## 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 <u>off</u> 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.



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.



Logging into Computers:

#### Sony Wall Computer:

Username: Sony Password: Sonywall2023

For all computers, use your USC credentials to log in.

#### **Startup Procedure:**

Begin by starting up the UE Node Computer and Switchboard Computer as a best practice before projecting onto the wall.

Ensure all three computers, excluding the Sony Wall Computer, are logged in and running, displaying the desktop.

On the Sony Wall Computer, initiate the Sony Wall Display Controller Application by double-clicking on the desktop icon.

Following this procedure will optimize the setup for projection, and you'll be ready to utilize the Sony Wall Display Controller Application. If you encounter any issues or have questions, feel free to seek assistance.



## Activating the LED Wall:

I. After launching the application, click "Power ON" once.

II. This action initiates the startup process for the LED Wall. You should hear a distinct click, and the LED panels will commence illumination.

Display Control Sof	tware for ZRC1	-300											- 0	
file(F) Array(A) Fun	ction(U) Insta	allation(I)	Tool(T)	System(S	6) Help(H)	(								
System Power	Standby	Power	ON	Cabir	net Power	OFF	ON	Blank	OFF	ON				
System Status			Arra	y Informa	ation									
Controller Warning:#1														
			1	C1-1-9	C1-2-9	C1-3-9	C1-4-9	C1-5-9	C1-8-9	C1-9-9	C1-10-9	C1-11-9	C1-12-9	
			2		C1-2-8	C1-3-8	C1-4-8	C1-5-8	C1-8-8	C1-9-8	C1-10-8	C1-11-8	C1-12-8	
Controller List			3	C1-1-7	C1-2-7	C1-3-7	C1-4-7	C1-5-7	C1-8-7	C1-9-7	C1-10-7	C1-11-7	C1-12-7	
Controller Power	er Status El	abinet 🔺	4	C1-1-8	C1-2-8	C1-3-8	C1-4-6	C1-5-6	C1-8-6	C1-9-8	C1-10-8	C1-11-8	C1-12-8	
					01.05	0105	0145		0105	0105				
				C1-1-5	C1-2-5	C1-3-5	C1-4-5	61-5-5	C1-8-5	C1-8-5	C1-10-5	C1-11-5	C1-12-5	
				C1-1-4	C1-2-4	C1-3-4	C1-4-4	C1-5-4	C1-8-4	C1-9-4	C1-10-4	C1-11-4	C1-12-4	
				C1-1-3	C1-2-3	C1-3-3	C1-4-3	C1-5-3	C1-8-3	C1-9-3	C1-10-3	C1-11-3	C1-12-3	
				C1-1-2		C1-3-2	C1-4-2	C1-5-2	C1-8-2	C1-9-2	C1-10-2	C1-11-2	C1-12-2	
					C1-2-1	C1-3-1	C1-4-1	C1-5-1	C1-8-1	C1-9-1	C1-10-1	C1-11-1	C1-12-1	
			10	C1-8-5	C1-8-4	C1-8-3	C1-8-2	C1-8-1				C1-7-4		
		Y												
Array Preview			13											
			14											
				•										Þ

## 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

Picture Settings			
Primary Control	ller : Controller-1		
Picture Mode	Mode11 : Rec709	<b>_</b>	Reset
	Copy From Rename		
Picture Settings		_	_
Ticture settings			
Primary Control	ler : Controller-1		
Picture Mode	Mode10 : Rec2020		Reset
	Copy From Rename		

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 Wanding.





