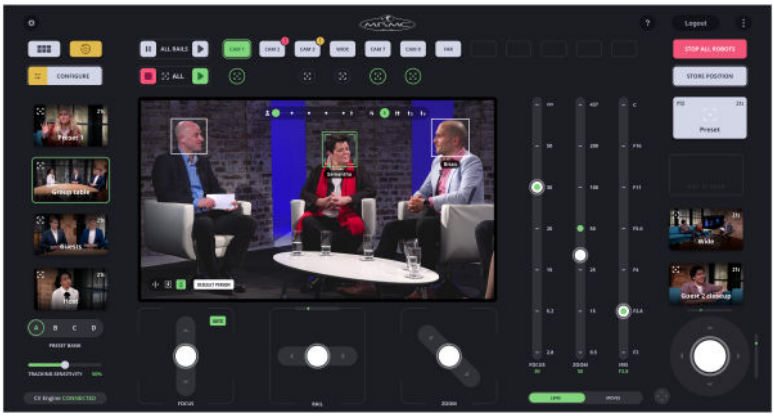
MARK ROBERTS MOTION CONTROL

POLYMOTION CHAT STUDIO 3.3



QUICK START GUIDE

Product code: MRMC-1999-33

CRANES AND RIGS | BROADCAST | HEADS & DSLR | PRODUCT PHOTOGRAPHY | RENTALS

Polymotion Chat Studio 3.3 Quick Start Guide

Product code: MRMC-1999-33

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Contact information	
Mark Roberts Motion Control Ltd. Unit 3, South East Studios Blindley Heath Surrey RH7 6JP United Kingdom	
Telephone:	+44 (0) 1342 838000
E-mail:	info@mrmoco.com (sales and general enquiries) support@mrmoco.com (customer support)
Web:	www.mrmoco.com www.mrmocorentals.com

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Chapter 1 **Polymotion Chat Studio 3.3**

Overview of Polymotion Chat Tracking System

Polymotion Chat is an advanced broadcast camera automation system solution. The advanced integrated AI engine detects face and limbs building a model of the subject and uses this to control and predict movement delivering high quality and natural camera motion. The easy to use interface allows the operator to create presets & moves, define static zones (so the camera will only move when there is enough movement by the subject), create an offset to allow for graphics to be on screen with the talent, manage acceleration and deceleration so the movement remains natural even on very tight or wide shots and many other options.

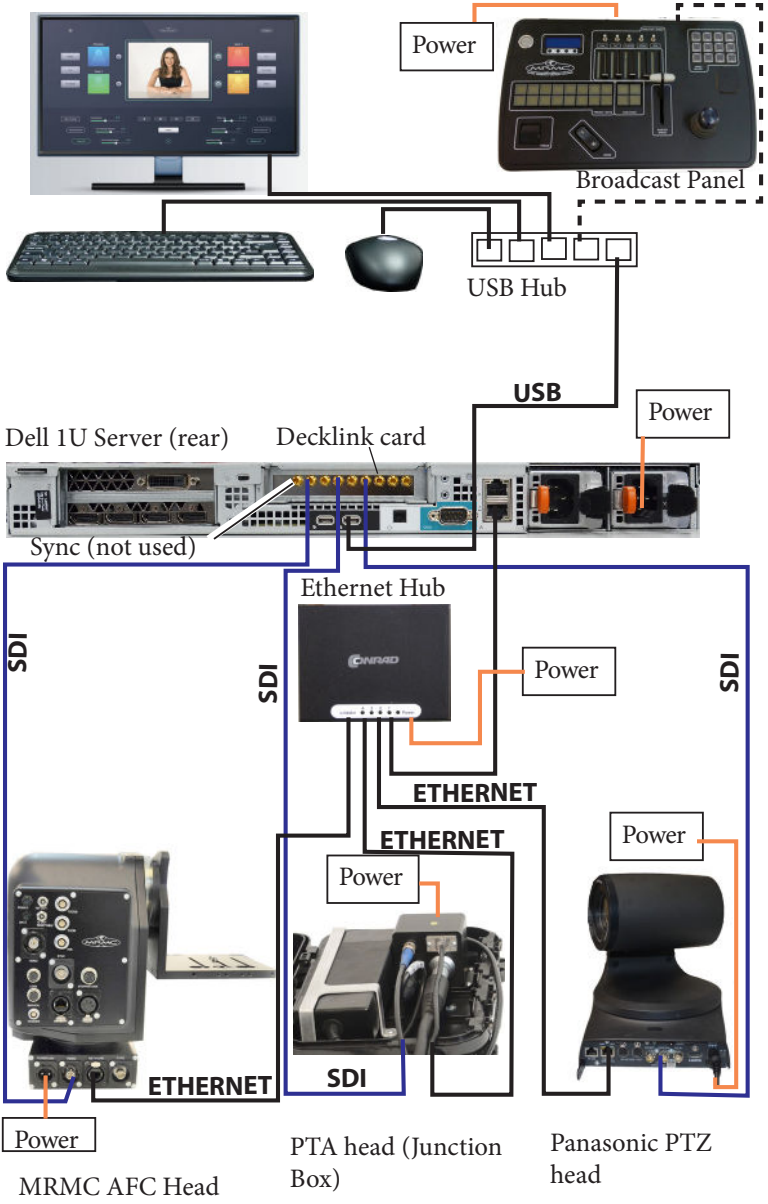
Setting up Polymotion Chat Studio

Polymotion Chat Studio can be set up on the following types of servers:

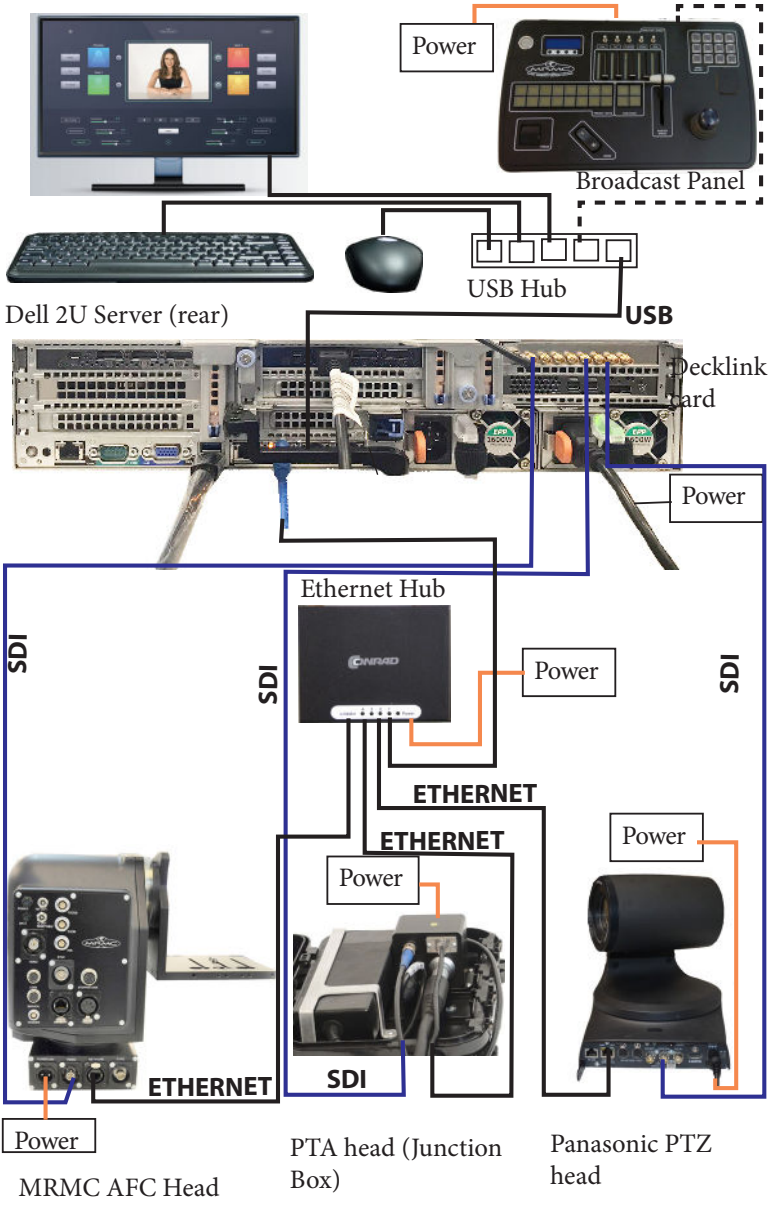
- Dell 1U Server: Supports up to three channels or 3 robotic heads
- Dell 2U Server: Supports up to 6 channels or 6 robotic heads.

Cable connections and the type of heads supported for both servers are similar, except that the Dell 2U server can support up to 6 heads. (For more information on system requirements, refer to *System requirements for Polymotion Chat Studio* on page 59.)

Connecting Cables (Dell 1U Server)



Connecting Cables (Dell 2U Server)

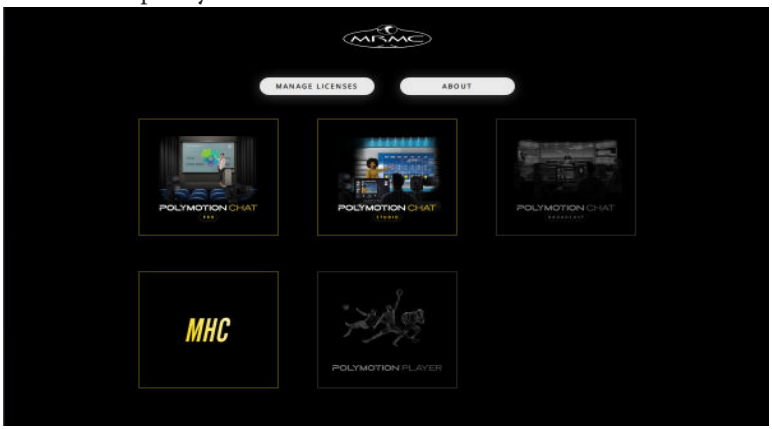


Launching Polymotion Chat

MHC Polymotion Chat runs via a utility called Polymotion Launcher. To learn more about installing Polymotion Launcher, refer to Appendix 1 *Installation and Backup* on page 59.

1. Use the icon on desktop to launch Polymotion Launcher.

2. Click/tap **Polymotion CHAT Studio/Broadcast**.



3. If you are launching this for the first time, you will be required to add a new license file or a license code. Contact MRMC Support for a new license. Refer to *Licensing your Polymotion Product* on page 69.

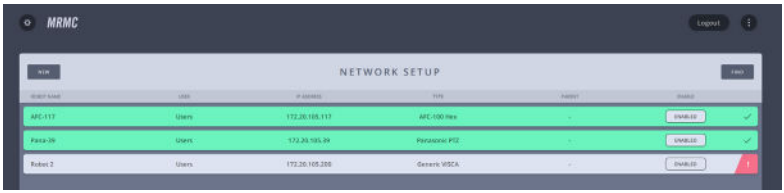
4. Once you have supplied a license code, MHC Server and Client are launched, login to MHC Client as Admin:
   Username: Admin
   Password: Admin1234

Setting up Polymotion Chat using Network Setup and Chat wizard

1. Cable together the robotic heads, Polymotion PC, cameras, and joysticks participating in the Polymotion network. Also connect the PC with the cameras using appropriate cables and data converters depending on method used for streaming the video. The possible

incoming sources of videos used by Polymotion system are: **USB Device**, **RTSP Stream**, **Decklink** and **NDI**.

2. Use the FIND button to retrieve a list of available robots on your network. Add all the robots that would be part of the Polymotion Chat system in the MHC Network setup page. Remember to specify the robot type for each of the participating robotic head



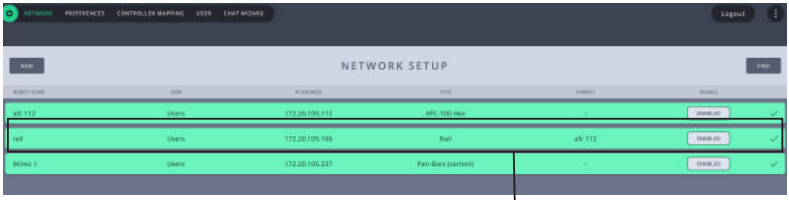
You can assign heads to a specific user, multiple users or all users.

