

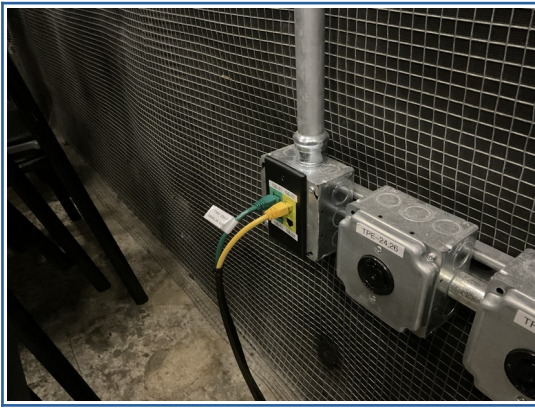
## Setting up LED Wall:

### I. Bringing Out the Cart from Storage:

To start the setup, bring the Cart from the Storage room to the stage. Before powering up the LED Wall, ensure that you connect the necessary components.

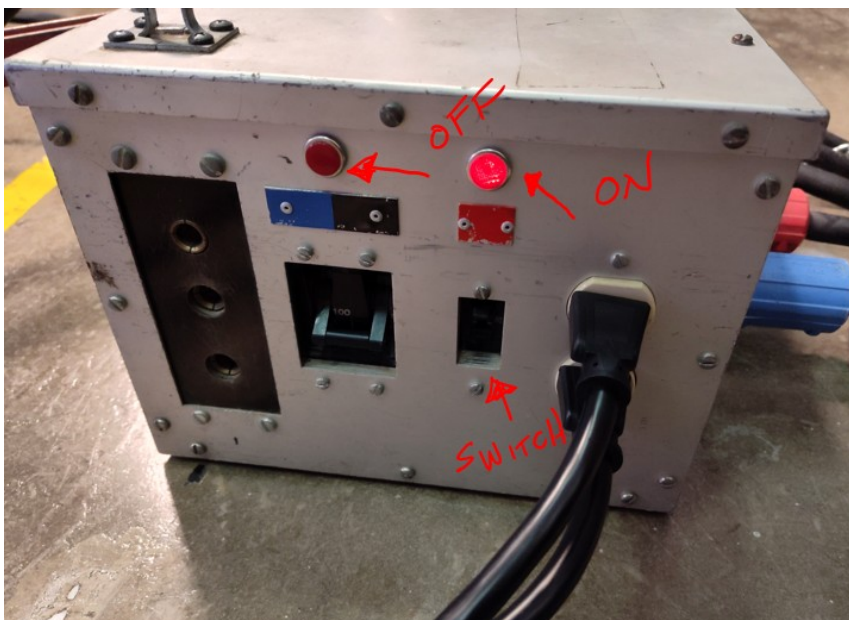
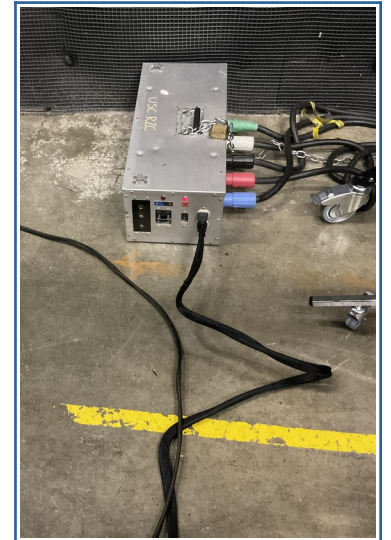
### II. Connecting CAT 5 Wires (Network Connections – Green and Yellow):

Connect the CAT 5 Wires to the wall outlets, ensuring that you match the color coding (green to green and yellow to yellow).



### III. III. Powering Up:

Plug in two power connections from the CART to a power source. Make sure the **power button** is **off** when plugging into the **Power box**. Once plugged in, power up by the switching to On.



IV. There will be power connections and switches on the lower left corner of the Cart. Turn these three switches ON to power up the cart and to begin powering up each computer.

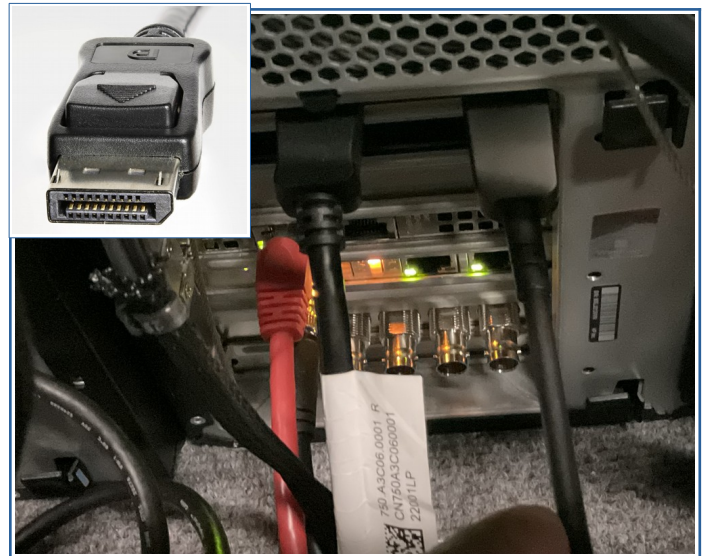


V. **Video Connection (D-sub):**

Complete the setup by connecting the D-sub Video cable from the LED Wall to the UE-NODE Computer on the Cart.



**UE Node Computer**



**Troubleshooting:**



## Powering Up the Four Computers Associated with the Cart:

- I. Power up the following four computers required for running the LED Wall, Virtual Camera, UE Render Node, and UE Switch Board for Editing:
  - Sony Wall Controller
  - Motive Computer (for Virtual Camera tracking)
  - UE NODE Computer (for rendering UE Set)
  - Switchboard Computer (for real-time UE Set editing)

This sequence ensures a smooth LED Wall setup, allowing for the integrated functionality of each component. If you encounter any issues or have questions, feel free to seek assistance.



*The LED Wall Cart*



**Sony Wall Computer**



**Motive Computer**

**UE Node**

**UE Switchboard**



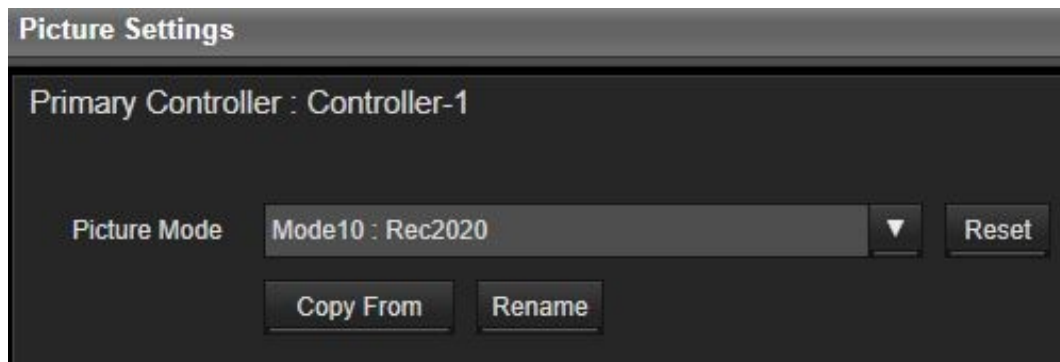
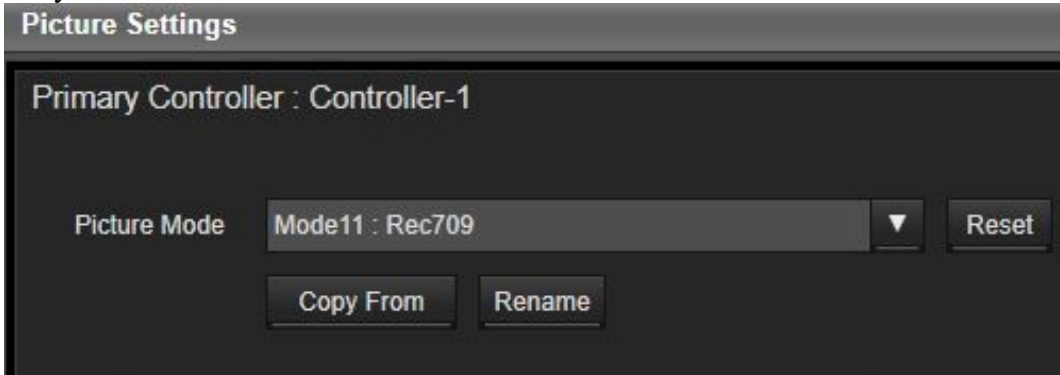
## Configuring the Color Space of the LED WALL:

On the tool bar click on **Array**

This will open the Picture Settings.

Click on Picture Mode to configure the LED Wall for REC 2020 or REC 709:

They will be labeled – Mode 10- Rec 2020 and Mode 11 – REC 709



Troubleshooting:

# Preparing Motive and The Virtual Camera Puck

On the Motive Computer, Click on the Motive application.  
We will begin by calibrating the Optitrax Cameras on the Calibrate Layout Tab:



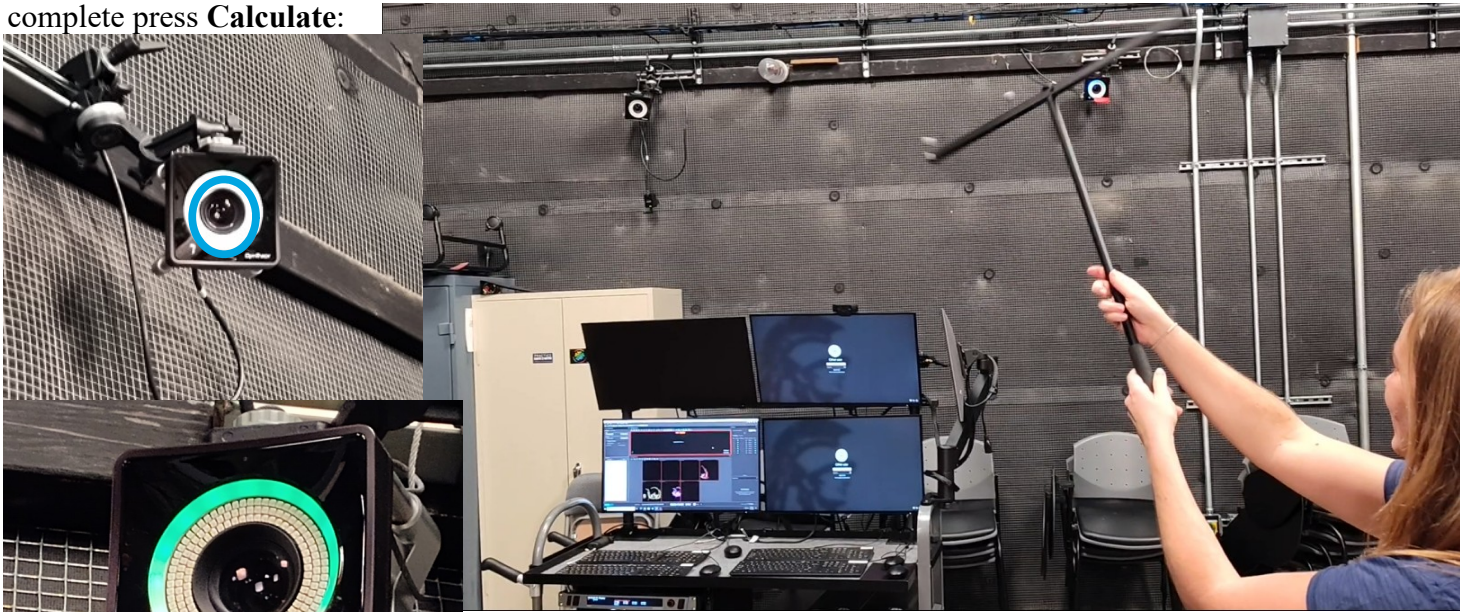
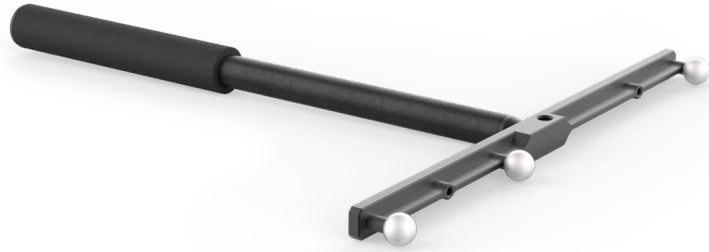
- I. Click on the *Calibrate Layout Tab Icon*
- II. Click on the **Orange Passive Square Icon** in the active view port of the stage cameras and make sure its set to **Active** to calibrate the cameras.
- III. Once Active then press Start Wandering.

