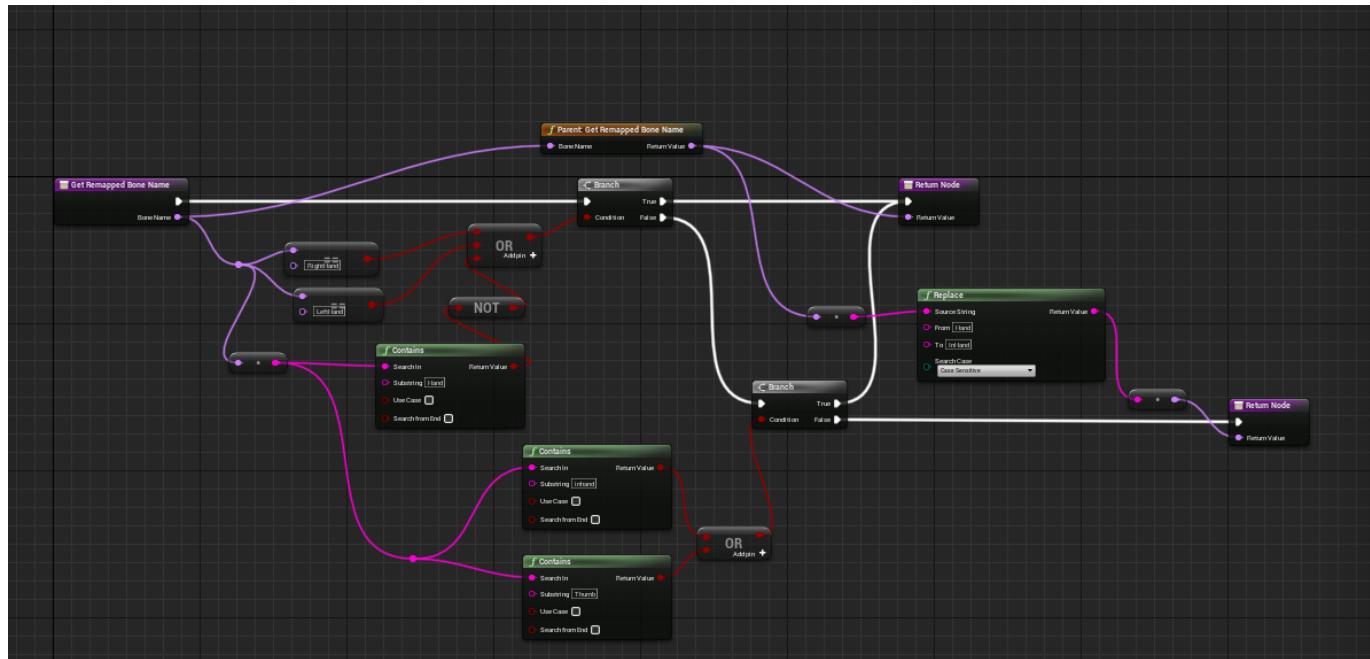
7.2 Remapping bone names by override function

We recommand you to use the above method to modify remapping bones, but if you want do more tricky thing with remapping you can override function GetRemappedBoneName defined in NeuronLiveLinkRemapAsset to mapping the bone, make sure you uncheck "Enable BoneMapping" first



Here is an example for mapping finger

bone with "InHand" in bone names



7.3 Inherit From LiveLinkRetargetAsset to do your thing with retargeting

If you are an advance player, you want to do more about retargeting, you can inherit LiveLinkRetargetAsset in c++ and control the whole restarting process like NeuronLiveLinkRemapAsset.

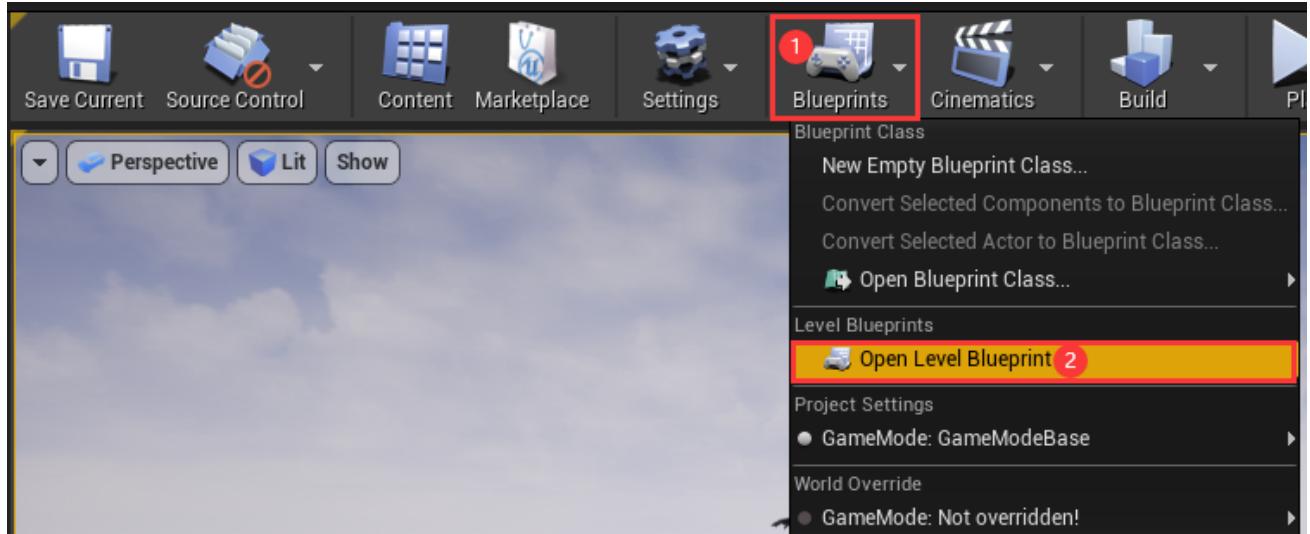
8. Using LiveLink Controller Component to control props

This is basic use of Live Link, You can refer to Unreal documents Using Live Link Data part from <https://docs.unrealengine.com/4.27/en-US/AnimatingObjects/SkeletalMeshAnimation/LiveLinkPlugin/LiveLinkBlueprintComponent/>. If the plugin receives Transform role data, you can use it to dirve your props.

