MiddleVR/Visbox Setup Manual for Unity Cleveland State University

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NOTE: This manual assumes that you already have a **Unity account**, **Unity Hub** and the latest LTS (Long Term Support) version of **Unity** installed on your computer. If you don't have Unity installed, refer to this link: <u>https://unity.com/download</u>.

Install Unity 2022.3.0f1 LTS		×
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Microsoft Visual Studio Community 2022	1.58 GB	1.59 GB
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└ 🗹 OpenJDK	114.82 MB	222.86 MB
└ 🛃 Android SDK & NDK Tools	1.12 GB	3.03 GB
iOS Build Support	465.13 MB	1.95 GB
tvOS Build Support	474.91 MB	1.99 GB
Linux Build Support (IL2CPP)	52.51 MB	217.44 MB
	Bac	k Continue

When installing Unity, make sure to check the "Android Build Support" box.

<u>If this option doesn't come up for you</u>, click "**Install Editor**" under "Installs" in Unity Hub and download the version. You will be able to download Android Build Support here.

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NOTE:

> Tutorials 1-3 are for your own personal computer.

> Tutorial 4 is for the MakerSpace computer only.

NOTE:

➤ <u>*MiddleVR:</u>

MiddleVR is a Unity plugin for multi-display, stereoscopy, cluster rendering and also VR systems such as Walls, CAVEs etc.

At its core, MiddleVR is a library handling all aspects of multi-display and cluster rendering, but also optionally adds VR capabilities such as: input devices, stereoscopy, interactions.

It offers a C# API (application programming interface), and a graphical user interface to configure a cluster or VR system.

<u>**MVRManager:</u>

A Unity GameObject with several scripts attached to it. Those scripts handle all the management of 3D nodes, cameras, viewports, devices, clustering.

The MVRManager will initialize MiddleVR with the specified options, especially the configuration file. It will create the 3D hierarchy of nodes that you've specified in MiddleVR Config and the cameras with their respective viewports.

Tutorial 1 - Installing MiddleVR on your Computer

- Follow this link: <u>https://www.middlevr.com/2/download-links/</u> to download MiddleVR. You will be prompted to make an account and will have to wait for your account to be approved by an administrator before downloading anything. You will get an email notifying you of your approval.
- 2. Once your account has been approved, download MiddleVR. This is free, but it is only the demo version:



3. Once the download is finished, launch the **MiddleVR Installer** and follow the instructions. If you leave everything to the default settings, MiddleVR should be stored here on your local machine:



× MiddleVR

Tutorial 2 - Configuring your Unity Project and MVRManager for Visbox

a. Create your New Unity Project

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• • ¢	Hub V3.4.2 is now available and will install after See Release Notes	r restarting.	Restart now Dismiss
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🖨 Installs			
🔄 Learn		Q Se	arch
🚢 Community		MODIFIED ^ E	EDITOR VERSION
Downloads			

1a. Open your Unity Hub and Click "New Project":

2a. Use the **3D** template for this project. Make sure to include your name when naming the project (ie: John Smith - Demo). In this particular example, the project is just named "Demo" as shown in the screenshots. Click "**Create Project**":

Unity Hub 3.4.1			
	New Editor Version: 2	project 021.3.26f1 LTS 🗘	
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★ New Core	Core 2D		\mathbf{b}
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	SRP 3D (URP) Core	PROJE	CT SETTINGS 2
	Sore Runner Game	NEW *	Name - Demo
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 ✓ Assets ▲ Scenes ▶ ▲ Packages 	Scenes								

3a. Once the project has been created, the UI should look something like this:

b. Import MiddleVR Packages into your Project

1b. Open the Packet Manager: Click on **Window > Package Manager**:

File Edit	Assets	GameObject	Component	Window	Help							
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Oemo - SampleScene - Windows, Mac, Linux - Unity 2021.3.26f1 Personal <DX11>

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	Add package	from git URL		7.3.1 보
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	 High Definition 	on RP Config		7.3.1 🕑
	Rider Editor			1.1.4 🗹
	Shader Grap	h		7.3.1 🕑

2b. Click on + and choose Add package from tarball...