The screenshot shows the Motive software interface with several annotations. A red box highlights the "ACTIVE" button in the top toolbar. Another red box highlights the "Calibrate Layout" tab icon in the top toolbar. A third red box highlights the "Start Wandering" button in the Camera Calibration panel. A white text box with a red border in the center of the main view area contains the text: "Set the Calibration Capture to Active by clicking on the orange button before Wandering". The interface also shows the Camera Calibration panel on the left, the Camera Preview window at the bottom, and the Devices panel on the right showing 7 cameras.

No.	Enable	Multiplier	Mode	Exposure	LED
1	●	○	○	100 μs	●
2	●	○	○	100 μs	●
3	●	○	○	100 μs	●
4	●	○	○	100 μs	●
5	●	○	○	100 μs	●
6	●	○	○	100 μs	●
7	●	○	○	100 μs	●



From here we will need to use the **Calibration Wand** to wand the Optitrax cameras around the stage. Each camera wanded will be colored with a green color from blue. Once each camera is filled with a green circle, the **Motive Application** should also have a Quality of: **High** - ensuring an optimum calibration for accurately moving the virtual camera in Unreal: Once this is complete press **Calculate**:



Camera Calibration

Calibration Ground Plane

Mask Visible  Clear Mask

Wanding

Start Wanding  Reset

Calibration Options

Calibration Type Full

OptiWand CW-500 (500mm)

Calculate  Apply

Wanding

Sufficient for Quality: Low

Camera	Samples
1	457
2	695
3	802
4	937
5	1020
6	1320
7	548

Perspective View

REC ACTIVE

0 Markers  
0 Selected

Camera Preview

1 OBJECT

2 OBJECT

3 OBJECT

4 OBJECT

5 OBJECT

6 OBJECT

7 OBJECT

Calibration

Calculate

Wanding

Sufficient for Quality:

Once **Motive** has Calculated the wand, the application will prompt you of the Calibration Result.

- Press **Apply**

The screenshot shows the 'Calibration' dialog box with a green 'Ready To Apply' status. It contains two summary tables: 'Calibration Summary' and 'Camera Summary'.

Calibration Summary	
Overall Result	Exceptional
Maximum Error (px)	0.091
Minimum Error(px)	0.058
Average Error (px)	0.072
Wand Error (mm)	0.173
Calculation Time	0:04

Camera Summary			
Camera	Samples	Result	Error
1	1376	████████	0.058
2	1380	████████	0.091
3	1936	████████	0.080
4	1380	████████	0.061
5	2000	████████	0.065
6	1380	████████	0.064
7	1376	████████	0.086

The screenshot shows the 'Calibration Result Report' dialog box with a 'Calibration Result: Exceptional' status. It displays various error metrics and a warning message.

Overall Reprojection	Mean 3D Error: 0.270 mm	Mean 2D Error: 0.072 pixels (Exceptional)
Worst Camera	Mean 3D Error: 0.210 mm	Mean 2D Error: 0.091 pixels (Exceptional)
Triangulation	Recommended: 2.7 mm	Residual Mean Error: 0.3 mm
Overall Wand Error	Mean Error: 0.173 mm	(Exceptional)
Ray length	Suggested Max: 20.9 m	

**Apply** **Cancel**

**i** All results are in the context of the wand data. Ensure even and comprehensive wandering through the entire volume and the calibration wand is in good working order.

The screenshot shows the Motive software interface with the 'Calibration' dialog box overlaid on the main workspace. The workspace displays a 3D point cloud of a wand with a grid overlay. The 'Calibration' dialog box is open, showing the 'Ready To Apply' status and the 'Calibration Summary' and 'Camera Summary' tables. The 'Calibration Result Report' dialog box is also open, showing the 'Calibration Result: Exceptional' status and the error metrics table. A red arrow points from the 'Apply' button in the 'Calibration Result Report' dialog box to the 'Apply' button in the 'Calibration' dialog box.



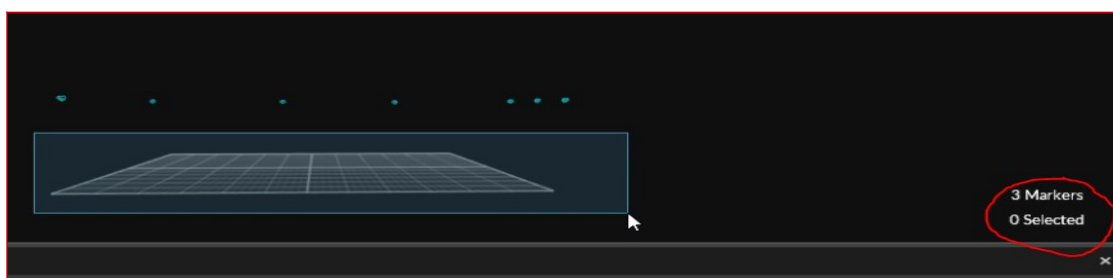
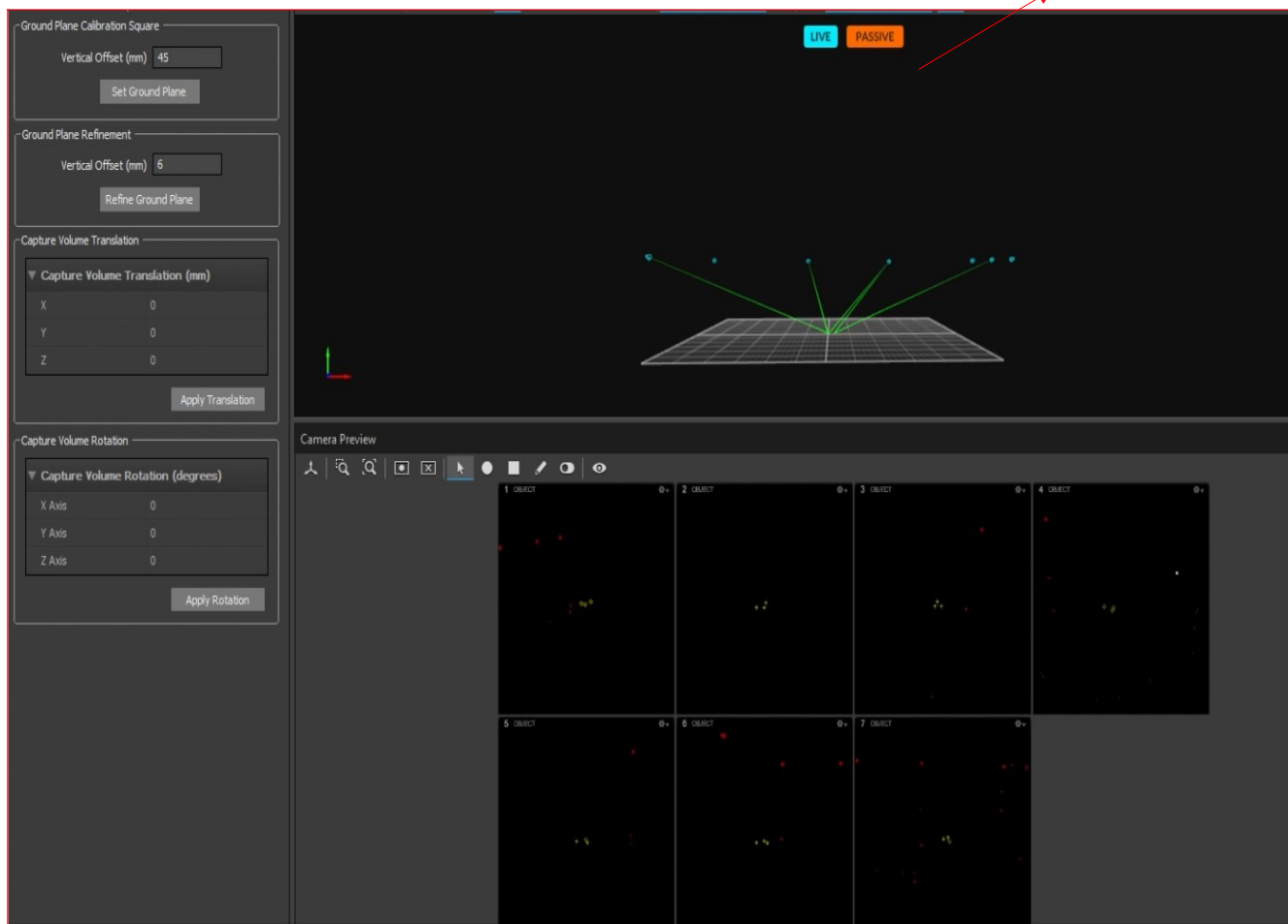
Once this is complete we will need to Set the Ground Plane. Continuing under the **Calibration Layout** you will select on the **Ground Plane** Tab. This function will assist in are final operation of calibrating the Optitrax cameras.

In the middle of the stage there is a marked cross in to align the calibration square.

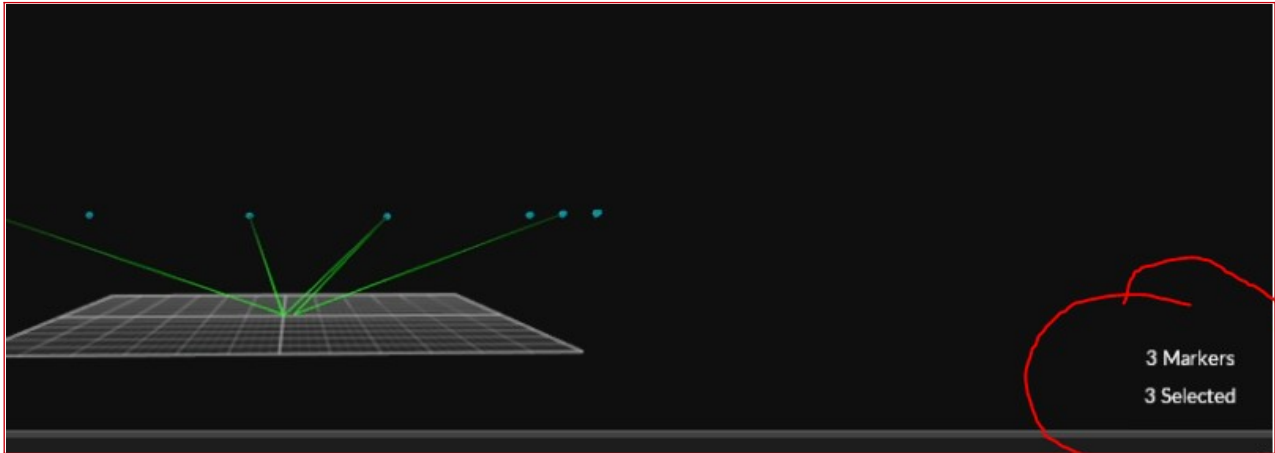
Place the Ground Plane along the corner axis of the cross on the stage floor.