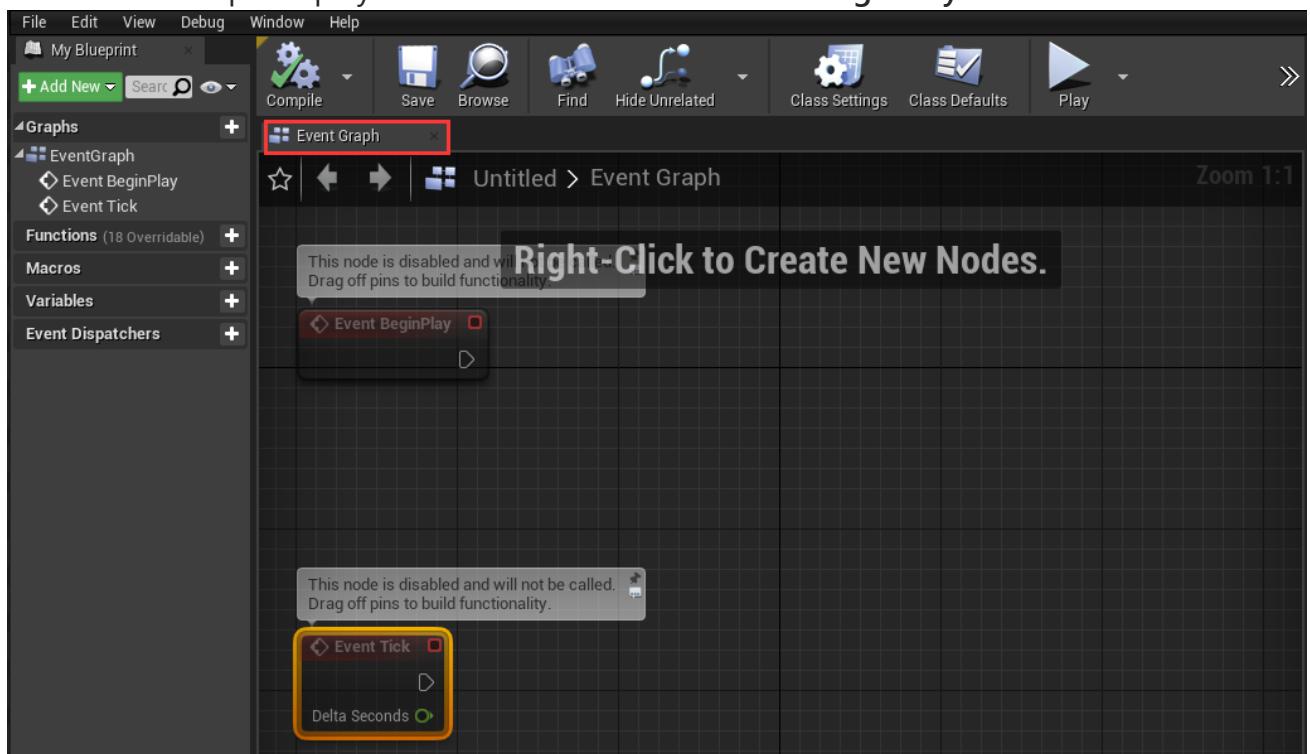
9. Projects Packaging

9.1 Implement animation driven In level blueprint

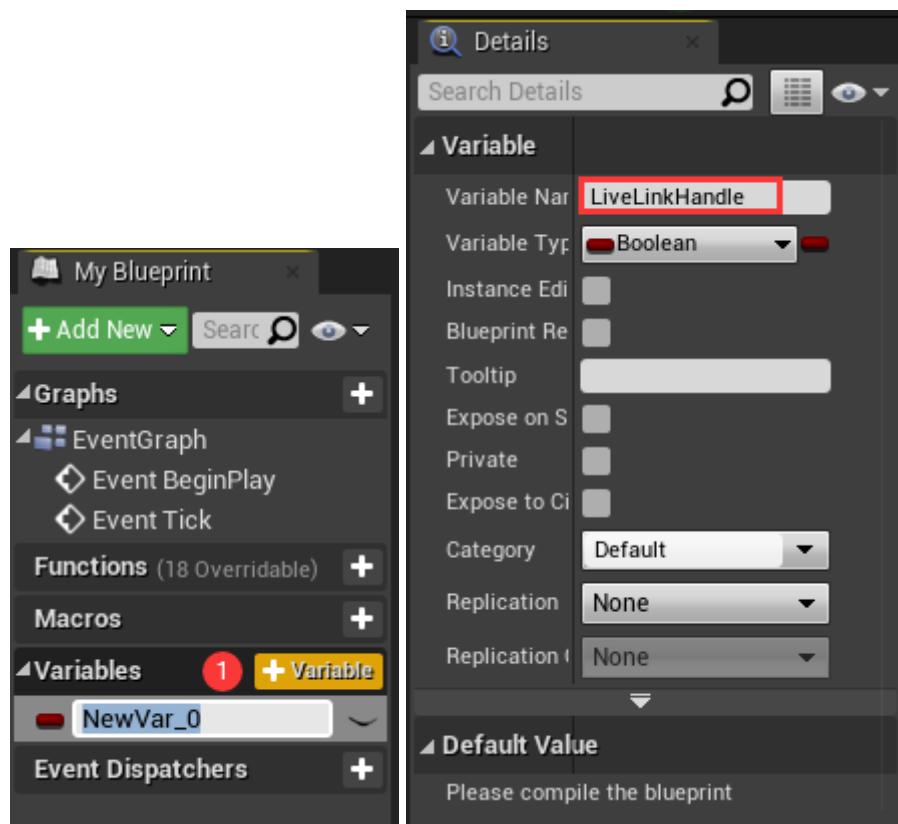
- On the Main Toolbar click the Blueprints button then select Open Level Blueprint



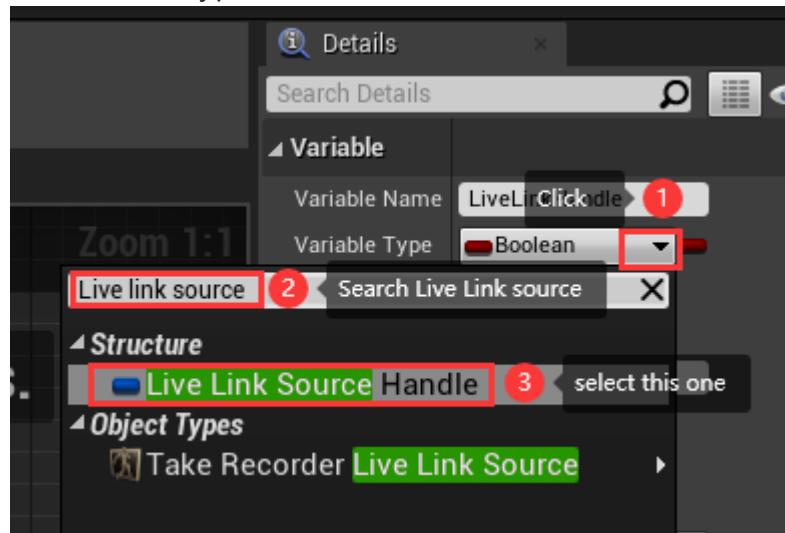
Note: Event Graph displays and with default nodes Event BeginPlay and Event Tick.



- Add A variable for handle live link
 - Move Mouse over + button, click +Variable button to add Variable in My Blueprint panel and type a new name for the Variable in the Details panel and press Enter.