> Note
>
> If a selected robot does not go green, then check it is on the same IP address range as the server PC. The FIND button does a network wide broadcast, therefore it finds heads even on different subnets.

> Note
>
> If an NDI protocol robot, such as that with a rig type of NDI_PTZ, is not being detected in Network setup page (turning green), then it is recommended that you download and install NDI Studio Monitor tool from NDI website. If the NDI Studio Monitor cannot detect the NDI protocol robot, then the Chat system will not detect it (as the Chat system uses the same source library as the NDI Studio Monitor for source detection).
>
> NDI® is a registered trademark of NewTek, Inc. Refer to http://ndi.tv/ for more information.

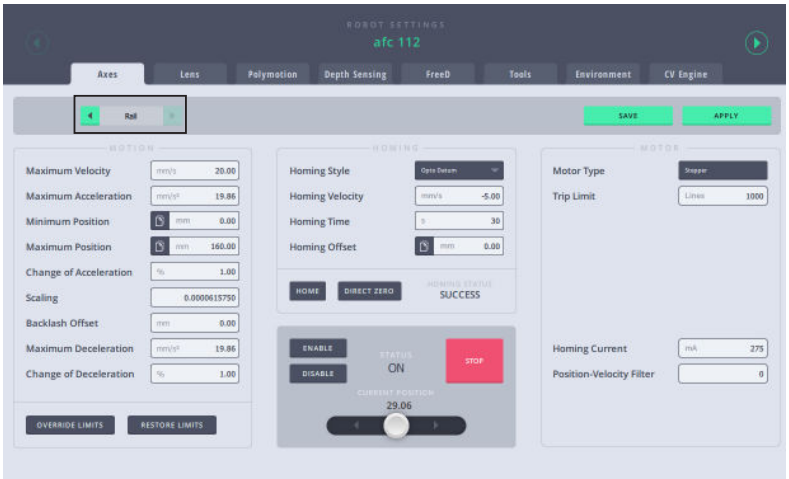
3. Rail/Lift Setup:

If you have Rail or Lift axis in a system, they are configured in the network setup as the 'child' of the 'parent' head that moves along the rail.



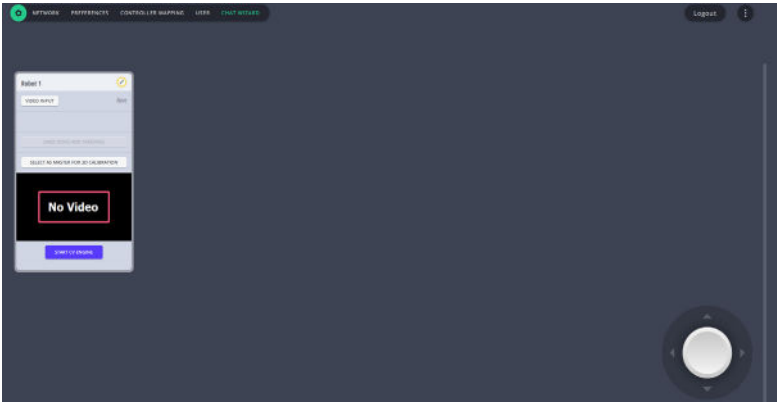
Rail set up as 'child' of 'parent' AFC head

Once added in the parent-child manner, Rail and lift appear as additional axes to the parent head in the Robot Setting page.

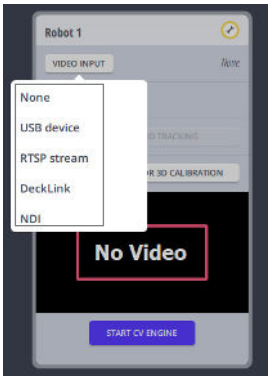


On the Preferences page, you can set limits and speed for Rail as an additional axis for the 'parent' head.

4. Select Settings > **CHAT WIZARD**. This page shows the added robots as boxes where video feed from each of them can be set up.

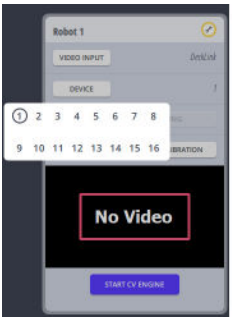


5. Under **VIDEO INPUT**, select the source of the video feed.



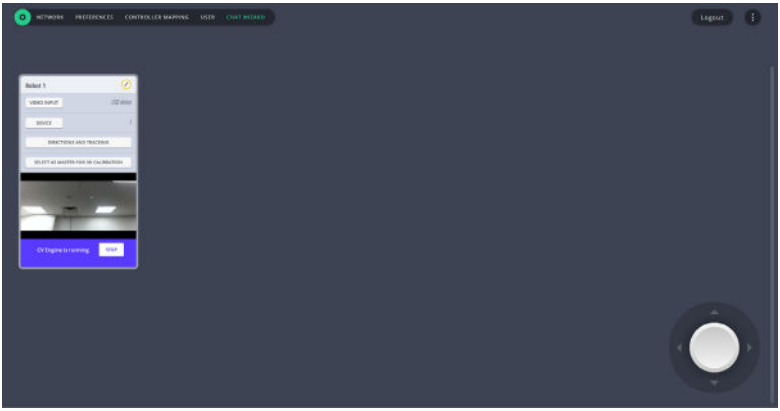
6. Select the DEVICE. If the selected video input is **Decklink** or **USB device**, then DEVICE is the port receiving the video feed from the camera on the robot. If the selected source is **RTSP** or **NDI stream**, then add the stream address in the appearing box.

   You can add up to 10 USB devices and 16 Decklink channels.



> Tip
>
> Use the on-screen joystick (pan-tilt) control to move the robot slightly to easily identify the robot if you are not able to do so by the name of the robot.

7. Click **Start CV Engine** to start the program that enables Polymotion tracking in MHC. As you do so, notice that additional windows pop up, which can take up to 30 minutes; these windows are for MRMC CV Engine, a software application that runs in the background to enable Polymotion Chat, and must not be closed at any instance while using the system for accurate functioning.