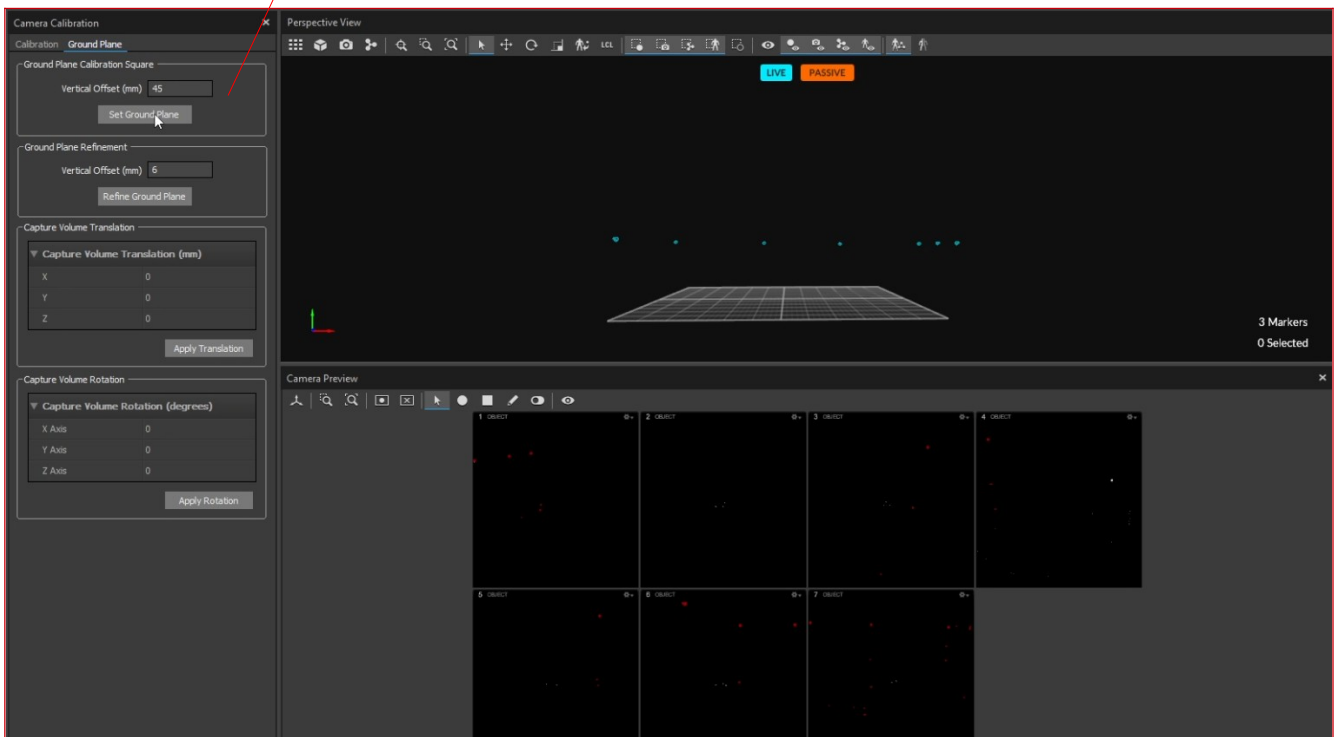
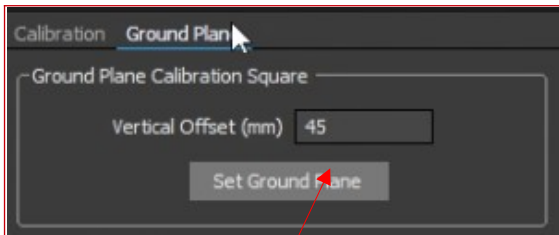
Click on the **Active Icon** in the view port of Motive and make sure its set to **Passive** in order to select the three tracking markers on the Ground Plane.



Select the three markers,



Once the three markers on the ground plane are selected click on Set Ground Plane to finalize the Calibration.





### Virtual Camera Puck:

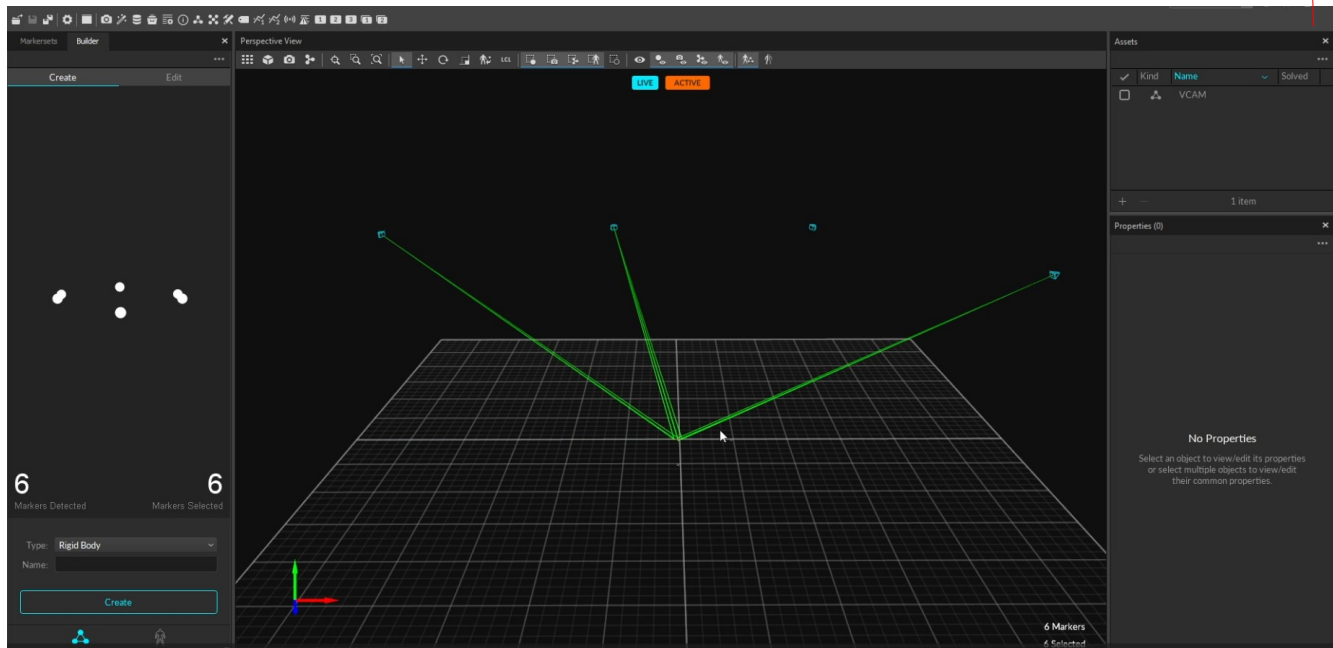
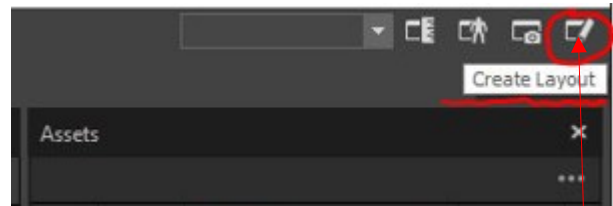
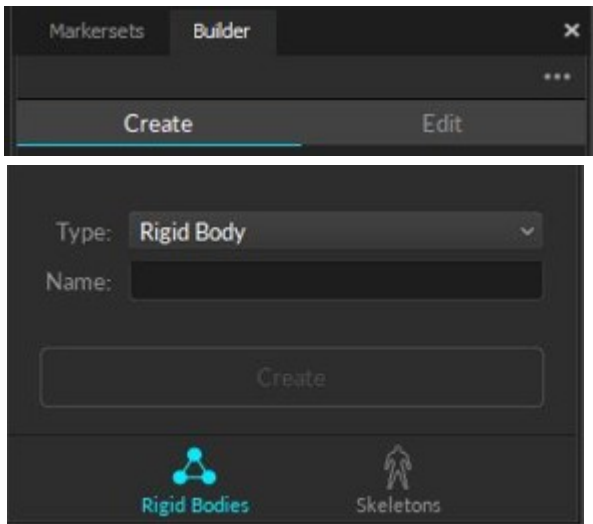
Click on the **Passive Icon** in the view port of Motive and make sure its set to **Active or Active /Passive** to set up and use the Camera Puck.



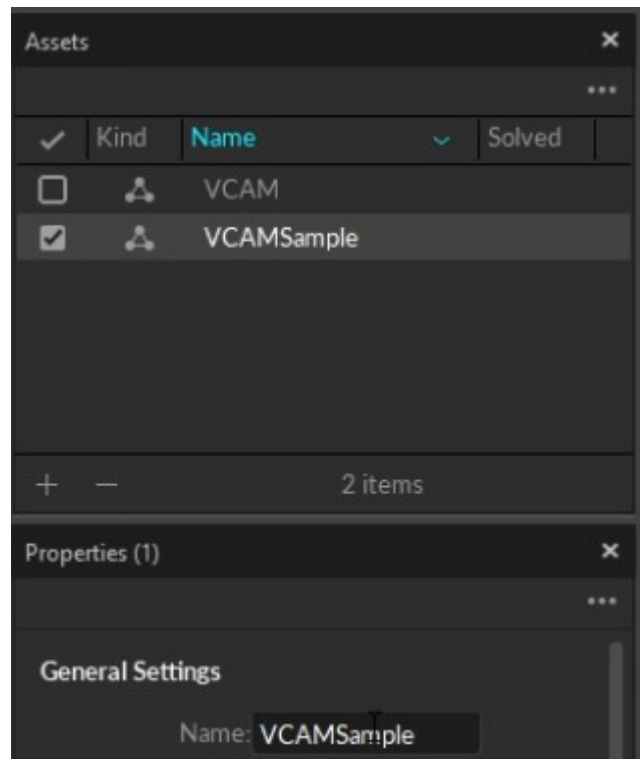
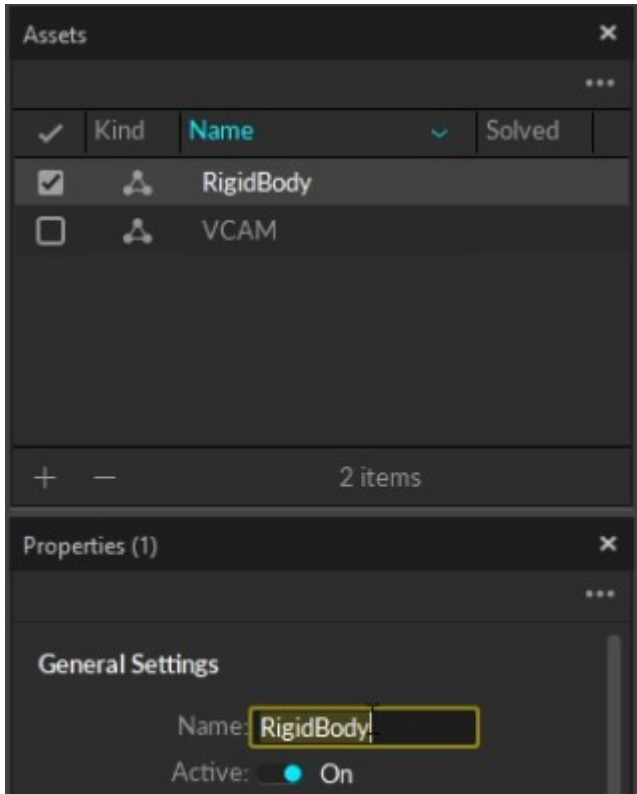
1. Place the Camera Puck on the Ground where we placed the ground plane. Then press the button so the OptiTrak Cameras can detect it.