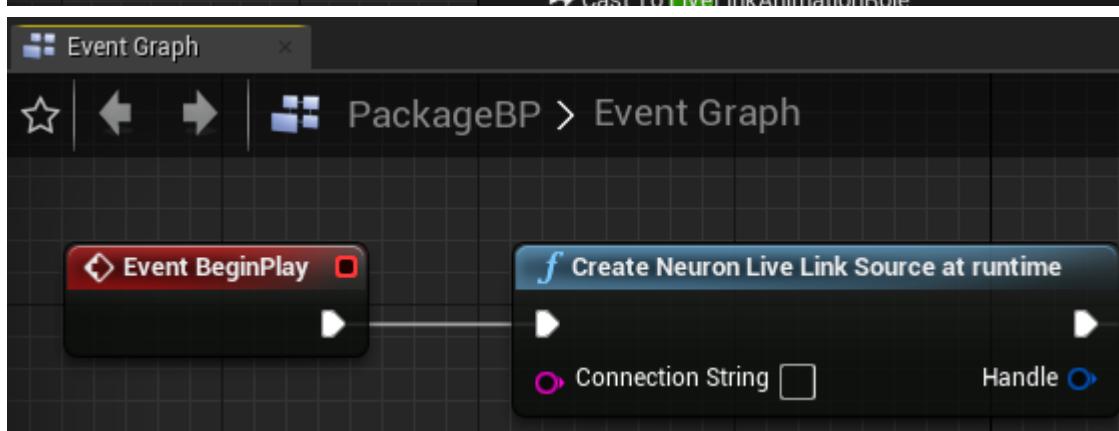
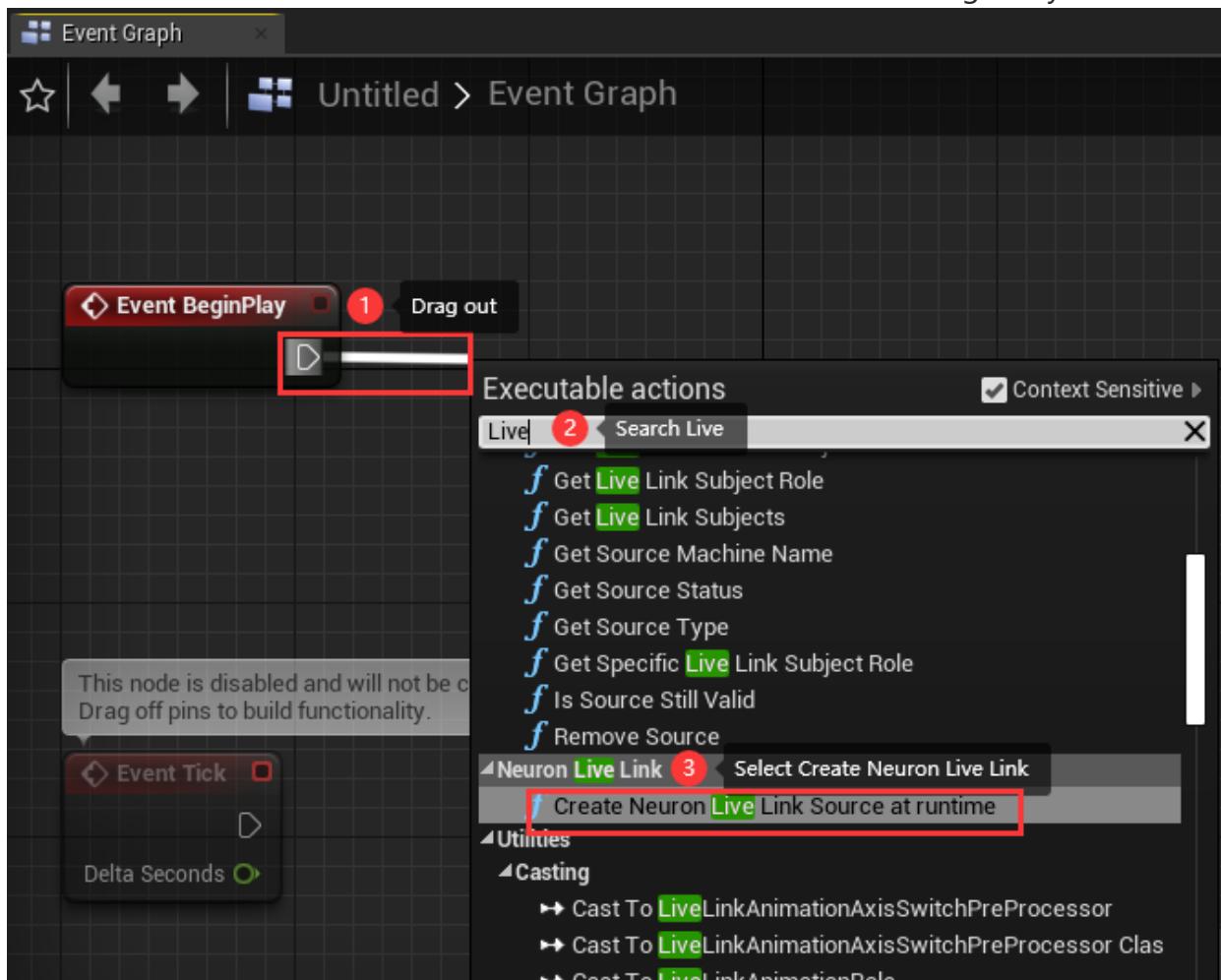


- Set Variable Type as Structure (Live Link Source Handle) in the Details Panel.

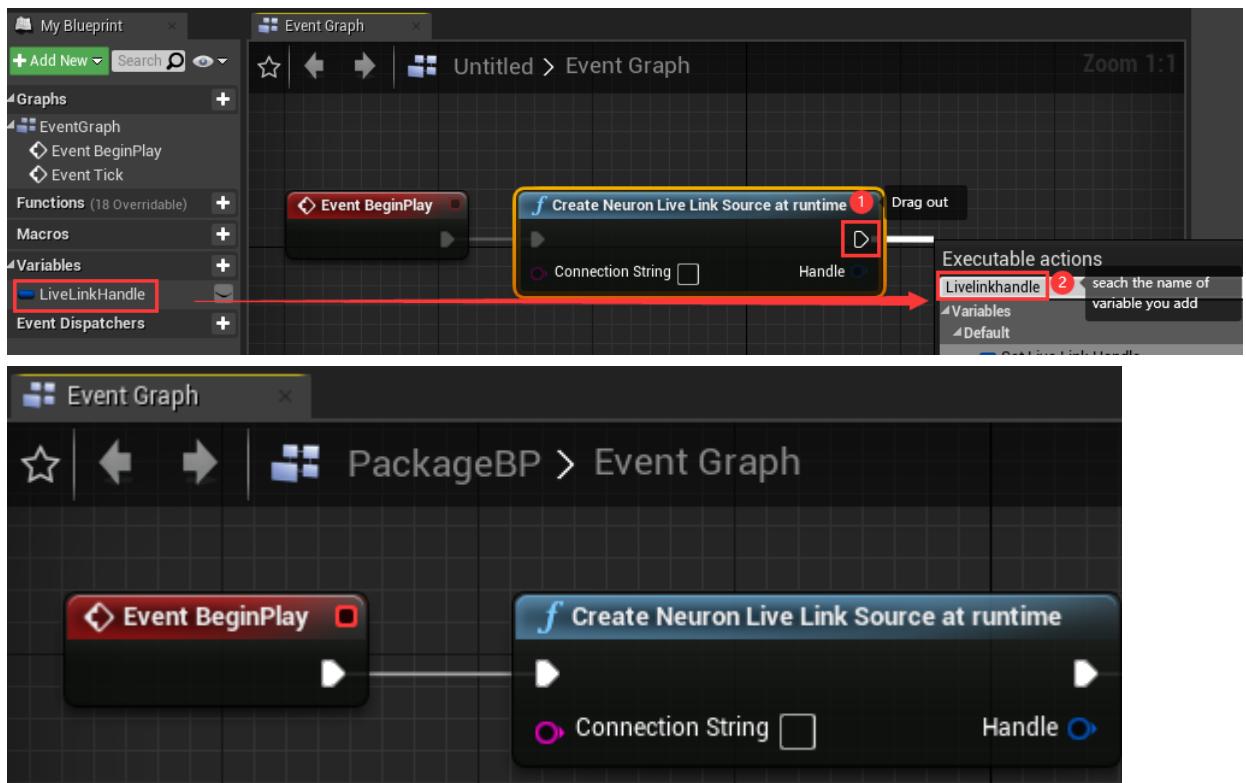


- Create Neuron Live Link Source at runtime and connect it to Event BeginPlay in Event Graph.