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**:



0

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

• Press Apply

Calibration								
Calcula	ate	Apply	Calibra	tion Result Report				3
	🛃 Ready To A	Apply		Calibration Res	ult: Exceptional			
C Maxi Min Ave Wa Cal	Calibration Sum Overall Result imum Error (px) imum Error(px) erage Error (px) ind Error (mm) Iculation Time	mary Exceptional 0.091 0.058 0.072 0.173 0:04		Overall Reprojection Worst Camera Triangulation Overall Wand Error Ray length	Mean 3D Error: 0.270 mi Mean 3D Error: 0.210 mi Recommended: 2.7 mm Mean Error: 0.173 mm Suggested Max: 20.9 m	m Mean 2D Error: 0.072 p m Mean 2D Error: 0.091 p n Residual Mean Error: 0 (Exceptional)	oixels (Exceptio oixels (Exceptio .3 mm	nal) nal)
Camer 1 2	Camera Summ ra Samples Res 1376	ary ult Error 0.058 0.091	<b>()</b> A	II results are in the con	text of the wanding data	. Ensure even and comp	Apply rehensive	Cancel
3 4 5 6 7	1936 1380 1380 1380 1380 1376 1376	0.080 0.061 0.065 0.064 0.086		anding through the er	tire volume and the calil	bration wand is in good v	working order.	
	Calibration Options Calibration Type OptiWand	Full CW-500 (500mm)						
	Calibration Calculate	Apply	L Camera Preview 大│ <sup>©</sup> Q, <sup>©</sup> Q│ ■		Calibration Result Report Overall Reprojection Mea Worst Camera Mea Triangulation Reco Overall Wand Error Mea Ray length Sugg	Exceptional n 3D Error: 0.270mm Mean 2D Error: 0.0 mmended: 2.7mm Residual Mean Erro in Error: 0.173mm (Exceptional) gested Max: 20.9m	)72 pixels (Exceptional) )91 pixels (Exceptional) or: 0.3 mm	×
	Calibration Su Overall Result Maximum Error (px) Average Error (px) Wand Error (mm) Calculation Time	Exceptional 0.091 0.058 0.072 0.173 0:04			<ol> <li>All results are in the context of wanding through the entire v</li> </ol>	of the wanding data. Ensure even and co rolume and the calibration wand is in go	Apply Canc	e
	Camera         Samples         I           1         1376         GI           2         1380         GI           3         1936         GI           4         1380         GI           5         2000         GI           6         1380         GI           7         1376         GI	Immary         Error           0.058         0.058           0.091         0.080           0.061         0.061           0.065         0.064           0.086         0.086		5 OUTCT	0- 0 OUCT	0+ 7 OMUCT		

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 Optirtrax 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)

Assets	×	_
	••• Assets ×	
✓ Kind Name ✓ Solved	d	
🗹 🙏 RigidBody	🖌 Kind Name 🖌 Solved	
🗖 🗛 VCAM	C 🕰 VCAM	
	🖬 🖾 VCAMSample	
+ - 2 items		
Properties (1)	★ + 2 items	
	••• Properties (1)	
Constal Sottings		
	Conoral Sottings	
Name: RigidBody	General Settings	
Active: 🔷 On	Name: VCAMSample	

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 <i>IMU settings</i> : <i>Active Tag ID</i> will be changed to <b>9</b>		VCAMSample				
	+ -		2 items			
	Properties (1)			×		
		LaDer: 🔾	UT			
		Orientation: 👥	On			
		Position History: O	Off			
		Orientation History: 🔾	Off			
		Show Tracked: 🦲	On			
		Show Untracked: 🦲	On			
		Untracked Markers: 👥	On			
		Pivot: 🥧	On			
		Assigned Markers: 💶 🧿	On			
		Pivot Scale: 1				
		Quality:	On	IMU		
		Marker Quality: O	Off	Ad	ctive Tag ID: <b>9</b>	
		Model Replace: 🔾	Off	Active Tag	RF Channel: 20	
				Se	nsor Fusion: — — 70	
	IMU					
	-	Active Tag ID				
		Active Tag RF Channel: 20				
		Sensor Fusion:	- 70			

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.

Properties (1)		×
		••••
Display Settings		
Color:		
Label: O	Off	
Orientation: 🦲	On	
Position History: O	Off	
Orientation History: O	Off	1
Show Tracked: 💶 💿	On	1
Show Untracked: 👥	On 🖡	1
Untracked Markers: 💶 💿	On	1
Pivot: 🦲	On	1
Assigned Markers: 💷	On	1
Pivot Scale: 1		I.
Quality: 💶	On	
Marker Quality: 🔾	Off	
Model Replace: 🔾	Off	

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 <u>checked on</u>.
- Give your Project a Name then Press Create.
- <u>Remember the Project location since you will need to save a copy to transfer over to the</u> <u>**BrainBar**</u>.