2. **Motive:** in the Create Layout Pane for type - select Rigid Body and then select the 6 markers in the Viewport from the Camera Puck, Name it **VCAM** then press Create.

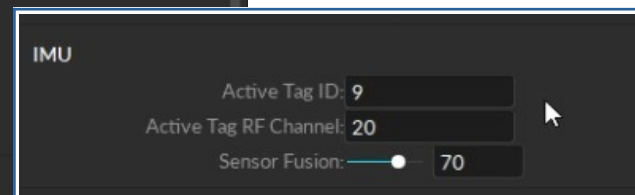
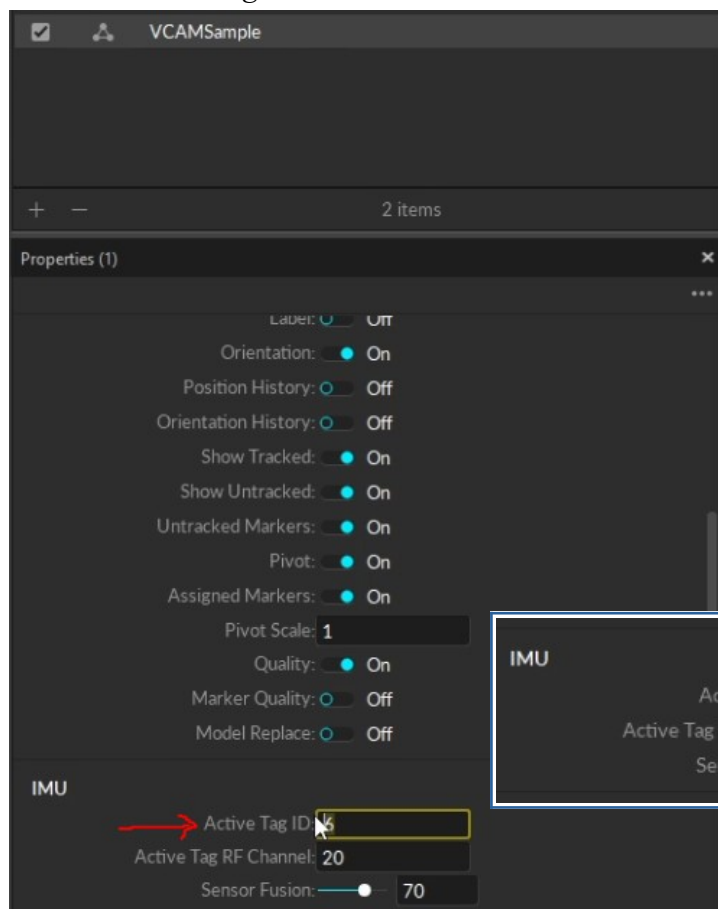


3. Under Properties name the Rigid Body **VCAM** ( this label will help to identify in Unreal as well)

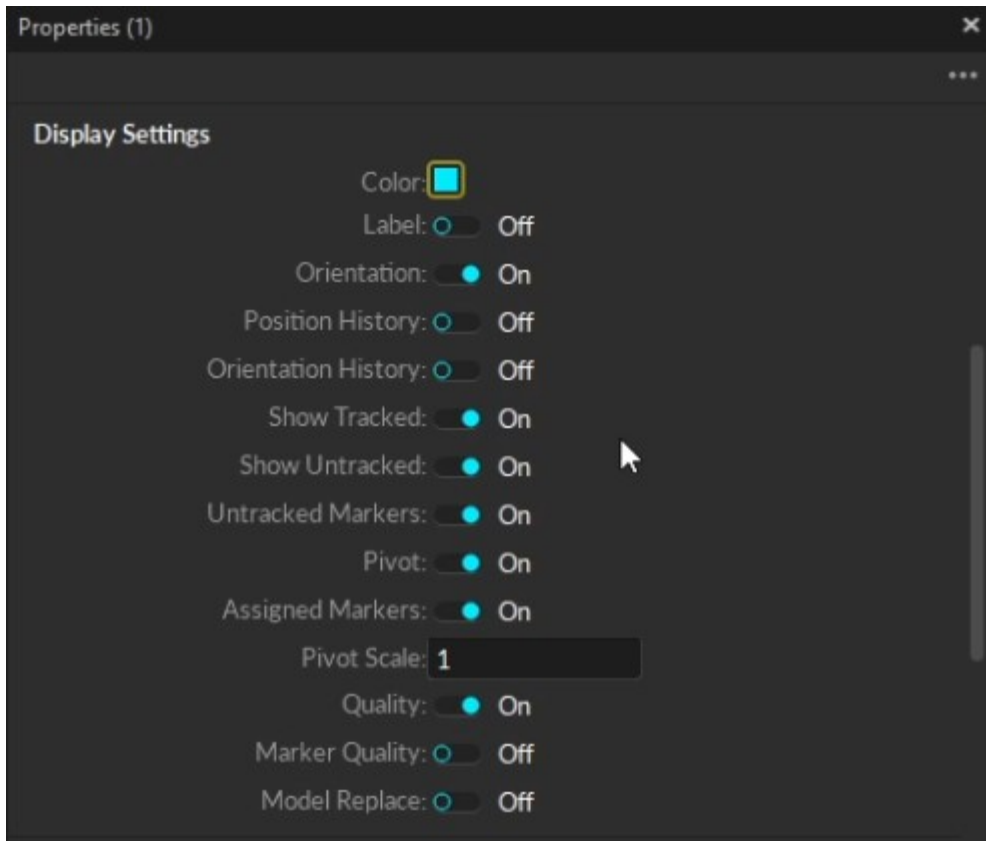


*Note: Make sure that these properties are set to Advanced Properties (click on ... to select advanced properties) to change the Pucks Channel settings.*

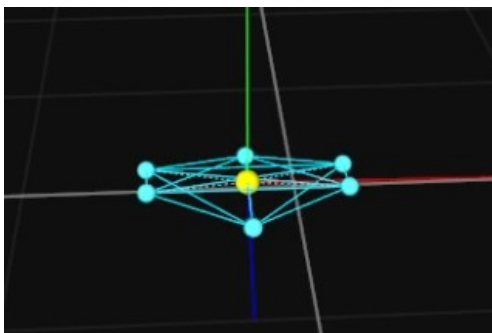
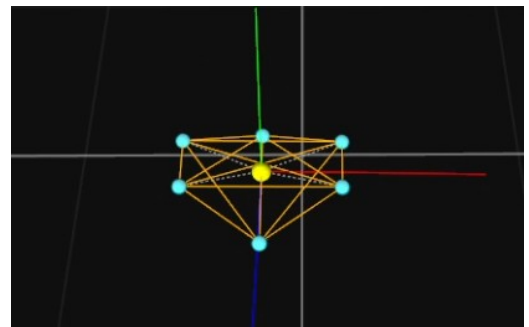
4. Under the *IMU* settings: *Active Tag ID* will be changed to **9**



5. You will need to set the color ID to light blue to indicate that its calibrated. Under Display Settings: Color – change to a light blue.



6. Grab the Puck from the stage and slowly turn in clockwise and counter clockwise motions so that the Puck can be calibrated. When the wire frame around the tracking markers turns light blue in Motive it is ready to be placed on the Camera.





Troubleshooting:

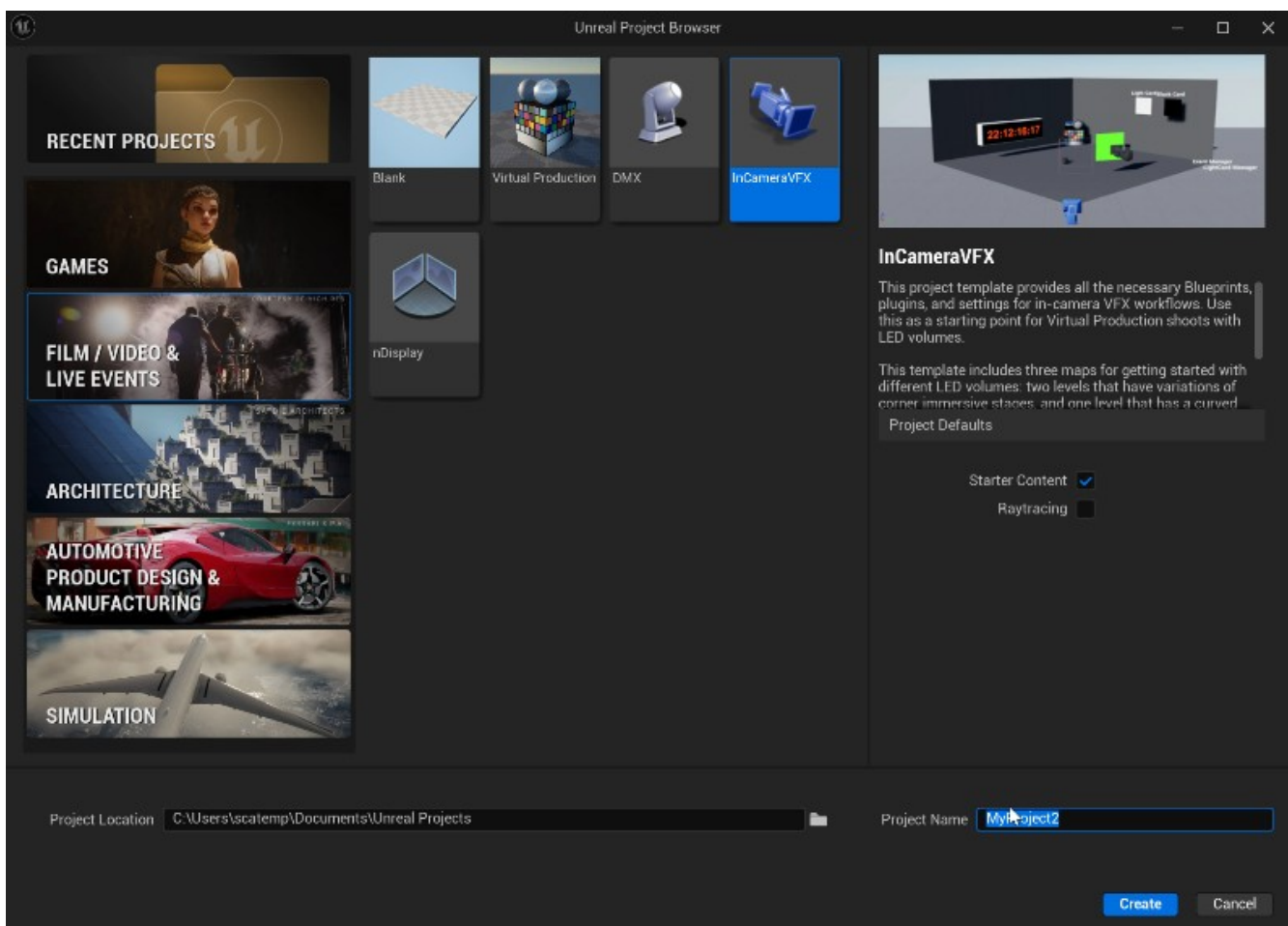
## Setting up an Unreal Project for the LED Wall:

Open up a new Unreal Engine Project.  
This step can be done from any computer  
running Unreal Engine 5.3.