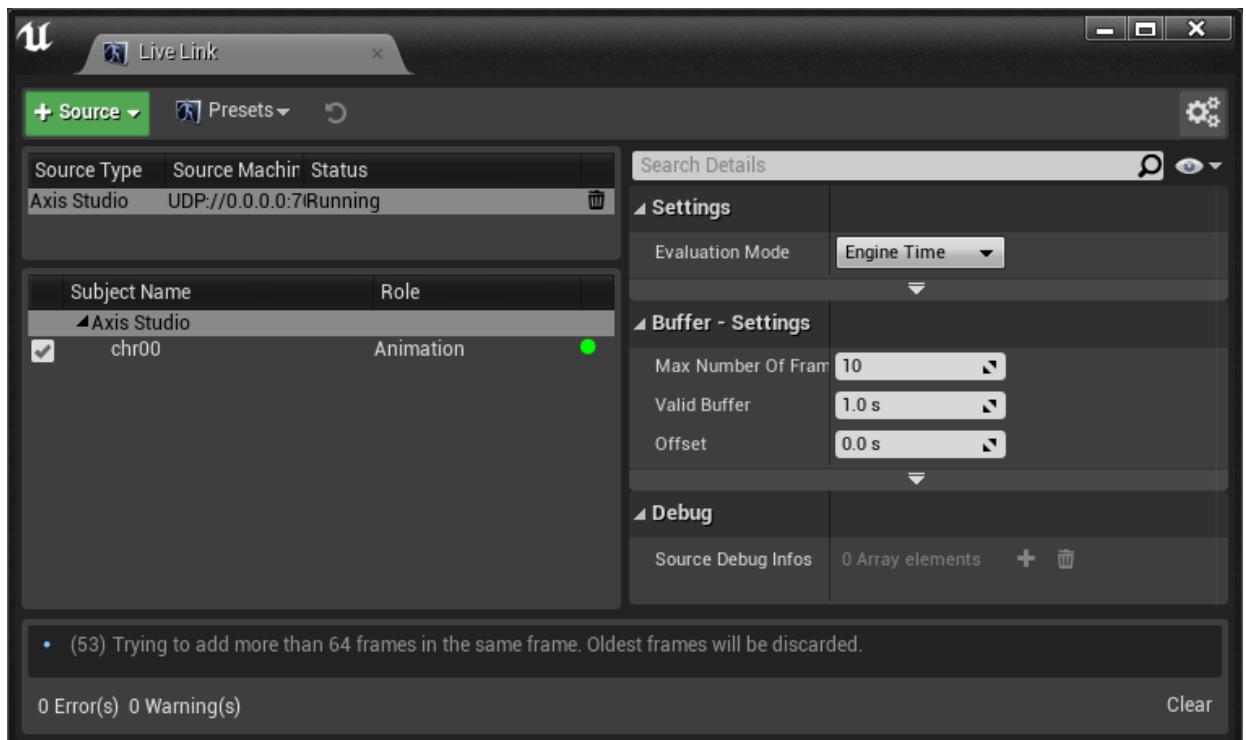
- Add Create Neuron Live Link Source at runtime Node and link to BeginPlay



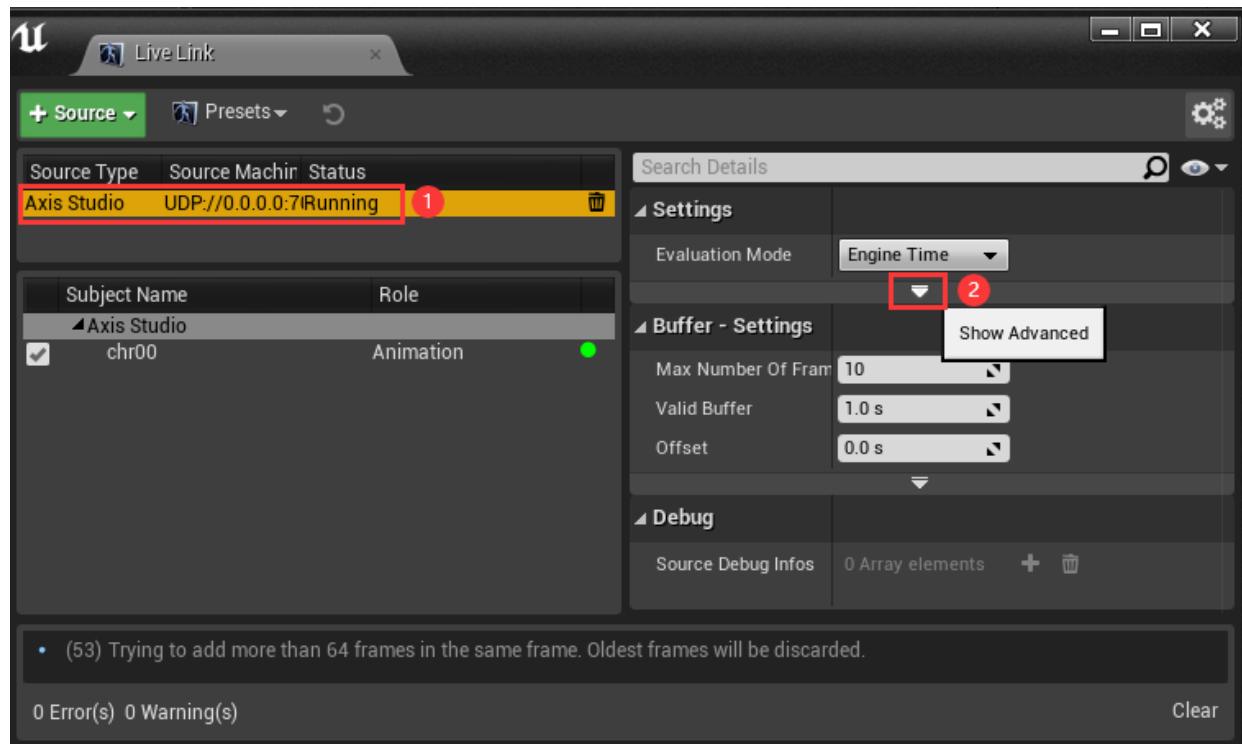
- Create Set node and connect to Create Neuron Live Link Source at runtime.



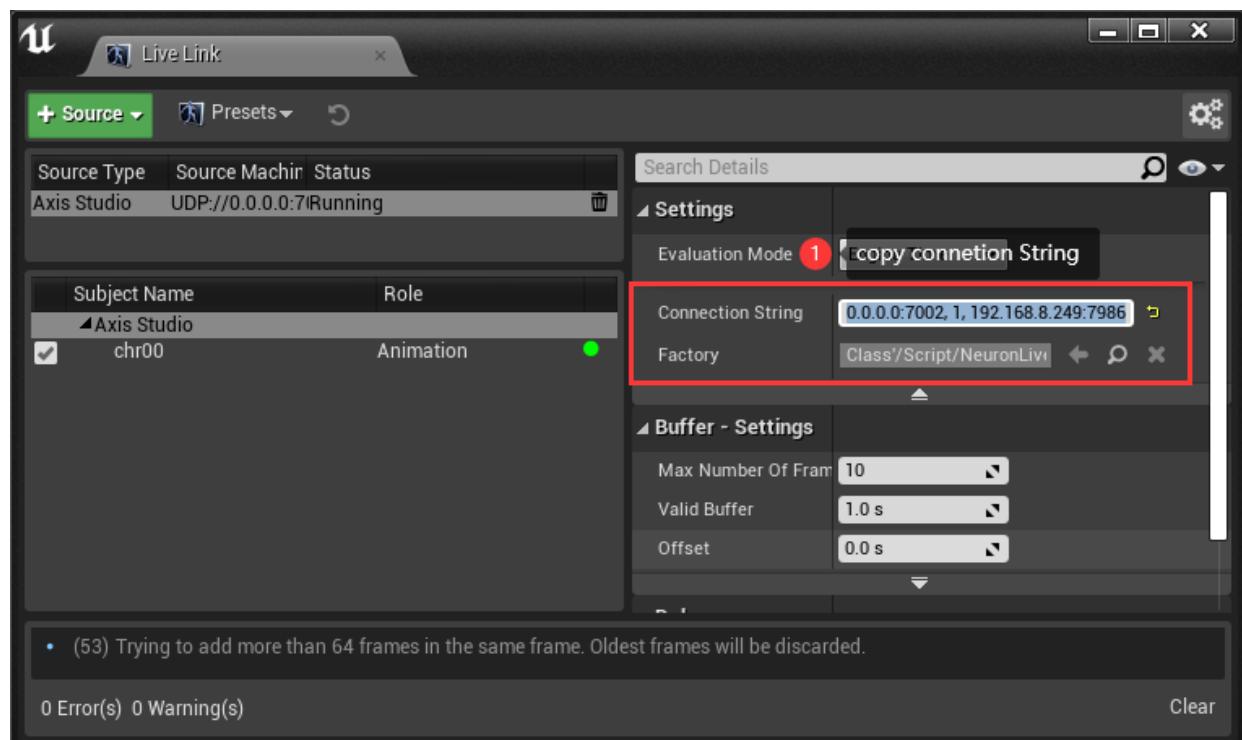
- Fill Connection String Pin in Create Neuron Live Link Source at runtime Go back to Live Link Window