NDI video feed issues

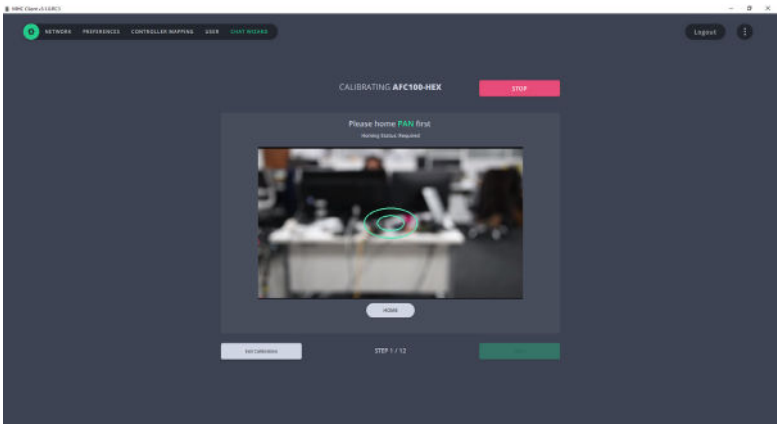
- If a video input was selected as NDI in Step 5 but is not displayed after clicking Start CV Engine, then it is recommended that you download and install NDI Studio Monitor tool from the NDI website. If the NDI Studio Monitor cannot detect the NDI video, then Chat system will not be able to detect it (as the Chat system uses the same source library as the NDI Studio Monitor for video source detection).
- On some servers or PCs, one of the two NDI heads or streams may not work if both NDI heads are connected to two different network ports of that server or PC. This issue can be resolved by connecting both NDI heads to a hub and then the hub to one of the network ports.

Note

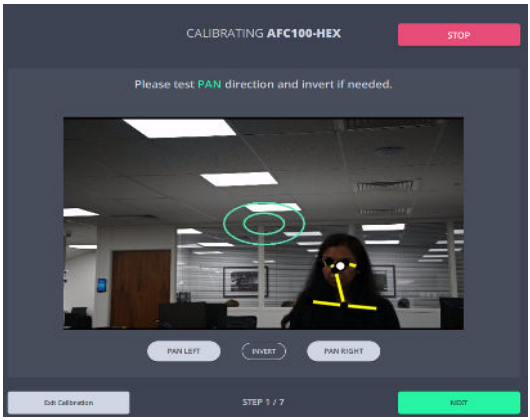
After Polymotion Launcher installation, when CV Engine is started for the first time, a configuration process for graphics cards, called PoseNet Initialisation, is started which can take up to 30 minutes for a Dell 2U server and up to 20 minutes for a Dell 1U server. For each subsequent Polymotion Chat launch, this process will take only a few seconds. During PoseNet Initialisation, the video feed appears with a message **CVE PoseNet Initializaing**. After clicking 'Start CV Engine' for all participating heads, users are advised to wait for this message to disappear before using tracking functions in the Chat system.

When CV Engine is started from the Chat Wizard page for the first time, a command window appears, this will stay on screen for 5 to 10 minutes and will close and reopen a few times while CV Engine builds the AI models for the pose estimation engine. DO NOT CLOSE THIS WINDOW, it will close itself once the models have completed building. When you see yellow limbs overlaid on people in the video frame it shows that the pose estimation is now working.

8. Click **Directions and Tracking** to calibrate all participating axes. If not already done, you will be asked to home the axes. For accurate target tracking, it is important that you home all participating axes. Click **Next** after completing each step.



Next, the direction should be set accurately for accurate tracking. For this, use the buttons for controlling the axis to check whether the robotic heads are moving in the direction stated on the button. If not, you can use the **Invert** button to invert the direction of the axis



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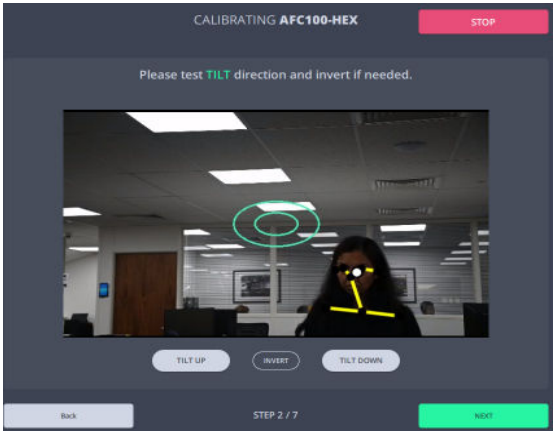
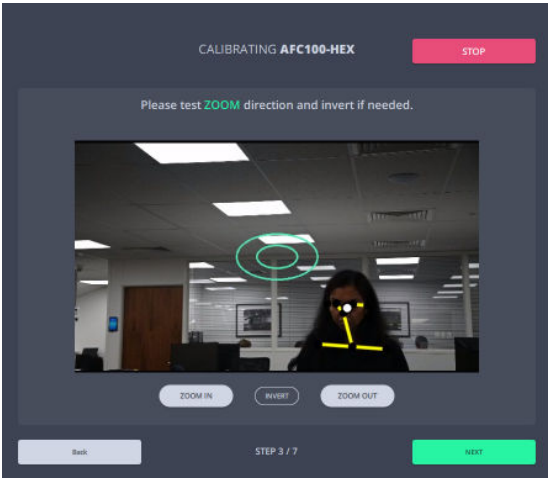
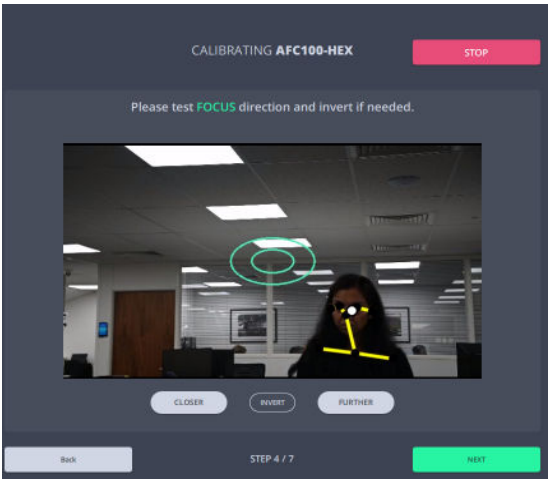
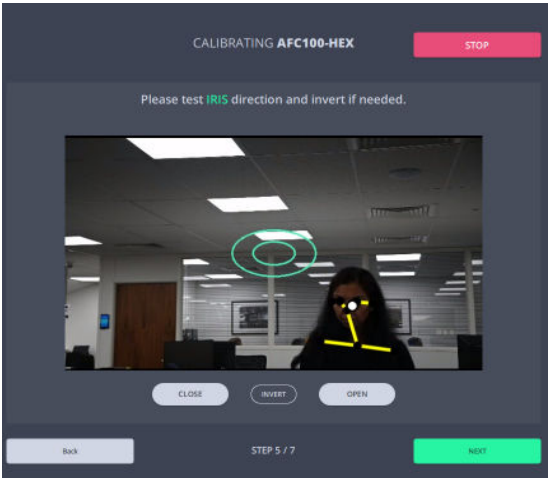
Note