#### Creating a Custom Master Level:

When creating your set to be used on the LED Wall, you wil 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: <u>https://www.twitch.tv/videos/</u>2030675785

# Adding the USC LED Wall File to your Project:

We are currently using Unreal Version 5.3. for the LED Wall setup. <u>Make sure</u> 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**: <u>https://drive.google.com/file/</u><u>d/1LyX26UZgzdYn-mvHow8J3MfEa3-aA9ma/view?</u> 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 –  $SL_nDisplay$ 





📥 Levels 🗸

Q Search Levels

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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 - <u>Switchboard computer</u> 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.

## **<u>Cloning UE Project from Switchboard to Node Computer:</u>**

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 freefilesync

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/Now	Switchboard - USC_ENV						
Config.	Configs Settings Tools						
	NevsConfig						
	Save Config As						
2 Configurations files will	Delete Current Config 🕇 Sla	∞ Scene					
1	Load Config						
be saved in the following							
directory:							

### **Example:**

C/UE\_Shared/Semester/

Add new Switchboard Configuration X						
Config Path	USCENV2024	Browse				
uProject	JE_Shared\SPRING2024\USCENV2024\USCENV2024.uproject	Browse				
Engine Dir	C:\Program Files\Epic Games\UE_5.2\Engine	Browse				
Perforce	2					
	OK Detect	Cancel				

#### Set up nDisplay

Add nDisplay Device

Config File NCFG\_USCWall.uasset

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





Browse Populate

OK

Cancel

-

Add Device - De	fault Map			• 0
Engine CL. Reference O O 🔿 🗢 🗦	3		† <b>!</b> †	€ €
nDisplay Devices	Address	Changelist	쓭	•
∘ 📶 ★ Node_0				•
Unreal Devices	Address	Changelist	쓭	•
• 🕦 SwitchBoard			썉	•

Switchboard - USCENV2024

Configs Settings

Sequence

Tools

С

Default

Settings

## **Configuring Settings:**

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

Multi User Server			
Server name	USCENV2024_MU_Server		
Command Line Args		Add Device 🔻	Level: Default Map
Unicast Endpoint	:9030		
Multicast Endpoint	230.0.0.1:6666		<sup>80</sup> ⇒ <b>"h</b> 3h
Multiuser Executable Name	UnrealMultiUserServer		90 · · · · · · · · · · · · · · · · · · ·
Multiuser Slate Executable Name	UnrealMultiUserSlateServer		
Directory for Saved Archives		Browse	
Directory for Live Sessions		Browse	
Auto Launch		3. Under <b>n</b>	Display Settings and also
Launch Multi-user server in UI mode	· CHECK	5 Unreal S	ettings, goto - Livelink
Clean History		Preset. C	lick on the <i>circular</i>
Auto Build	✓	arrows to	parse the asset then click
Auto Endpoint	✓	an the tel	and calcot LLD Comono
Unreal Multi-user Server Auto-join		on the tat	and select LLF_Camera
Extra Static Endpoints		u .	
	Parsing assets		
Disable Ensures			
Disable All Screen Messi			
LiveLink Preset	0—0	- 6	3
Craphico Adaptor	Confid		
Graphics Adapter	LiveLink Preset	0—0	
Media Profile		Search	
Lock GPU Clock	Graphics Adapter	ocuron	
Look of a clock	Media Profile	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 Swtichboard 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.

Sequence DE	efault			Slate	Scen	е
Add Devic	e - Level: ML_	ParallaxDemo			- 0	nDisplay Monitor
Engine CL Project CL 6439	• 0 • 0 = •	28		t‡t	Start all co	Console:
nD	isplay Devices	Address	Changelist	8 0	•	Node_0 10.10.6
• 1	★ Node_0	10.10.68.12	.8	1	•	
U	nreal Devices	Address	Changelist	* 6	•	
• 🛈	SwitchBoard	10.10.68.13	.5	* 0	•	
						0-0