Select Axis Studio source and Click Show Advanced in Settings panel

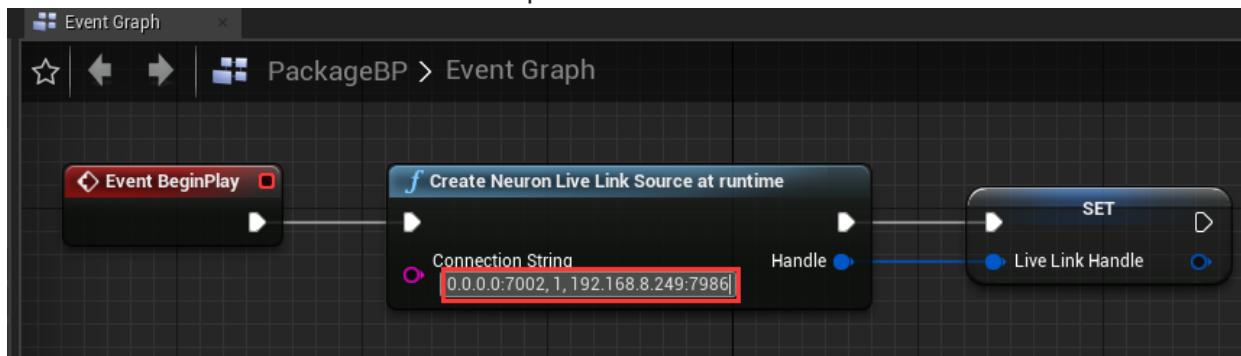


Connect string and Factory will display in the Settings panel.



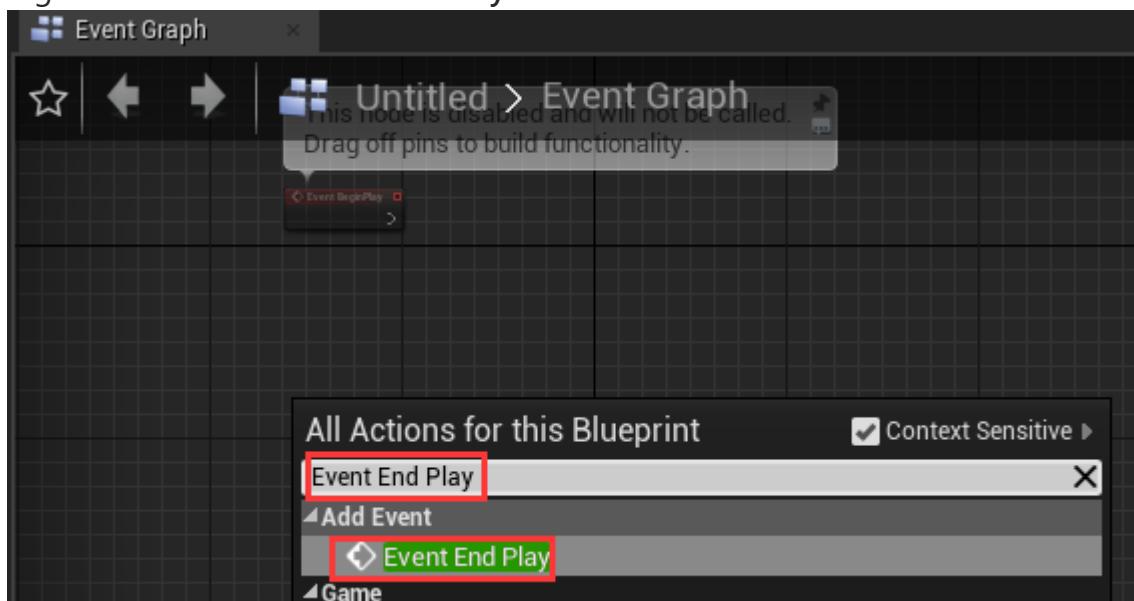
Copy Connection String in settings panel and paste it into Create Neuron Live Link

Source at runtime node in Event Graph.