3b. Go to where the MiddleVR files are stored. If you didn't store the files anywhere specific, they will be located here:

C:\Program Files\MiddleVR2\unity_packages

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\uparrow		,Program Files\MiddleVR2\unity_p	ackages		С		م
New f	older					■ •	
ots		Name	(Date mod	ified	Туре	Size
ram		com.middlevr.hdrp.tgz	5	5/17/2023	2:52 PM	TGZ File	8
		com.middlevr.ndi.tgz	5	5/17/2023	2:48 PM	TGZ File	3,18
ckages		com.middlevr.netcode.tgz	5	5/17/2023	2:49 PM	TGZ File	50,81
	1	com.middlevr.tgz	5	5/17/2023	2:48 PM	TGZ File	15,55
		com.middlevr.urp.tgz	Type: TGZ File Size: 15.1 MB Date modified	I: 5/17/20.	23 2:48 PI	TGZ File	7
File	name:	com.middlevr.tgz			~ 2	Package tarball (*.tgz; Open	*. tar.gz) Cancel

Click on and open the file with this name: **com.middlevr.tgz**

4b. You should see something like this in the package manager after you've added the package. Close the package manager afterwards:

π Hierarchy			6 🕫 G	ame			Inspec		
+ - (All	æ			₩ - = = - = -		🔾 🔻 2D 📍 🎼 😒 🕶 💋 💷 🔻 🕀	Pa		
SampleScene						= "			Edit View in Package Manager
Main Camera Directional Light		*		Package Manager				ation	
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		\Box		▼ Features			isolar	v name	MiddleVR
				Engineering		MiddleVR	ersio	n	2.5.7
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🔻 🚔 Assets									
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c. Add MVRManager into your Project Hierarchy

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+ - Q. All	R	∅ ▼ ☆ ▼ 拱 ▼ ⊯ ▼
SampleScene Main Camera Directional Light		
■ Project 🛛 🖹 Console		
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Q, All Prefabs	▲ Pa	ckages > MiddleVR
Assets Scenes Scenes Scenes Scenes Code Coverage Coverage Coverage		Editor Resources Runtime Changelog Changelog MVRManager MVROffscreenMgr package README.md

1c. Go to the "Project" tab > Packages > MiddleVR:

2c. Drag and drop the **MVRManager** object (Packages > MiddleVR > MVRManager) into the "**Hierarchy**" tab:

' Hierarchy	- ∃ : # Sc	ne 👁 Game	
+ ▼		〃 @ ▼ ₩ ▼ 描 ▼ Ħ ▼	
© >> I WVKManager	> >C⊡##		
	I.I.		
Project E Console			
⊤ ★ Favorites	▲ Package	> MiddleVR	
Q, All Materials Q, All Models Q, All Prefabs	Edite Edite Rese Runt	r r urces me	
▼ 🗁 Assets ■ Scenes	E Cha	igelog	
V 🗁 Packages	MVF	Manager	
Code Coverage Custom NUnit		1gr	
Editor Coroutines	= pacl	age	
JetBrains Rider Editor			
MiddleVR Editor			

3c. The project should now be configured to run in a cavspace environment (Visbox). When Unity is in "Play" Mode, the camera will be appear in this format:

* Viewport_Left	Viewport_Front 1 (GPU 0)	Viewport_Right

d. Configure MVRManager

1d. Select MVRManager in the "Hierarchy" and make sure the settings in the "**Inspector**" match the picture below:

Inspector Tag Untagged		▼ Laver Detau	1	a
Profab	Onen	Select	Overrides	
	open			
				₩ ÷ :
🔻 # 🖌 MVR Manager	r Script (Script)			Ø⊐‡ i
		Re-apply player settings		
		Pick configuration file		
		MVRManagerScript		
Editor Config File		//Assets/Config/MultiDispla	ay.vrx	
Attach To Camera		✓		
Preview Window				
Cluster Properties				
Simple Cluster		✓		
Simple Cluster Par	rticles			
Editor Cluster Debu	igging Properties			
Enable Editor Clu	uster Debugging			
Exe Path				
Editor Cluster ID				
Start Other Clust	ter Nodes	 Image: A set of the set of the		
Log Level				
Log Folder				
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Custom Argumer				
ICVFX Properties				
Show Scene On Sc	reens			
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Advanced Properties				
Editor Log Level				
Show FPS				
Template Camera		None (Game Object)		
Disable Existing Ca	ameras	~		
Quit On Esc		~		
Disengage Untrack	ed Nodes			

e. Add 3D Objects into your Project Hierarchy

1e. To test MiddleVR's setup, add three 3D objects to the hierarchy. **+** > **3D object** > Any shape:



2e. From a top view, adjust your 3D objects like this:



3e. Click on **Main Camera** in the "Hierarchy" and adjust it in the project scene so that the forward most object (the cube in the particular example) is the only object visible to the main camera:



This toolbar can be used to switch from "rotate" to "move" mode. You may need to rotate the "Main Camera" to get a similar view in this example.



f. Configure Your 3D Objects to be Grabable

1f. Click on any of the shapes in your "**Hierarchy**". In this example the "Cube" object is selected to be configured:

Inspector	
Cube	Static 🔻
Tag Untagged Layer Default	
Transform	07:
▶ III Cube (Mesh Filter)	0 ≓ :
🕨 🛗 🖌 Mesh Renderer	0 :t :
→ ү 🖌 Box Collider	0 ≓ :
Default-Material (Material)	0 i
Shader Standard	
Add Component	

2f. In the "**Inspector**" box, Click the "**Add Component**" button and search "**Rigid Body**". Add it to the "**Cube**" object:

Inspector		a :
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1	Add Component	
	(q rig ×)	
	Search	
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	-Rigidbody 2D	l l l l l l l l l l l l l l l l l l l
	🎋 Event Trigger	
	New script >	

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Mass	1		
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Use Gravity	×		
Is Kinematic			
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	Disciele		
► Info			
Default-Material (Material)		Ø	:
Shader Standard			.]
	Add Component		

3f. In the "**Inspector**" box, Click the "**Add Component**" button and search "**Actor**":

Add Component	
(actor	×
Search	
# Actor	
New script	

4f. Click the "**Actor**" script and ensure that the settings are the same as in the below picture:

6	Ins	pec	tor				a	
5	9	~	Cube			Sta	atic	
	•	Tag	Untagged		Layer Default			
►	7		Transform			0		
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►	I	<u>~</u>	Mesh Renderer			0		
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g. Test your Unity Program

1g. Click on the "Play" button at the top of the UI. You will likely get a message saying that the license for MiddleVR will expire shortly after the date you installed it. Just press "OK":



Assuming that the main camera can only view one object in "Scene" mode and looks like the picture below in "Game" mode, you have successfully set up a VR project compatible with the Visbox cave space environment! Make sure to save all changes (Ctrl + s)

"Scene" mode vs "Game" mode:



2g. Now that you have a starter project in which you can pick up objects with a controller, you can now start developing your VR project. If you are still new to Unity, refer to Unity Learn (<u>https://learn.unity.com/pathways</u>) for tutorials.

Tutorial 3 - Exporting and launching your Unity project in MiddleVR

a. Exporting your Unity Project

1a. In Unity, go to File > Build Settings...:



2a. If there is nothing in the **Scenes in Build** box, make sure to click the **Add Open Scenes** button. Make sure **Windows, Mac, Linux** is selected under the **Platform** box and that 64-bit (Or anything relating to 64-bit) is selected next to **Architecture**. MiddleVR is only compatible with 64-bit builds:

Build Se	ettings					×⊡ ÷
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🗸 Sce	nes/SampleSce	ene				0
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Мах Т	exture Size	No Override				
Textu	re Compression	No Override			Learn abo	out Unity Cloud Build
Playe	er Settings				Build 🔄	Build And Run

3a. Click on "Player Settings":

		Add Open Scenes
Platform	🖵 Windows, Mac, Linux	
📮 Windows, Mac, Linux 🛛 🛠	Target Platform	
Dedicated Server	Architecture Copy PDB files	Intel 64-bit 👻
🗰 Android	Create Visual Studio Solution Development Build	
iOS ios	Autoconnect Profiler Deep Profiling	
рга PS4	Script Debugging Compression Method	Default 👻
PJ5 PS5		
WebGL	l	
Universal Windows Platform		
▼ Asset Import Overrides		
Max Texture Size No Override	-	
Texture Compression No Override	-	Learn about Unity Cloud Build
Player Settings	E	Build 🔹 Build And Run

4a. Under "**Player**" > "**Resolution and Presentation**", ensure that you settings match the photo below:

Project Settings				
Adaptive Performance Audio	Player			0 7
Burst AOT Settings		DefaultCompany		
Editor		Hello World		
URP Global Settings				
Input Manager	Default Icon			None
Memory Settings				
Package Manager Physics				
Physics 2D				Sele
Player				None (Texture 2
Guality				
Scene Template				
Script Execution Order				
Services				
Cloud Build				
Cloud Diagnostics	Settings for Windows, Mac, Linux			
Collaborate	► Icon			
In-App Purchasing ShaderGraph	Resolution and Presentation			
Tags and Layers	Resolution			
TextMesh Pro	Fullscreen Mode			
Time	Default Screen Width	1920		
Timeline	Default Screen Height	1080		
UI Builder	Mac Retina Support	×		
Version Control	Run In Background*	 		
XR Plugin Management	Standalone Player Options			
	Capture Single Screen			
	Use Player Log	~		
	Resizable Window			
	Visible In Background	~		
	Allow Fullscreen Switch*	~		
	Force Single Instance			
	Use DXGI flip model swapchain for D3I	D11 🗸		
	Supported Aspect Ratios			
	Shared setting between multiple platforms			

Resolution and Presentation						
Resolution						
Fullscreen Mode	Windowed					
Default Screen Width	1024					
Default Screen Height	768					
Mac Retina Support						
Run In Background*						
Standalone Player Options						
Capture Single Screen						
Display Resolution Dialog	Disabled					
Use Player Log						
Resizable Window						
Visible In Background						
Allow Fullscreen Switch						
Force Single Instance						
Supported Aspect Ratios						
* Shared setting between multiple platforms.						

5a. Under "**Player**" > "**Other Settings**", ensure that you settings match the photo below:



6a. Press Build and pick a folder on your machine to store the executable file:



b. Launching your Project on MiddleVRConfig

NOTE: You can only do this next part on your computer if your free trial has not expired yet. You will follow this same process on the MakerSpace PC.

1b. Go to "C:\Program Files\MiddleVR2\data\Config\Standard\Default.vrx" and launch the executable file:

This PC	This PC > OS (C:) > Program Files > MiddleVR2 > data > Config > Standard							
	Name	Date modified	Туре	Size				
	🙀 Default.vrx	5/26/2022 7:48 PM	VRX File	3 КВ				
	m, MultiDisplay.vrx	5/26/2022 7:48 PM	VRX File	4 KB				
	m, MultiDisplay-Cluster.vrx	5/26/2022 7:48 PM	VRX File	5 KB				
	φ, VirtualCluster.vrx	5/26/2022 7:48 PM	VRX File	3 КВ				
-1	\dot{m} , VirtualCluster_ServerUnityWindow.vrx	5/26/2022 7:48 PM	VRX File	4 KB				
*	\dot{m} , Warping_Scalable-Display.vrx	5/26/2022 7:48 PM	VRX File	6 KB				
*	φ, Warping_Vioso.vrx	5/26/2022 7:48 PM	VRX File	4 KB				
*								

2b. From here you will be able to add your executable file (Demo.exe in this example) into MiddleVRConfig by pressing **+**, adding the file and then pressing the **Run** button:

MIDDLEVR - N	W CONFIGURATION [PERMANENT LICENSE]			
File View License Help				
	Apps Quick links			
	APPS	CONFIGURATIONS		
Devices	ратн	Letauit AdvasedCalibration *		
	Demo C:\Program Files\MiddleVR2\demo_outpost\Demo_Outpost.exe	Cube-5-Sides-Flatten-VitualCluster*		
'ନ'	C:0+rogram Hiles/MiddleVK2\calibration\calibration\calibration\calibration\calibration\calibration	Cube-5-Sides *		
3D nodes		HoloStage *		
		MultiDisplay-Cluster * MultiDisplay *		
		SimpleStereoActive * SimpleStereoPassive *		
⊢ ⊾_ ⊢		VirtualCluster * VirtualClusterStereo *		
Displays	1	VirtualCluster_ServerUnityWindow * VirtualStage_Optitrack *		
		VirtualStage_Stype*		
Cluster				
	⊙ ADVANCED			
1 A				
	Log folder: BROWSE RESET OPEN IN EXPLORER			
Apps	Log level: Info (2) Idefault *			
	Date prefix			
	Monitoring:			
	Disable stereoscopy:			
	Disable network synchro:			
	Disable soft swaplock:			
	Force viewport size: 000x600			
	Custom arguments:bunnies 1000			
	Current command line : *C:\Program Files\MiddleVR2\demo\demo_outpost\Demo_Outpost.exe*	config "C:\Code\ProjectsTemp\Cfg\Warping\SD.vrx"bunnies 1000 -popupwindow		
2				
- NVidia driver setting 'VSync': Force-off				
- Widia driver setting 'Stereo - Emails: 0 - Widia driver setting 'Stereo - Display mode': On-board DIN connector - Widia driver display avec info: No Widia Succ devices found on this sustem				
- Willia driver display sync into no wylala sync devices round on this system				

NOTE: You will also not be able to test your program on MiddleVRConfig without a wand and glasses. You will have to put your executable file on a USB flash drive and load your executable file onto the MiddleVRConfig on the MakerSpace PC. You can test your program in the MakerSpace cave space with the necessary equipment.