### Unreal Project Browser:

Select a project for **Film/Video & Live Events** and then select the **InCameraVFX** template.  
This will enable the plugins required to run the LED wall and a Virtual Camera.



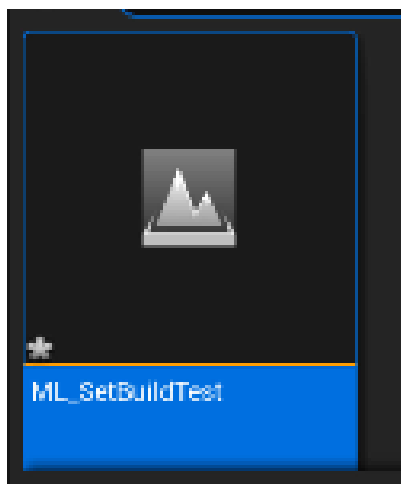
- Starter content can be left checked on.
- Give your Project a **Name** then Press **Create**.
- Remember the Project location since you will need to save a copy to transfer over to the **BrainBar**.

## Creating a Custom Master Level:

When creating your set to be used on the LED Wall, you will need to create a Level and name it in the following format: *ML\_(SetName)* – ex. *ML\_Western*

Using this naming convention will also help when controlling the UE editor and UE node Computers through Switchboard for the LED Wall.

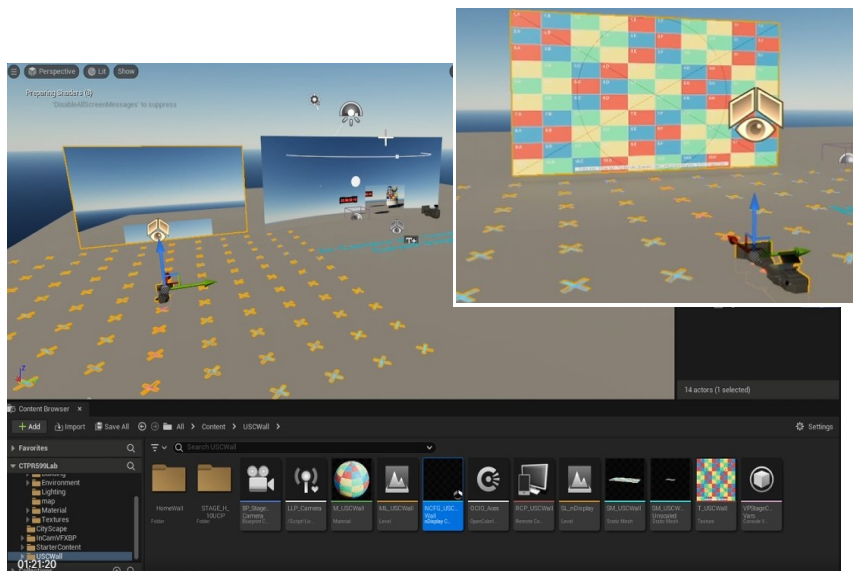
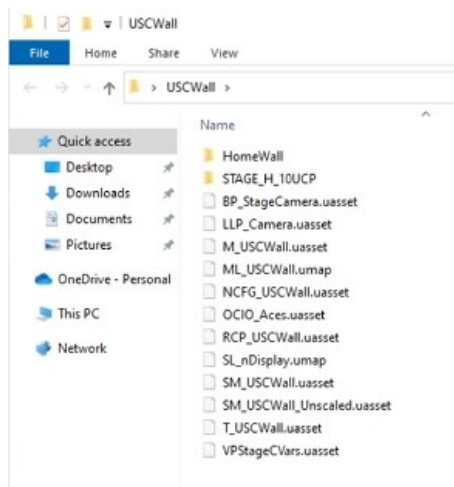
This Master Level will allow you to build your custom set to be used with the LED Wall.



For an in depth tutorial on creating a sample set go to the following link: <https://www.twitch.tv/videos/2030675785>

## Adding the USC LED Wall File to your Project:

We are currently using Unreal Version 5.3. for the LED Wall setup. Make sure your Project file is created with Unreal 5.3.

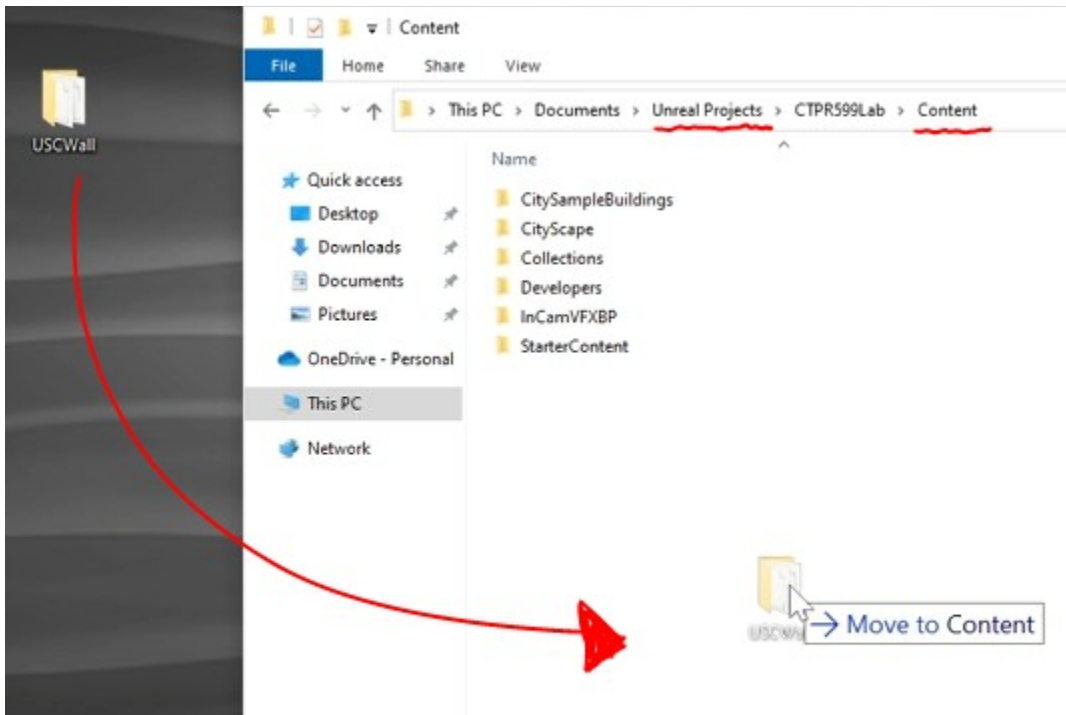


The following file can be downloaded at this link from the google storage drive **USCWall5.3**: [https://drive.google.com/file/d/1LyX26UZgzdYn-mvHow8J3MfEa3-aA9ma/view?usp=drive\\_link](https://drive.google.com/file/d/1LyX26UZgzdYn-mvHow8J3MfEa3-aA9ma/view?usp=drive_link)

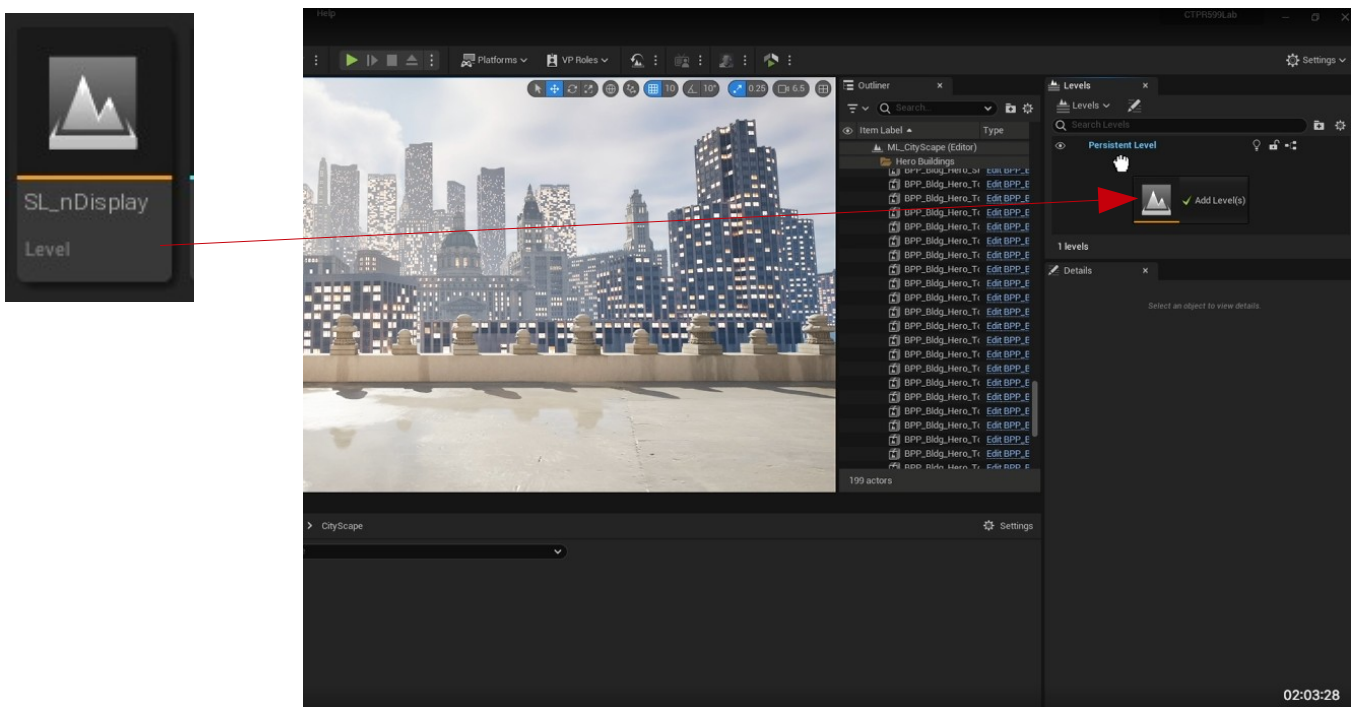


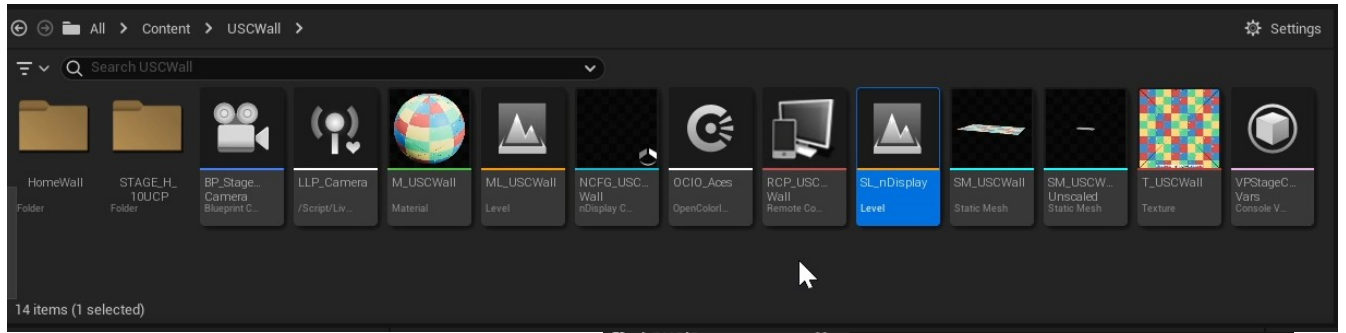
or one will be added to the UE Shared folder on the C drive of the Switchboard Computer.C:UE\_Shared/Spring2024/