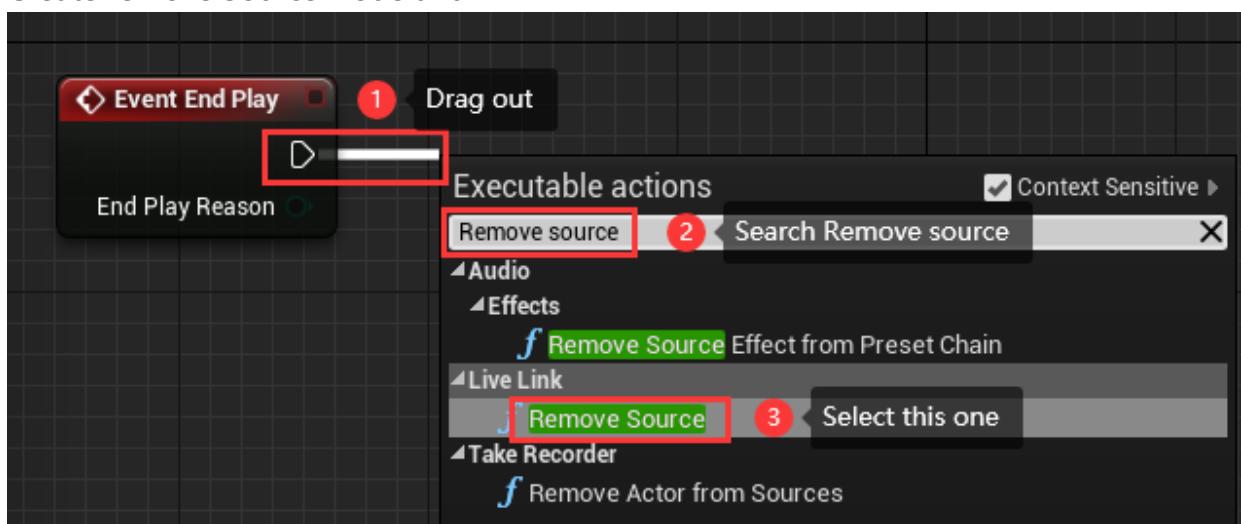


- Remove live link source and connect to Event EndPlay node

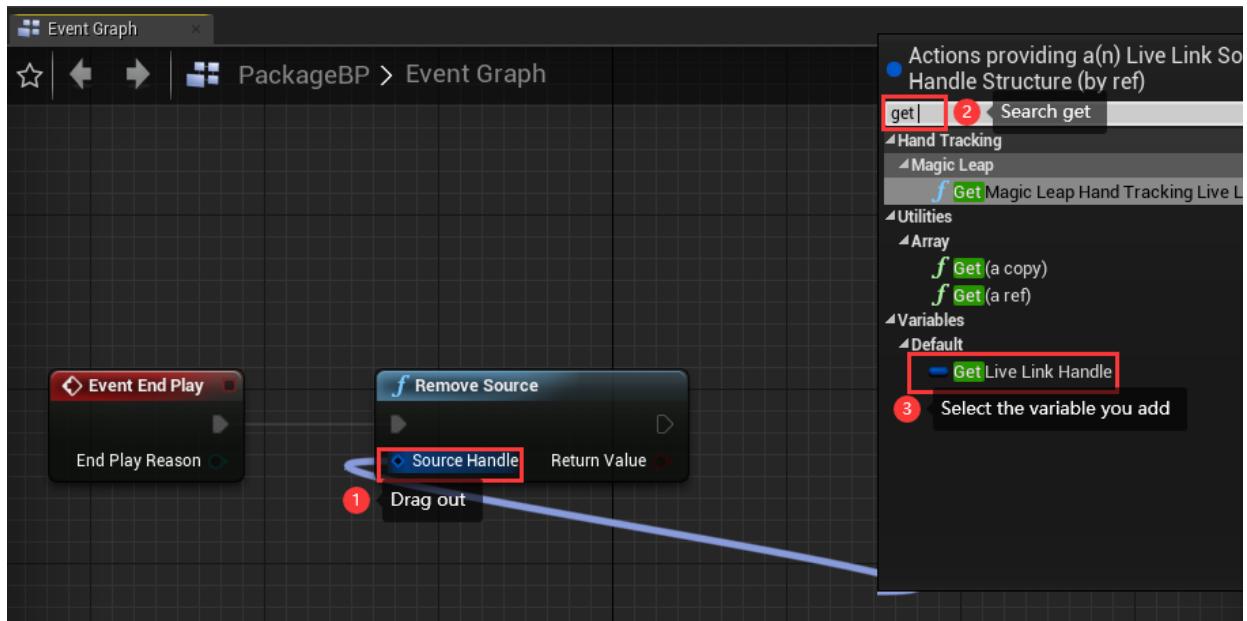
- Right-Click to create Event EndPlay.



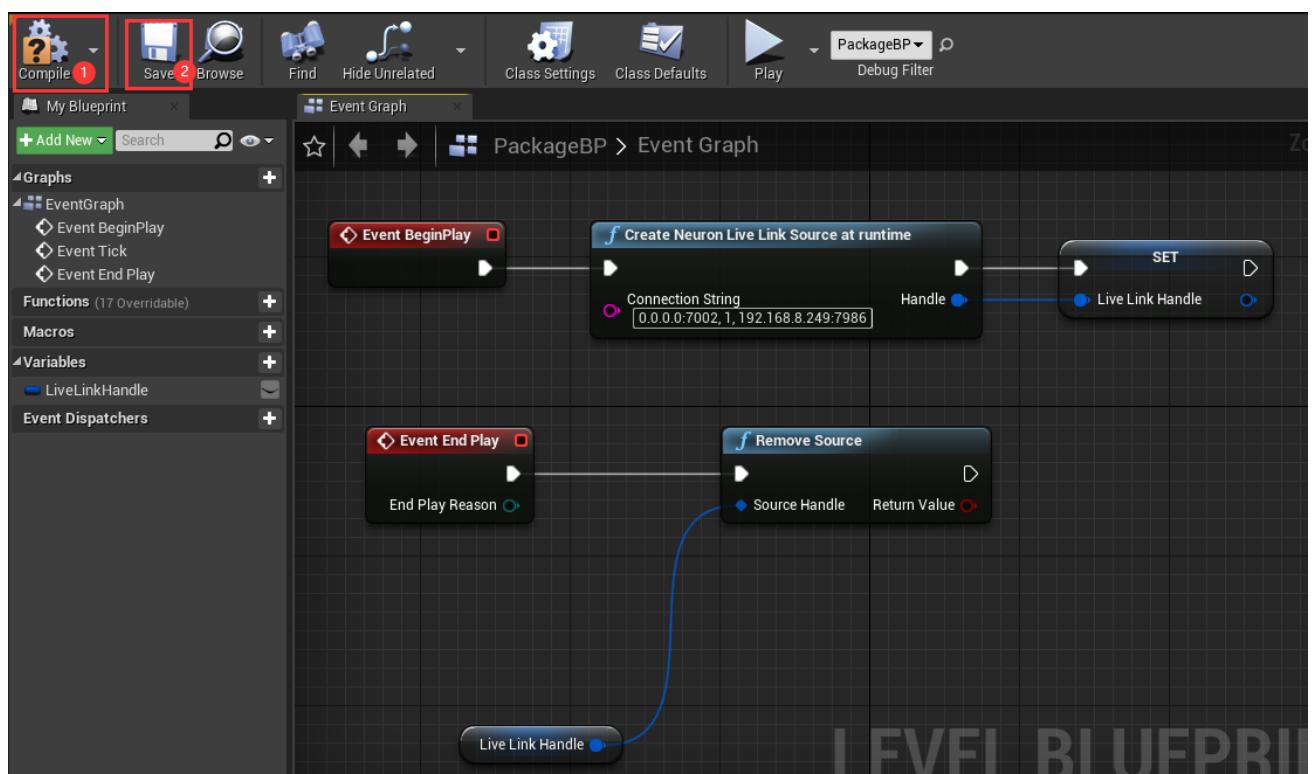
- Create remove Source Node and link



- Create Get node and connect to Remove Source node



- The event graph will show like the following image, Click Compile and Save the level blueprint

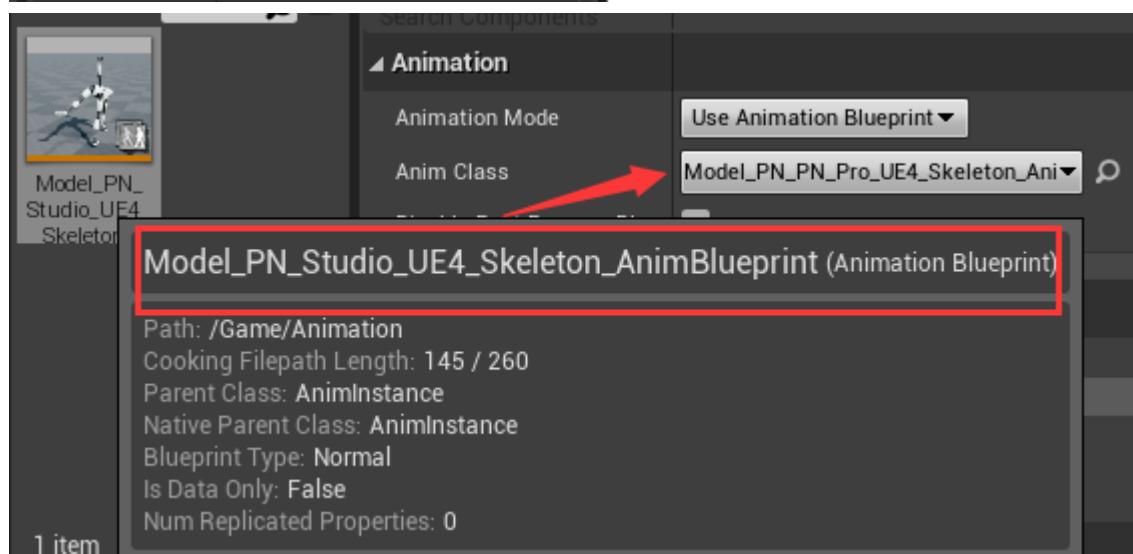
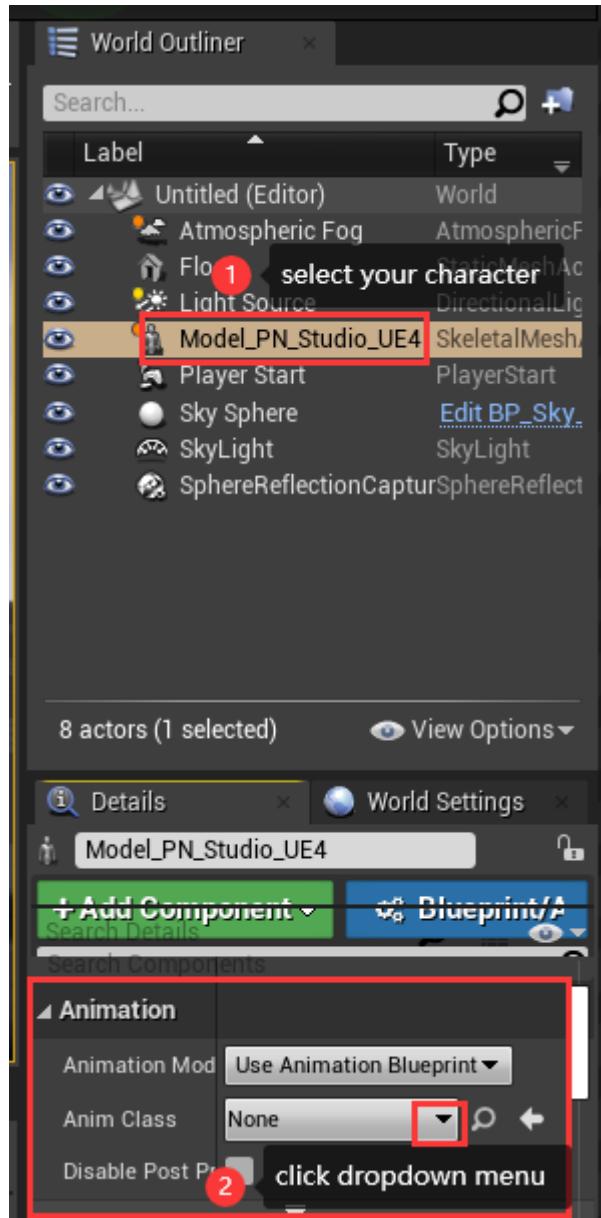