If you had any trouble following this guide, refer to MiddleVR's guide here: <u>https://www.middlevr.com/2/doc/current/TutoUnitySetup.html</u>

Tutorial 4 - Run "Hello World" Program on MakerSpace Computer and Visbox

NOTE: This tutorial is a guide on how to set up the Visbox projector and MiddleVRConfig to run the "Hello World" program on the MakerSpace Computer only. This will not work on your personal computer as the projector, "Hello World Program" and Visbox are only available in the MakerSpace.

1. Once the MakerSpace computer is powered on, Click on the desktop icon labeled "**PROJS-ON.sh**". This will turn the projector for Visbox on. *If Windows is not already signed on, ask a lab tech for assistance:*





You should be able to hear the projector power up. Wait a few minutes for the projector to warm up. Once the Visbox looks like the picture below (the Visbox logo will be projected on the three vertical walls of the box), you can proceed to step 2.

- 2.
- a. Click the desktop icon labeled "DTrack3":



b. Click "Connect":



If the DTrack3 UI looks as it does above, you can proceed to part c.

ONLY IF THE CONNECT BUTTON IS NOT AVAILABLE and instead there is a button titled "Wake on Lan", go to the ART controller (the big black machine next to the Visbox) and switch the power off and back on again:



Exit out of DTrack3 and open it back up again. The connect button should now be there.

c. Click "**Start**". This will connect the glasses and wand to the Visbox environment:

DTrack3 v3.0.2 max. 4 cameras / max. 30 bodies	-	\Box ×
<u>D</u> Track3 Hardware Iracking <u>V</u> iew Iools <u>H</u> elp		
Start c01 -/- c02 -/- c03 -/- c04 -/- sync - 🛛 💸 - 👁 - 🗤 18		mup start
Monite Start : tab 01		ēX
cameras per tab: 4 2		4
Data Display		đX
3ody ID Name Filter x [mm] y [mm] z [mm] rx [deg] ry [deg] rz [deg] 3DOF ID ^{x [mm]} y [mm]		z [mm]
Flystidk Display		đX
en e	1 [1	
rijstičk oli oz os o4 os o6 jx jy tilter x(mmj y(mmj z(mmj rx(degj ry(deg	j rz (deg)	
 Fingertracking Display		ØX
coordinate system hand room		
· hand ID hand geometry x [mm] y [mm] z [mm] rx [deg] ry [deg] rz [deg]		
Event Display		đX
2023-08-24T15:07:24: (DTrack3) measurement started 2023-08-24T15:07:24: arttrackGgEVision warning 1 0x144 "camera c02 overloaded: too many reflections, results incomplete" 2023-08-24T15:08:42: (DTrack3) measurement stopped		
Start or stop measurement Configuration 'standard' on C	Controller 'atc	-302037002

3.

a. Click the desktop icon labeled "**MiddleVRConfig.exe**". This will look similar to the MiddleVRConfig app that you launched on your computer. If it asks to run the previous configuration, select "**Yes**".



b. When MiddleVRConfig is open, make sure that the "**Hello World**" program is selected. Hit "**Run**":



The Visbox environment should now look like this:



- **4.** You should now be able to test the program with the glasses and wand. You should be able to walk around in the cube environment.
 - a. The wand (1) should be in a box labeled "ART" (2)
 - **b.** The glasses (3) should be by the computer or plugged into the ART controller (4) for charging

If you cannot find these two pieces of equipment, ask a lab tech for help.



2. ART Wand Box





3. Glasses



4. ART Controller



- 5. **IMPORTANT:** Follow these steps when you're finished testing.
 - a. Exit out of MiddleVRConfig
 - b. Click "Stop" in the DTrack3 program and exit.



c. Click the desktop icon labeled "**PROJ-OFF.sh**". This will power down the projector:



d. You will know that you powered off the projector correctly when the Visbox looks like this, or how it originally did before the projector was turned on:



6. If you run into any trouble, ask a lab tech for assistance.