Clicking **Invert** inverts the axis and saves the change in the robotic head. This is in contrast to the changes made on Preferences page which apply any changes to a given user only.

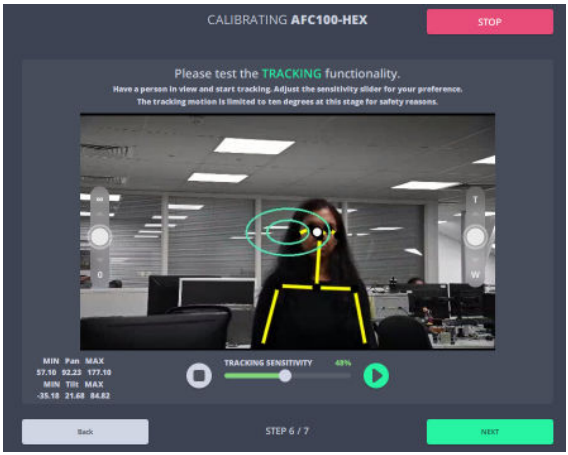



CALIBRATING AFC100-HEX
STOP
Please test ZOOM direction and invert if needed.
ZOOM IN
INVERT
ZOOM OUT
Back
STEP 3 / 7
NEXT


CALIBRATING AFC100-HEX
STOP
Please test FOCUS direction and invert if needed.
CLOSER
INVERT
FURTHER
Back
STEP 4 / 7
NEXT

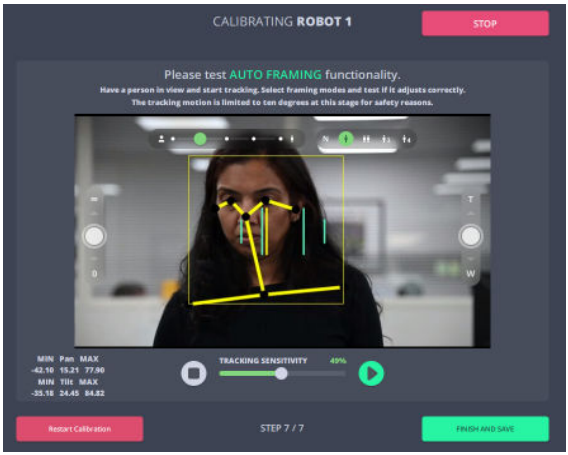


If Rail and Lift are added to the head then additional steps for calibrating these axes will appear in Chat Wizard.



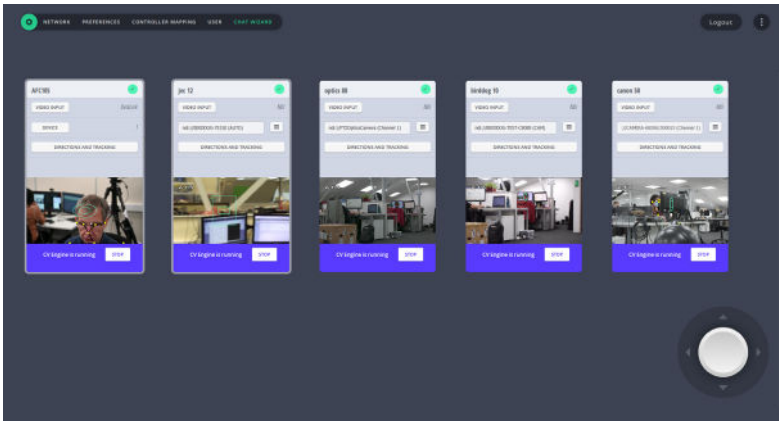
In this step, you can adjust the **tracking sensitivity** by clicking the play button to temporarily start tracking and then tweaking the sensitivity using the slider. To modify tracking sensitivity a person needs to be

present in the frame to allow tracking to begin. If that is not possible, skip this step.



In this step, test the Autoframing functionality by having a person stand in front of the came and then selecting different framing modes to test if the adjust correctly.

9. Repeat Steps 2-7 for all the robotic heads that are part of Polymotion Chat system.



These are instructions when both MHC Server and Client are on the same machine. To configure MHC Client on a remote PC, follow the instructions in *Remote Client Configuration* on page 74.

> Note
>
> In order to modify setting and record presets, you need to log in as Engineer type user. Use Settings > **User** page to check whether one is already set up or create a new one.
>
> To learn more about the user types, refer to *MHCv3.3 User Manual*.