9.2 Put an Skeletal Mesh in your map and setup animation blueprint



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In the **Content Browser**, locate the Skeletal Mesh you want to add to the map as a Skeletal Mesh Actor. Place it into the map and set its animation class like the following graph, then you can click play button and test your animation. If everything is ok, don't forget to **save** your map and other assets.

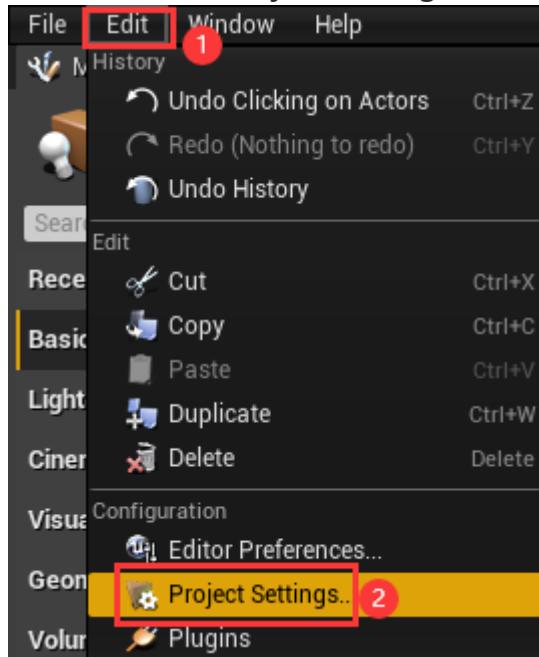


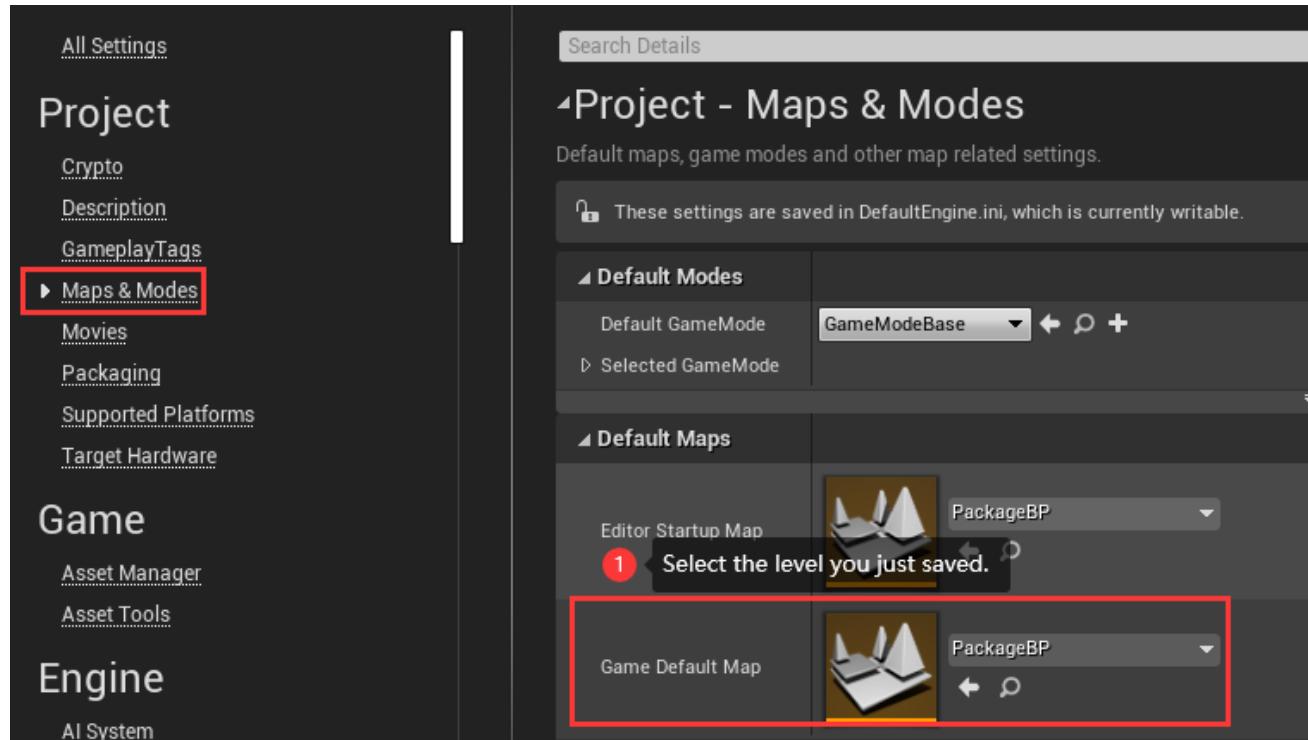
NOTE: You can also drag your AnimationBlueprint into the viewport directly or use our PNS_Actor blueprint class but use you own skeletal mesh and animation blueprint to set you animation character.

9.3 Setup Game Default map

Before packaging your game, you will first need to set a **Game Default Map**, which will load when your packaged game starts. If you do not set a map and are using a blank project, you will only see a black screen when the packaged game starts. If you have used one of the template maps, like the First-Person template or Third Person template, the starting map will be loaded.

- Click on **Edit > Project Settings > Maps & Modes** in the Editor's main menu.