1. Copy the USCWall folder to your UE Project Content directory -

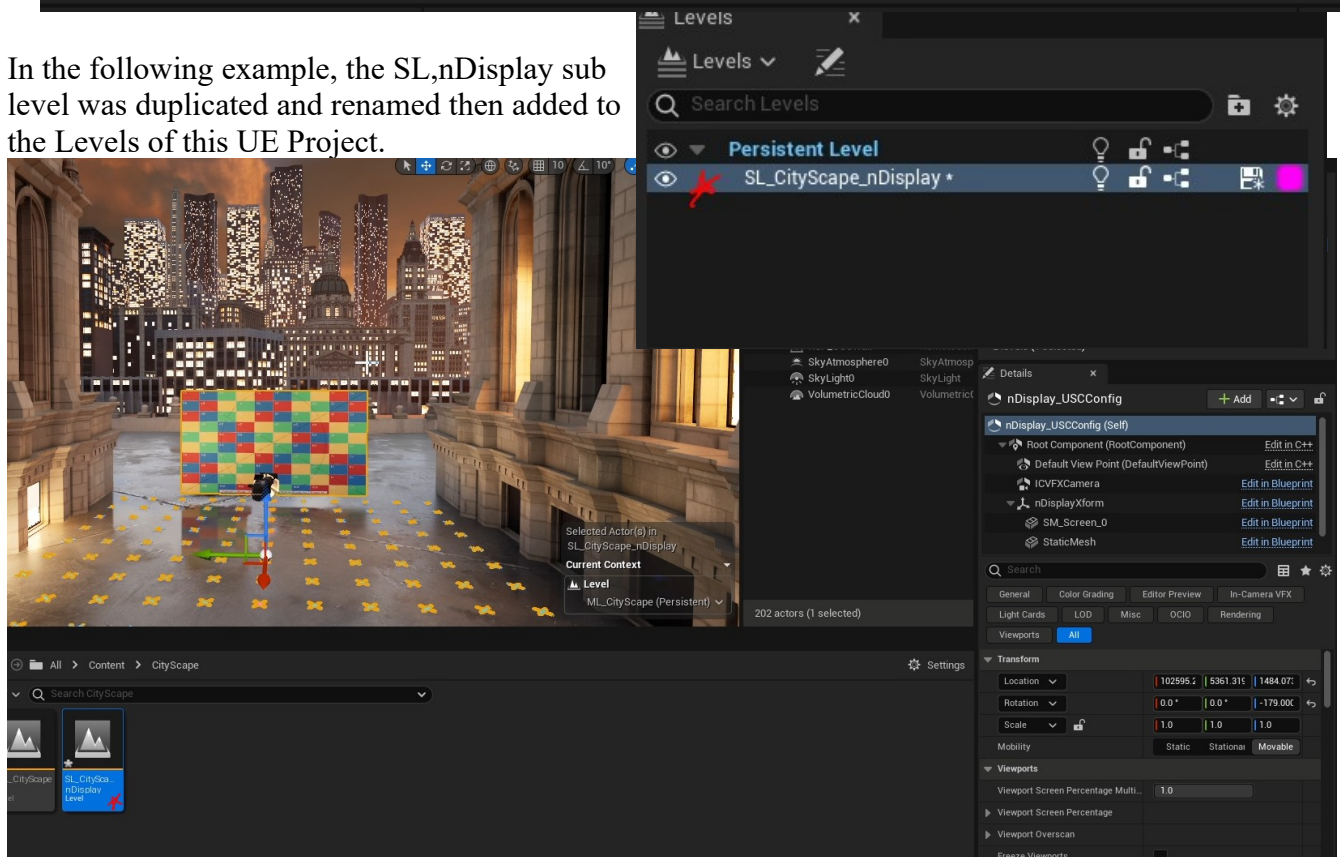


Restart your Unreal Project so the files that were copied can populate into your UE Folders. Once the files are in your content drawer in Unreal, drag the following file into your levels panel of your Set – *SL\_nDisplay*





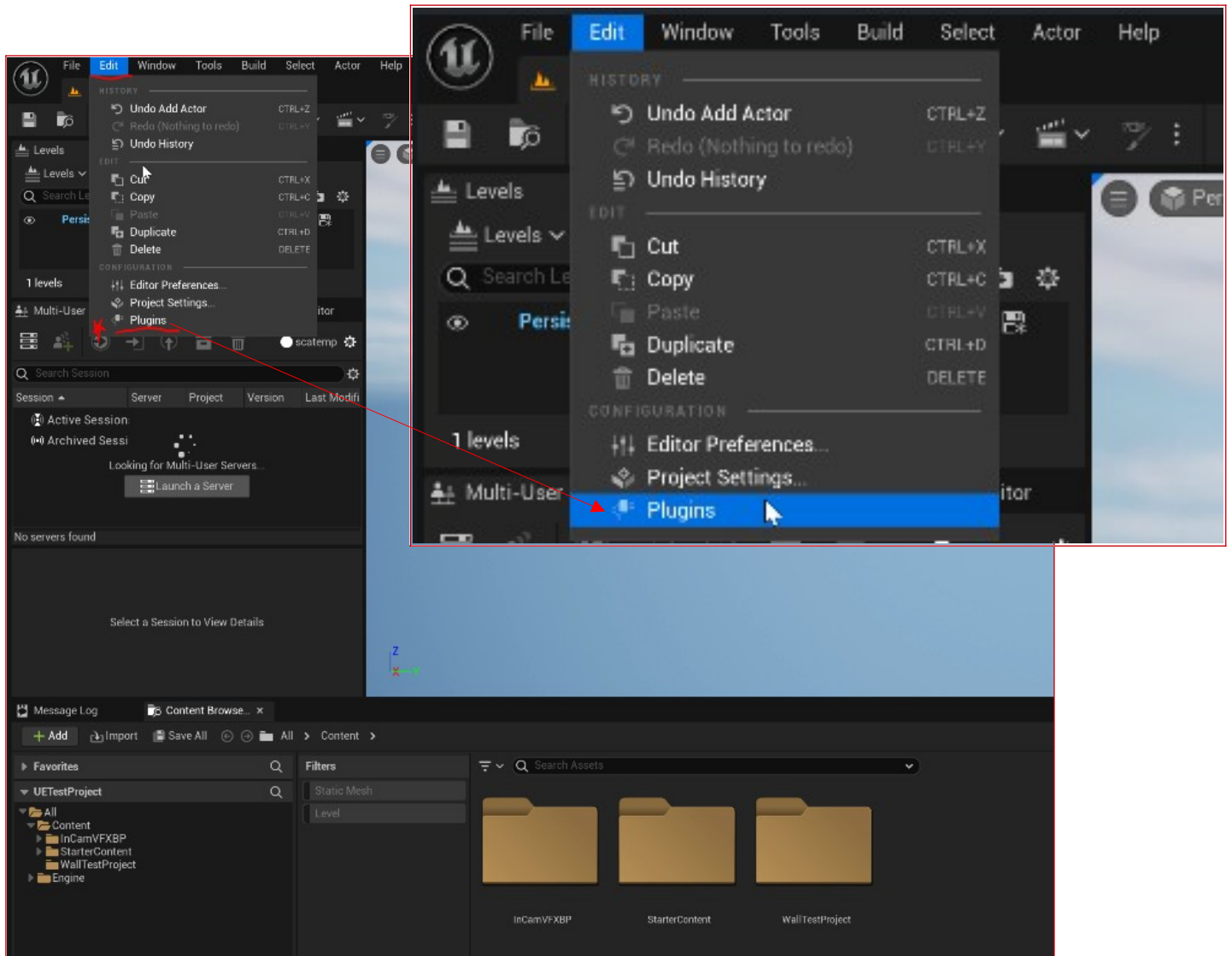
In the following example, the SL,nDisplay sub level was duplicated and renamed then added to the Levels of this UE Project.



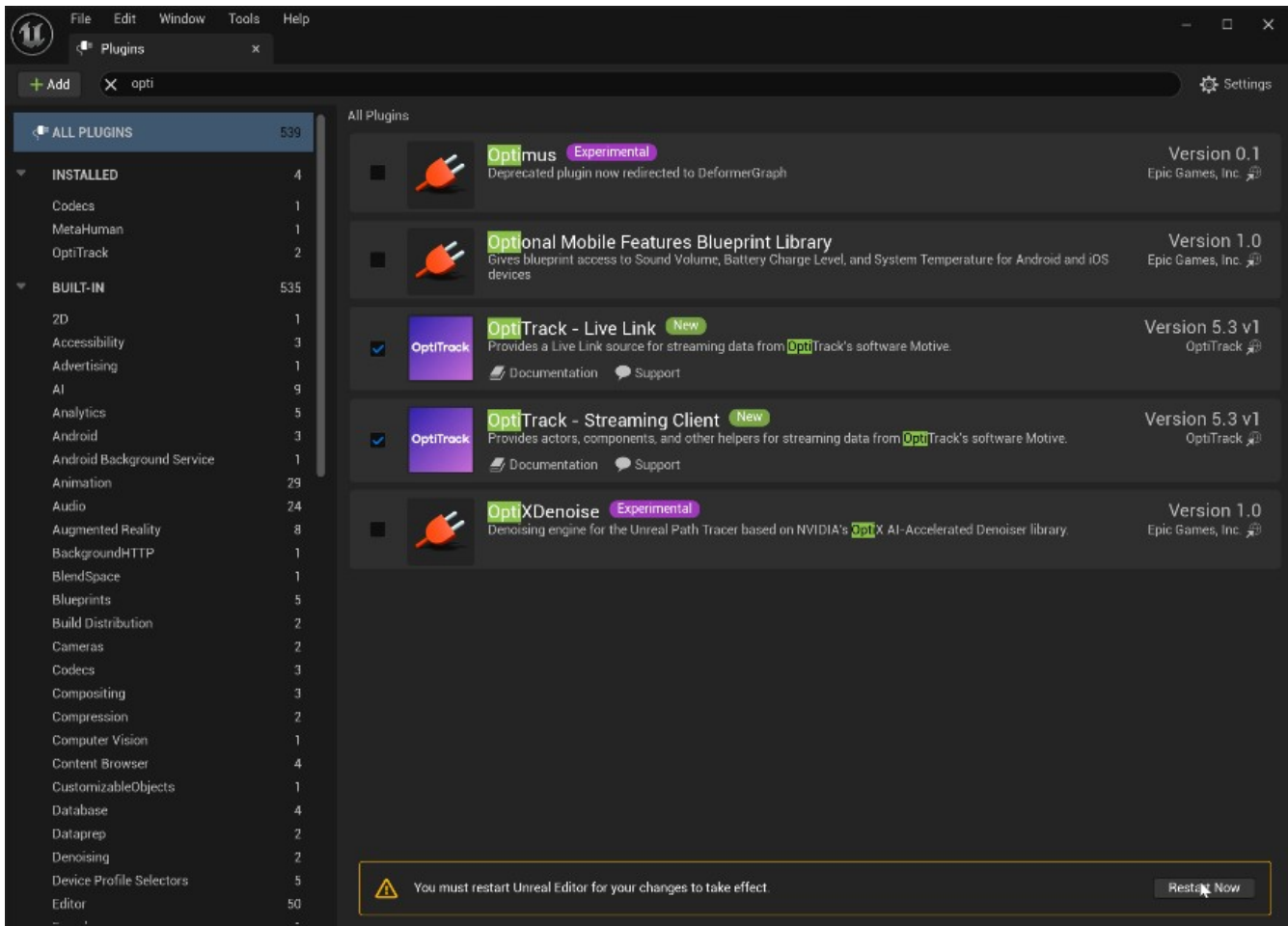
# OptiTrax Plugin for Virtual Camera Tracking: (These Plugins can be enabled on the Brain-bar - Switchboard computer once the project has been created and copied