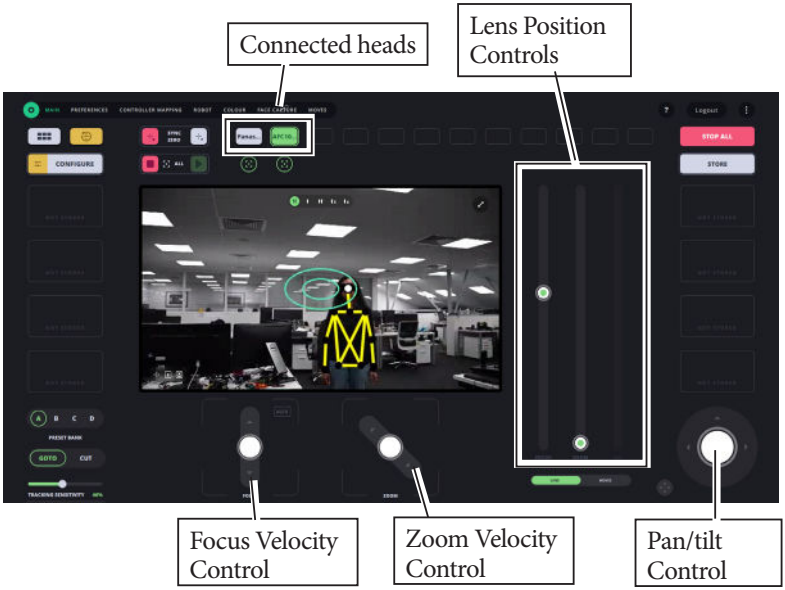
Setting up the robotic heads for Polymotion Chat

Provided all the participating robots are connected properly and video feeds from all the cameras are being successfully received and are correctly configured, your first session will involve logging in to the MHC Client.

When you login to MHC Client, this multi-view screen view appears which shows the live feed from all the connected cameras. If you have only one camera, then it goes straight to the operator screen. You can select the live feed from any camera to set up presets, begin tracking and change the tracking settings for that camera.

For more detail on Multi-screen view, go to *Multi-screen View* on page 40.

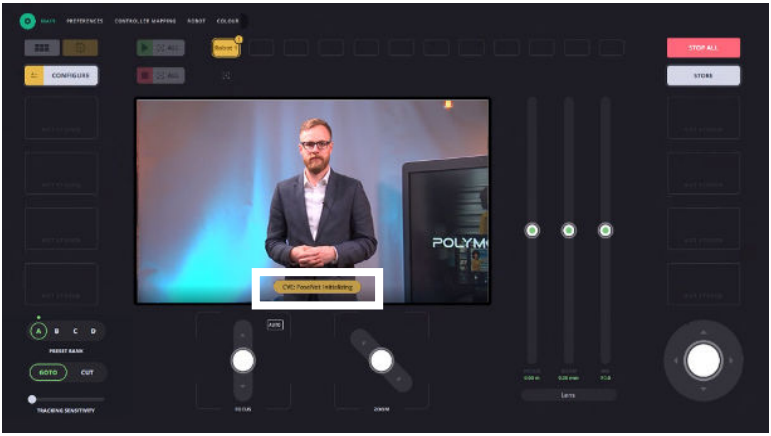
Polymotion Chat Main page



The controls on the Main page can be used to control robotic head axes as well as set up and run presets which can be later used to follow targets automatically. Also, Engineer-type users have additional controls like the Configure button, which Operator type users do not.

Note

When Polymotion Chat Main page is started for the first time after Chat installation, the CVE PoseNet Initialization process is started and a message appears in the LiveView window. This process will continue for up to 30 minutes depending on the number of heads in your Chat configuration. For each subsequent launches this will take only a few seconds. While this process is in progress, the tracking controls will not function in the Chat program.



Axes sliders and joystick controls

The Focus and Zoom Velocity sliders can be used to moved the lens axes in either direction. They are velocity controls in that the further they are pushed the faster the axes move.

The Pan /tilt joystick control is a directional control for Pan and Tilt axes.

The Focus, Zoom and Iris sliders on the right are position controls in that they can be used to move the lens axes to specific positions shown by the markings as stored in the lens table for the lens physically installed on the robotic head. It is important that the lens table is set up properly in → **Robot→Lens tab** for these to function accurately.

Important

End stops on Focus and Zoom are not supported for Panasonic PTZ devices.

In order to get the pan and tilt end stops to work smoothly for Panasonic PTZ heads, Chat system uses the settings in the head. The applicable models incorporate an EEPROM for storing the settings, and each time a command that changes the settings is received, data is written in the EEPROM. The number of times data can be written in the EEPROM is limited so if data is sent frequently, the model will cease to operate normally when the maximum number of times for writing the data has been reached. Therefore, it is recommended that end stops are not changed frequently for PTZ heads to prevent EEPROM from failing.

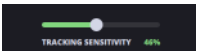
Note regarding Panasonic PTZ Head Zoom function

On the Panasonic PTZ head, if you are on a wide zoom setting, the head can focus quite closely, such as 0.5m. However when you zoom in to the telephoto end of the zoom, the closest the head focus is about 3m. The software in the Panasonic knows about this and will move the focus slider up when you zoom in.

Also if you are at the tight end of the zoom and try to move focus to a close position, the software in the head will not allow you to do this. It will move to the closest possible focusing distance.

If your Polymotion Chat Installation contains a head moving on a Rail, then there are some additional options on the Polymotion Chat user interface to control the speed and travel length on the rail. Tracking will continue to work through this axis.

Tracking Sensitivity

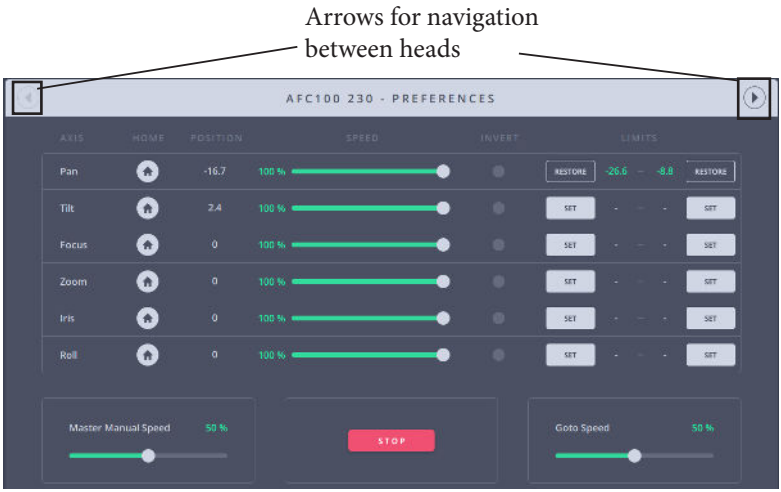


Tracking sensitivity determines how quickly the camera moves in reaction to the target moving away from the reference point, i.e. the deflection from the desired position. This feature gives better control over lower speeds. For example, when the slider is at the half way mark the sensitivity demand is only 20%. Use a high tracking sensitivity value for generally wide on zoom.