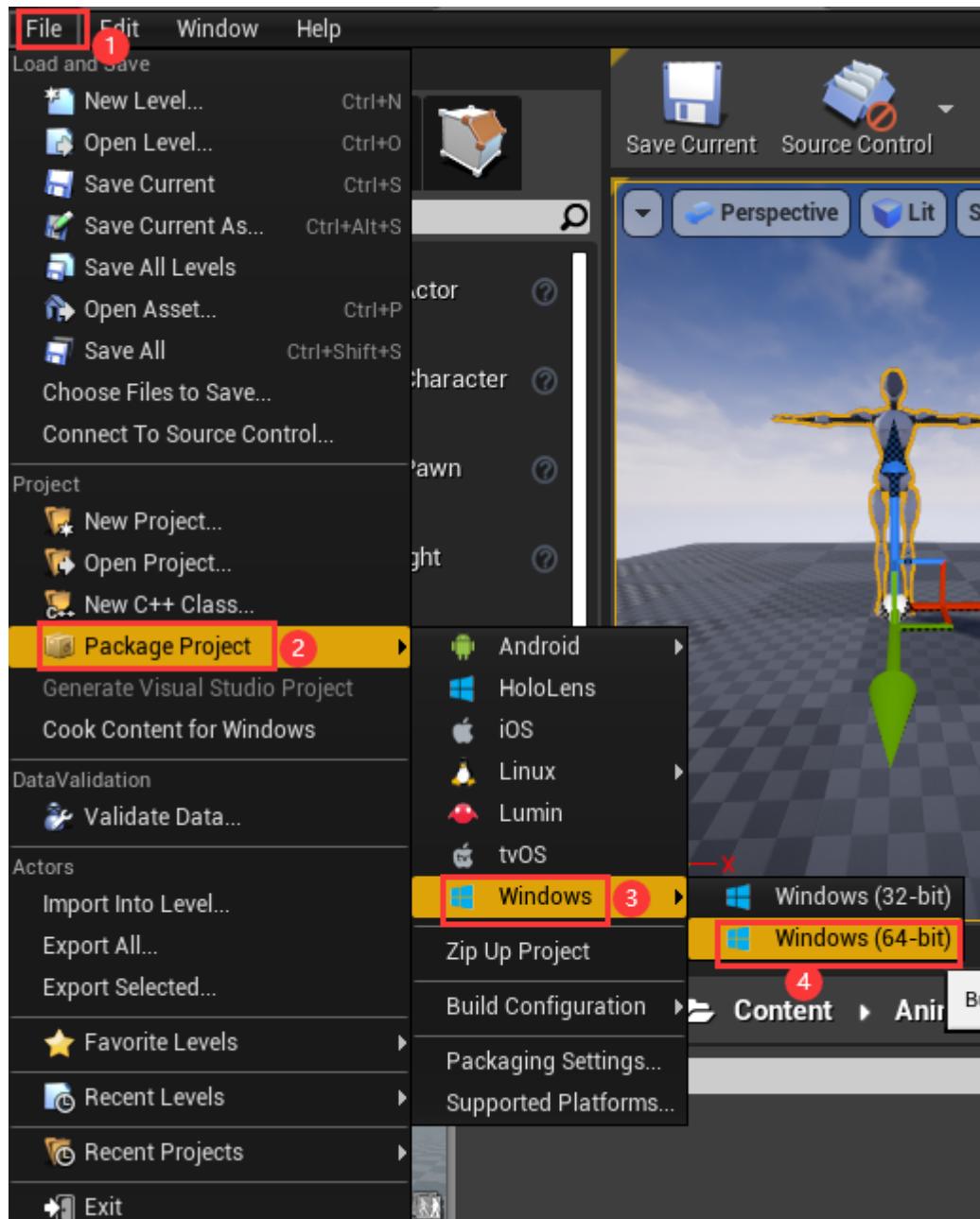




Note: you may also need to specify your own game mode to use your own player character and player controller.

9.4 Package your Project to a runnable binary

Click on File > Package Project > [PlatformName] in the Editor's main menu. (in the graph we select Windows 64-bit platform)



You will be presented with a dialog for selecting the target directory. If packaging completes successfully, this directory will then contain the packaged project.

10. Plugin Structure

```
|   NeuronLiveLink.uplugin      Plugin description file
|   BuildInfo      Basic Build info for plugin
+---Arts
|       Mannequin_Tpose.FBX UE4 default Mannequin Tpose animation FBX
|       SK_Mannequin.FBX     UE4 default Mannequin skeletal mesh
|       Mixamo_Ch46_nonPBR.fbx Mixamo Ch46 model in FBX format
|       PN_Avatar.fbx        FBX File for import skeletal animation to unreal engine
|       PN_Avatar_Stickman01.fbx  Plugin default skeletal mesh
|
+---Binaries
|   \---Win64      Binaries files of the plugin
|
+---Content
|   |   BP_PNSBaseActor.uasset    Base actor for driving skeletal mesh animation in
Axis Studio
|   |   PNS_Prop.uasset          Actor for driving props in Axis Studio
|   |
|   +---Maps
|       |   DemoMap.umap        Demo map for use the plugin
|       |   DemoMap_BuiltData.uasset  Build data for map
|   |
|   +---Mannequin    Mannequin skeletal mesh, materials, textures, animation
blueprint, remap asset and actor object in UE4
|   |
|   +---Mixamo_Ch46  Mixamo ch46 skeletal mesh, materials, textures, animation
blueprint, remap asset and actor object
|   |
|   \---PNSChar    default skeletal mesh, materials, textures, animation blueprint,
remap asset and actor object
|
+---Doc
|       AxisUnrealLiveLinkPlugin Handbook_EN.pdf      This handbook in English language
version
|       AxisUnrealLiveLinkPlugin Handbook_CN.pdf      This handbook in Chinese language
version
|
+---Intermediate   Intermediate fies(generated header files, precompiled object files
etc.) for the plugin
|
+---Resources
|       Icon128.png    Icon files for plugin
|
\---Source      Sources files for Plugin
    +---MocapApi      external MocapApi C++ lib to receive data form axis studio
    |       |   MocapApiLib.Build.cs
    |       |
```

```
|     +---bin
|     |     \---x64      MocapApi C++ lib binary files
|     \---include
|             MocapApi.h      MocapApi C++ lib header file
|
+---MocapApiAdapter      MocapApi adapter module to use MocapApi in unreal engine
|     |     MocapApiAdapter.Build.cs      Module build file
|     |
|     \---Public
|             MocapApiAdapter.h      Module interface file
|             MocapApiLog.h      Log category used in this module
|             MocapAppManager.h      Mocap application manager
|             MocapStructs.h      Struct used in unreal engine for MocapApi
|
+---NeuronLiveLink      Live link runtime module for neuron(mocapApi)
|     |     NeuronLiveLink.Build.cs      Module build file
|     |
|     \---Private
|             MocapClient.h      MocapClient for receiving axis studio data in live
link
|             |     NeuronLiveLinkSourceFactory.h      Factory for create
NeuronLiveLinkSource
|             |     SNeuronLiveLinkSourceFactory.h      Editor UI for create
NeuronLiveLinkSource
|             |     SubjectNameSetter.h      Subject name setter for animation blueprint
|             |
|             \---Public
|                     NeuronBoneMappingInfo.h      Bone mapping info for retargeting
|                     NeuronLiveLink.h      Module interface file
|                     NeuronLiveLinkBPLibrary.h      Blueprint library
|                     NeuronLiveLinkLog.h      Log category used in this module
|                     NeuronLiveLinkRemapAsset.h      Retargrtng asset for dirving animation
data
|                     NeuronLiveLinkSource.h      Live link source for neuron
|                     PNSAnimInstance.h      Blueprint amimation instance(can set subject
name) for diving animation data
|
\---NeuronLiveLinkEditor      Neuron Live Link Editor module
    |     NeuronLiveLinkEditor.Build.cs      Module build file
    |
    \---Private
        LiveLinkEditorPrivate.h      Module interface file
        NeuronBoneMappingWidget.h      Bone mapping editor UI
        NeuronLiveLinkRemapAssetDetailCustomization.h      Remap editor for
Neuron
```

10 FAQ

- Got compile error when rebuild my project. Our plugin use precompiled files and there is a rebuild bug in unreal engine which will delete the precompiled files if you rebuild your project. so please download the plugin again and replace the files in Intermediate folder with the new downloaded files and click build to build again.

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