## Copy your project to the Switchboard Computer

In the Unreal Engine Editor, on the top toolbar, click on **Edit** and then click on **Plugins** -



In the browser of the Plugins Window, type Optitrack so that these plugins will narrow down to the ones needed. Click on the **OptiTrack – Live Link & OptiTrack – Streaming Client Plugins**



then click **Restart Now**.

Your base Unreal Project is ready for assets and to be projected onto the LED Wall.

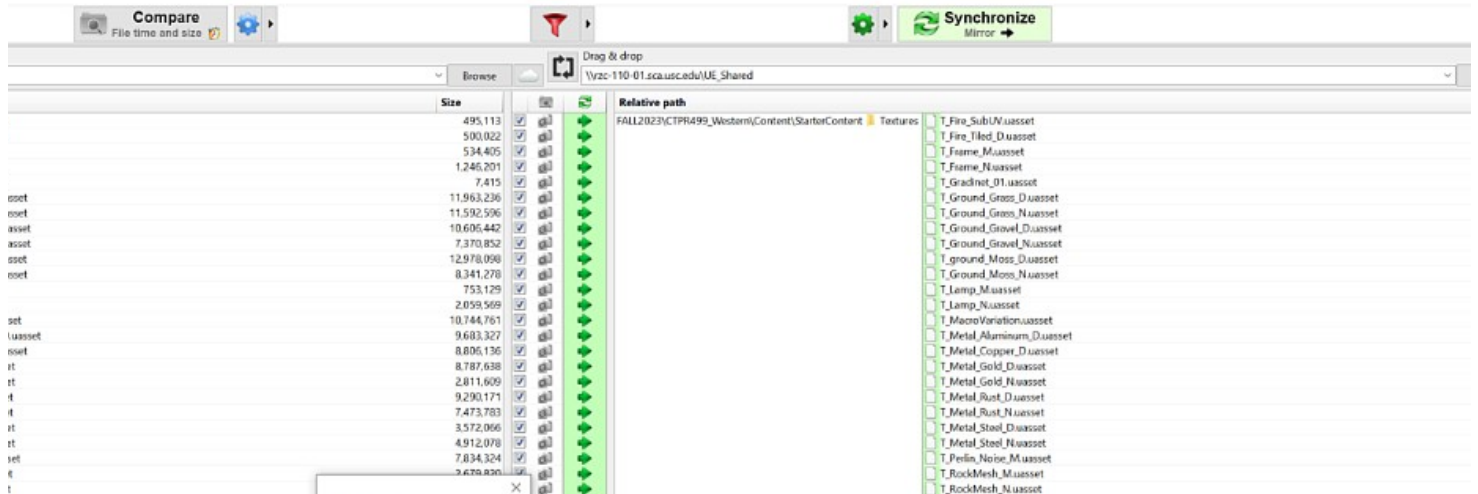


## Cloning UE Project from Switchboard to Node Computer:

To copy your UE Project from the Switchboard to the Node computer place the UE project file in the following directory on the Switchboard Computer: C:UE\_Shared/Semester/

next we will use the software **frefilesync**

Open the application (this has already been setup for the directories to sync) then press synchronize.



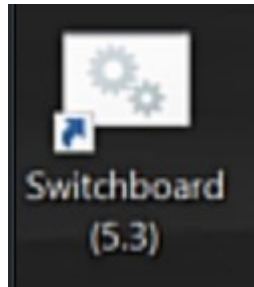
Troubleshooting:

## Setting up Switchboard:

1. Execute the **Switchboard Listener** on the **Node Computer** and **Switchboard Computer**.



2. Execute the Switchboard application on the Switchboard computer.

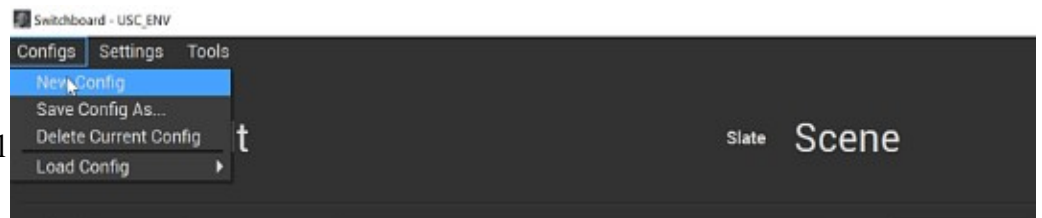


## Creating a New Configuration file from Switchboard:

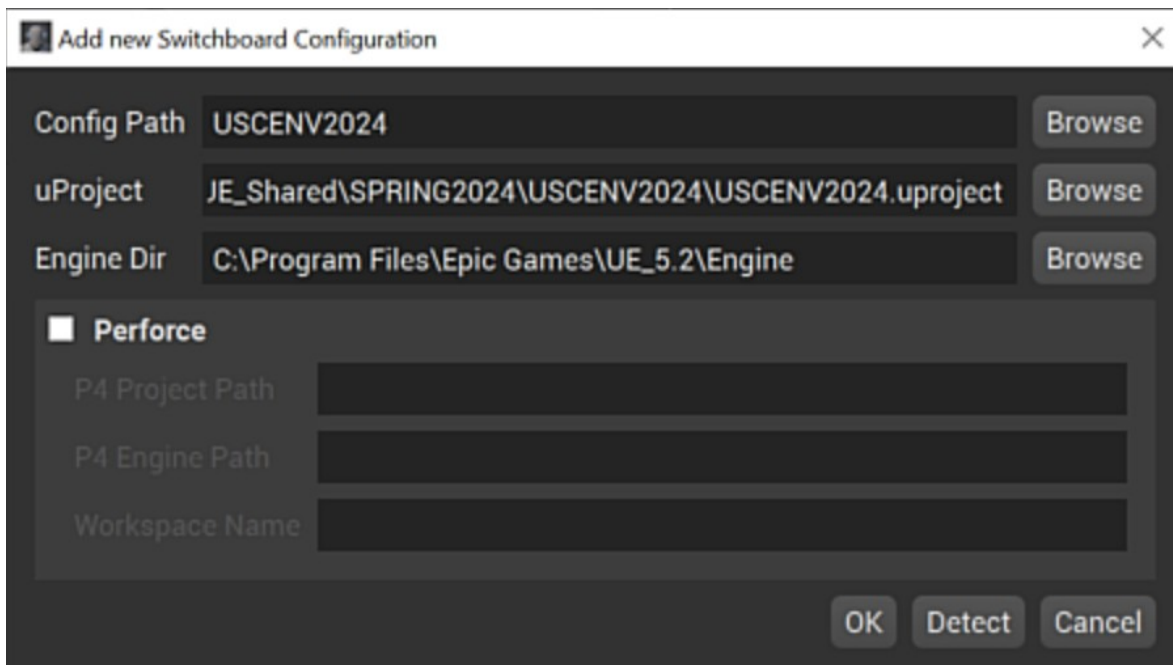
1. go to Configs/New Config.

2. Configurations files will be saved in the following directory:

C/UE\_Shared/Semester/

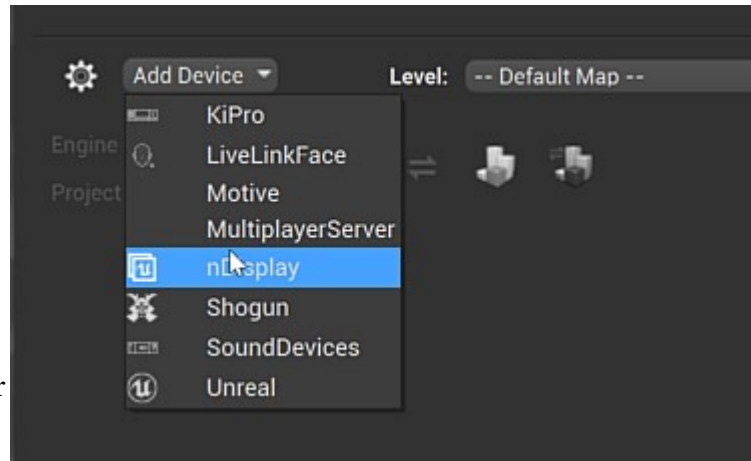


## Example:

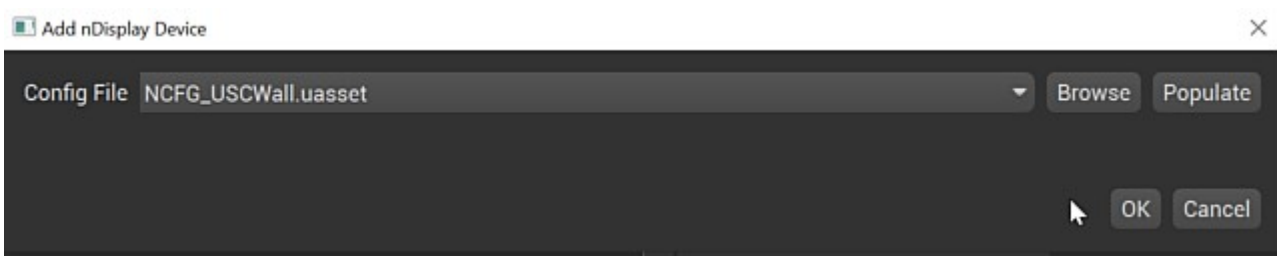


## Set up nDisplay

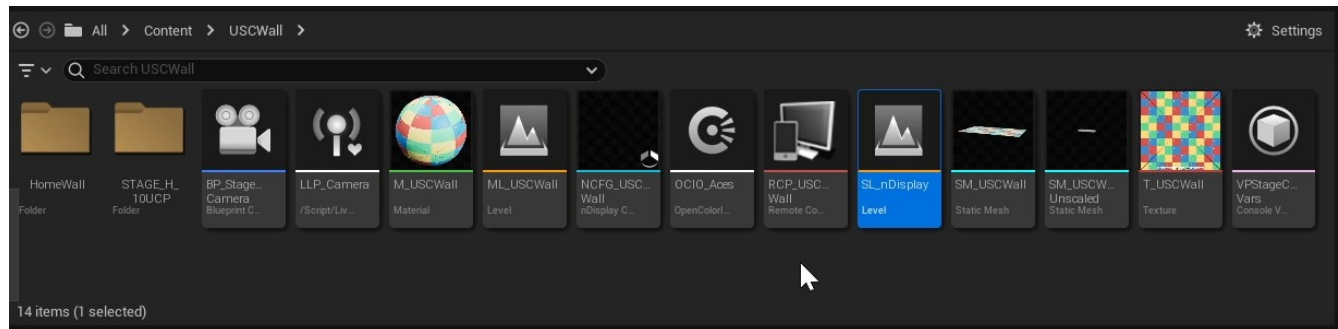
1. Go to add device/ nDisplay:



2. The Config File for the USC LED wall will be your content directory of your Unreal Project – USCWall Folder -



Click on Browse and navigate to your UE project/Content/USCWAll/ and find click on the following file: NCFG\_USCWAll.uasset



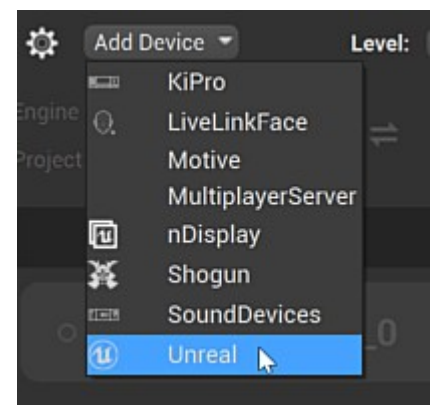
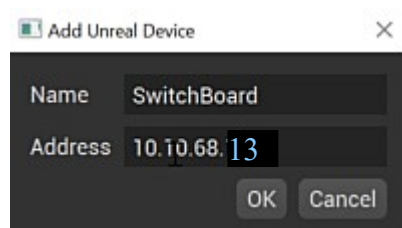
Clicking Populate on the ADD nDisplay Device will add the NCFG\_USCWAll.uasset *if it has already been added to your Unreal Project.*

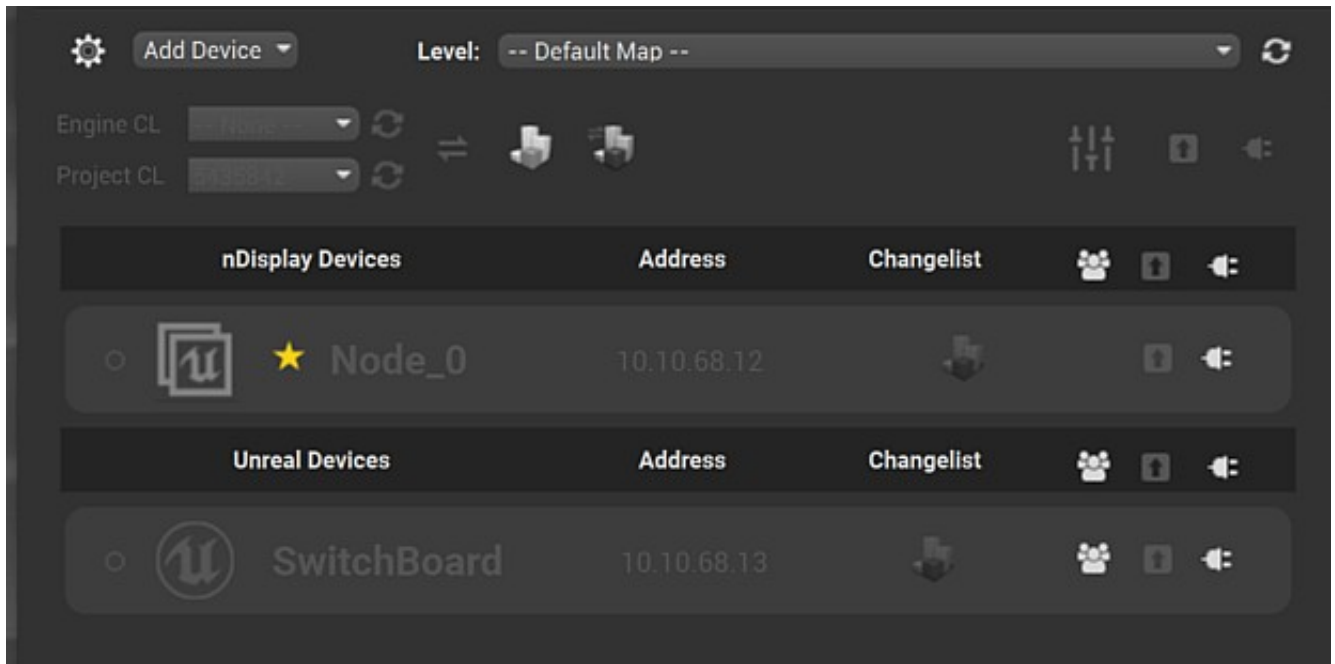
3. Change the IP Address of the Node Computer to **10.10.68.12**

## Add the Unreal Device – Switchboard Computer:

1. go to Add device/ Unreal

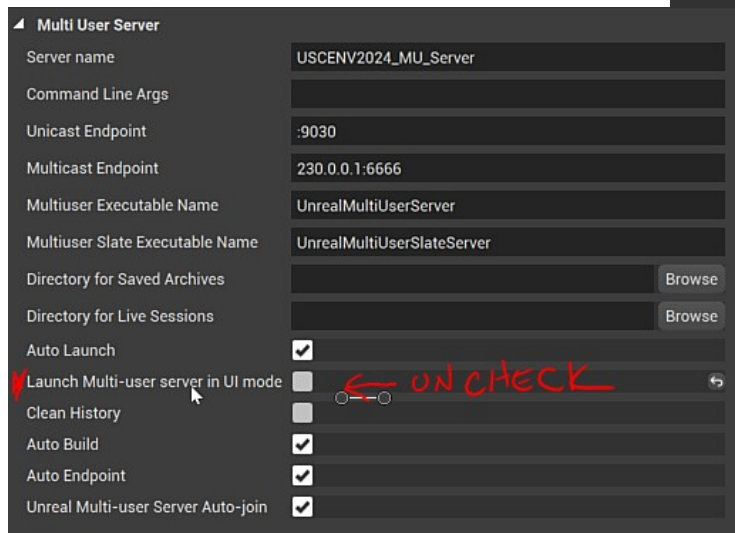
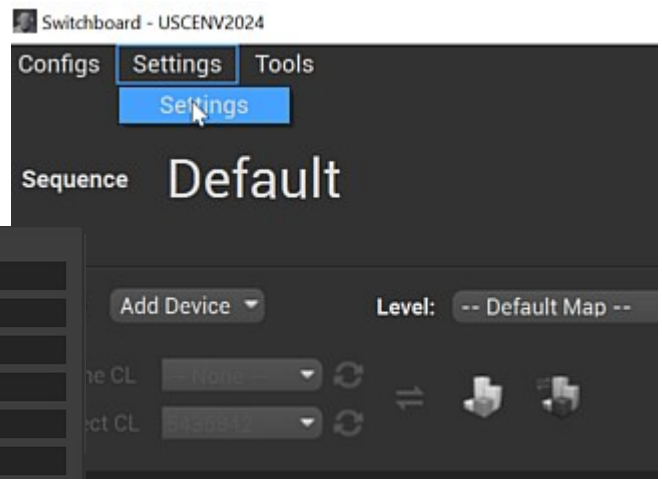
2. Name it Switchboard and the Address is **10.10.68.13**



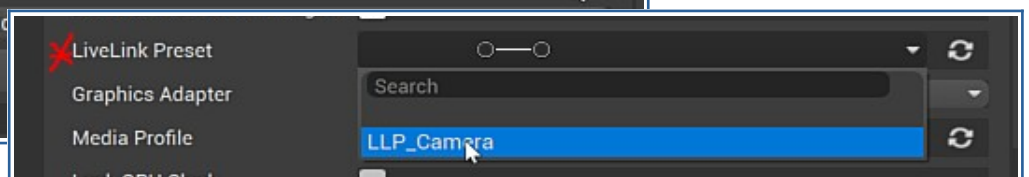
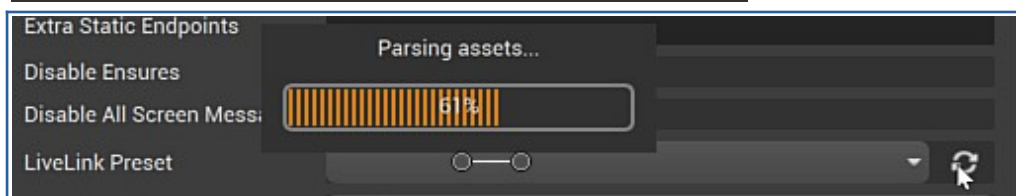


### Configuring Settings:

1. go to Setting/Settings on the top tool bar of Switchboard.
2. In Multi User Server settings – uncheck Launch Multi-user server in UI mode



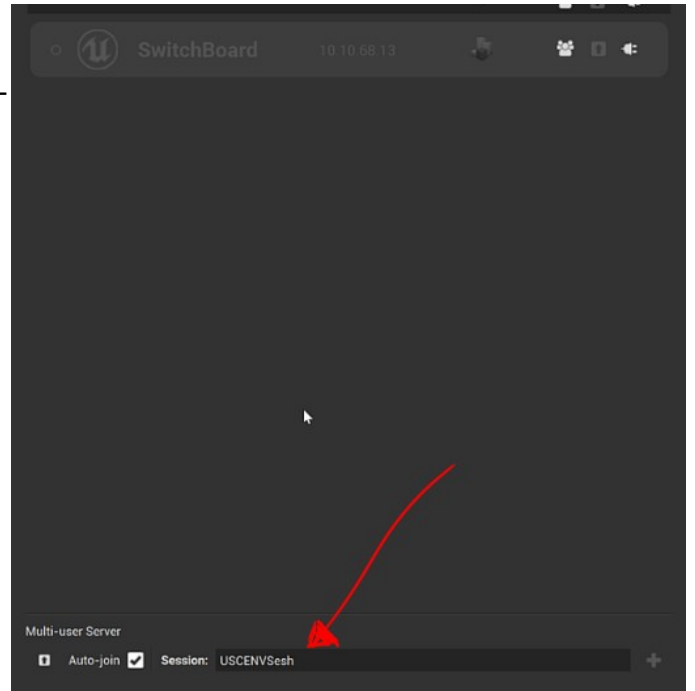
3. Under nDisplay Settings and also Unreal Settings, goto - LiveLink Preset, Click on the circular arrows to parse the asset then click on the tab and select LLP\_Camera





Clicking off the settings window will close it and return you to the main UI of Switchboard.

4. On the lower left hand corner of the Switchboard UI, create a name for your multi-user session.



5. You can now choose your **Level**, then sync the the two computers by clicking on the plug icons, then click on the square arrow icon to launch UE on the Switchboard and Node Computer.