Tracking sensitivity automatically adjusts based on the lens FOV or zoom level. The more zoomed in the lens is, the less the camera is panned and vice versa. You should have the lens table set up for this to function accurately.

Setting pan and tilt soft limits

We can restrict the movement of the robot/camera to acceptable visual limits in the preference page. If the subject of the tracking goes outside of these limits then the camera will not follow them any further.



To set soft limits:

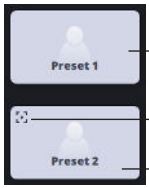
1. Use the joystick to position an axis at a point that you want to set as minimum limit.
2. Click the first SET button to set the minimum limit.
3. Similarly, position the axis at the point you want to set as maximum limits.
4. Click the second SET button to set the maximum limit.

5. Use steps 1-4 to set soft limits for the required axes in the all the participating robotic heads. Use the arrows shown in the above picture to navigate between the robotic heads.

Note regarding Panasonic head's preference limits

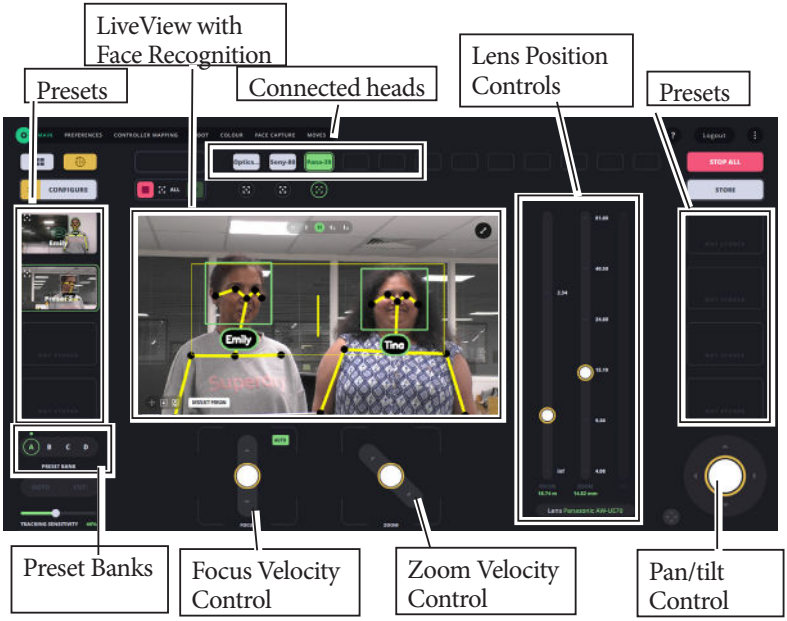
All preference limits are cleared when Panasonic head is removed from MHC or added to MHC. Therefore, the user needs to re-set them when adding the head in MHC.

Presets



The Polymotion Chat Operator page allows for 32 positional presets organised in 4 banks of 8 presets each. Each of these presets can be set as tracking or non-tracking. For each camera, **Tracking presets** are used for setting the starting position for limb detection and tracking and **non-tracking presets** used

to store a position. When storing a position, all the axes positions are stored. A preset button is faded when no position is stored in them.



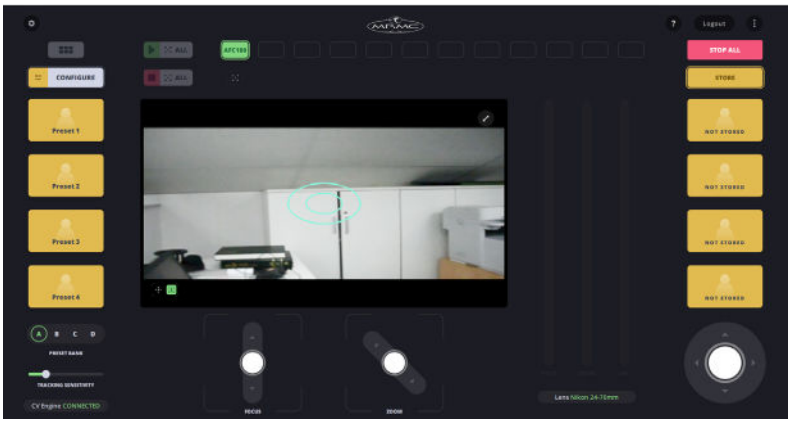
Preset Banks

On the Chat main page, presets are organised in 4 banks in groups of 8 presets for each bank allowing you to store and use upto 32 presets. Click on the bank to switch to 8 presets for that bank. A green dot appears over the bank when you activate a preset for a bank and remains on the bank with last activated preset even when you move between different banks.

Storing a non-tracking preset

1. Click/tap one of the connected robotic heads for which you want to store the preset.
2. Use the controls to go to the desired head position. Ensure that the Zoom and Focus axes are in correct positions. For a tracking preset, set the position of the head to the target that you want to track.

3. Switch to store mode by clicking/tapping on STORE. You will see that the preset buttons change to yellow, indicating that the preset buttons can be selected to store your current head position.



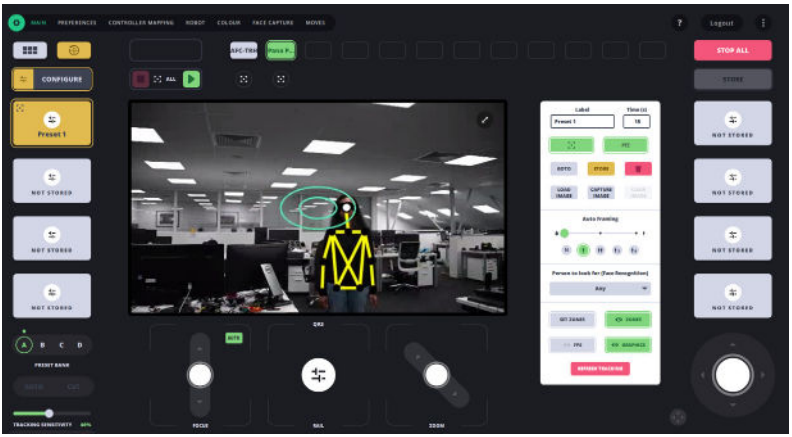
4. Click/tap on a preset button to store the current head position.

You can use these steps to **edit a preset** as well as store new preset position for a preset button.

Storing/editing a tracking preset

1. Use the controls to go to the desired head position. Ensure that the Zoom and Focus axes are in correct positions. For a tracking preset, set the position of the robotic head to the target that you want to track.

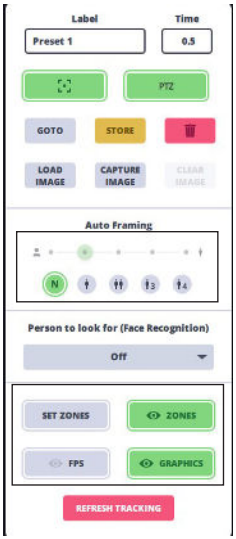
2. Switch to Configure mode by clicking/tapping on CONFIGURE . You will see a yellow border around CONFIGURE , indicating that the preset buttons are in the Configure mode.



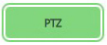
3. Click/tap on a preset button that you want to set. This button will now change to yellow and a Configure box display will appear.
4. Use the section *Configuring a Preset* on page 24 to set up tracking options on a preset.
5. Clicking Store in the preset configuration stores the current preset settings.
6. Click CONFIGURE to exit Configure mode.

You can use these steps to edit a preset as well as store new preset position for a preset button.

Configuring a Preset



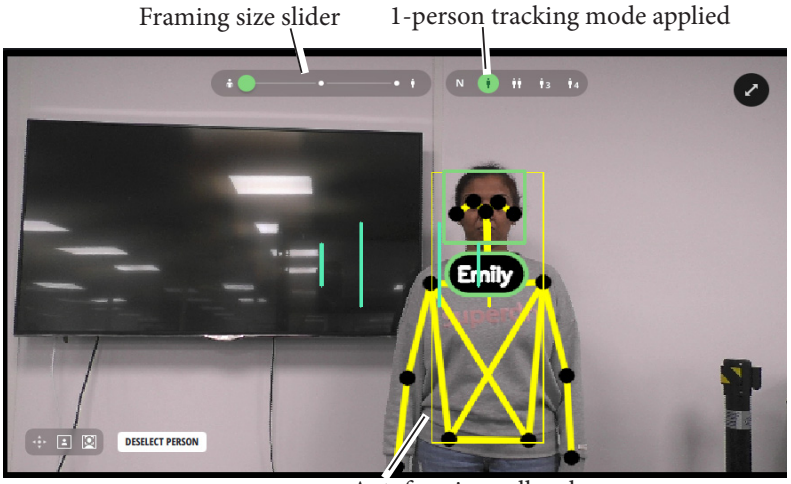
Option	Description
Label	Allows the user to set a custom name for the preset.
Time	Time taken to go to the preset if mode is set to 'CUT'. If this value is lower than the minimum time required by all axes to go to the position, then this value is disregarded and time taken is equal to that of the slowest axis.
	Sets the preset as tracking or non-tracking. Green means the preset is set as tracking preset and grey means non-tracking.

Option	Description
	Toggles the preset between PTZ and non PTZ preset. When greyed, the PTZ is tracking only, in other words, when selecting such a preset, the pan, tilt and zoom axes positions will not be changed. This option is useful if changing autoframing is desired while the head is tracking.
	Click to move the robotic head to the preset position stored in the preset.
	Stores the current position of pan, tilt, zoom, focus and iris. The tracking mode and static zone settings are stored automatically.
	Deletes the preset.
	Load an existing image for the preset button.
	Capture a still image from the camera and set it as the image for the preset button.
	Clear the image from the preset button.

Autoframing

Autoframing allows you to set how much of the target(s) will be kept in the frame while tracking the target. Depending on the set autoframing mode, the Chat system works out the extent which the target will kept in the frame. In default tracking mode of 'Normal', autoframing is not applied. In all other tracking modes auto-framed target is indicated by the yellow rectangle. The vertical green lines indicate the stop zone for autoframing. While tracking, you can use the positional zoom slider on the right to make fine adjustments to zoom position. In autoframing

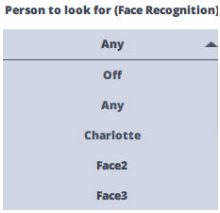
modes, the stop zone only applies to the pan axis, tilt is handled by the setting in the Framing Size slider: from head and shoulder to full body.



Tracking mode	Description
	Framing size slider: Allows the user to define size of the subject's body to be kept in frame. The slider can be used to vary the framing size from face up to full body.
	Normal tracking: Default framing mode where Chat system adjusts pan and tilt to keep the subject at a point in the frame. Autoframing doesn't apply in this type of tracking.
	1-person tracking: In this auto framing tracking mode, the Chat system keeps one subject in the frame provided lens can zoom wide enough to capture the person.

Tracking mode	Description
	2-person tracking: In this auto framing tracking mode, the Chat system keeps two people in the frame.
	3-person tracking: In this auto framing tracking mode, the Chat system keeps three people in the frame by tracking the right shoulder of the person on the right and the left shoulder of the person on the left.
	4-person tracking: In this auto framing tracking mode, the Chat system keeps four people in the frame by tracking the right shoulder of the person on the right and the left shoulder of the person on the left.

Person to look for (Face Recognition)



Face recognition feature allows for auto tracking of a specific person based on the profile selected here. When a facial profile of a person is set up and enabled on Face Capture page, it is added in this drop-down list. This function is even available when tracking multi subjects. For example, when a preset is set to 1-person tracking and that person's profile name is selected in the 'People to look for' list, when the preset is activated, the head will auto-track the specified person and display their profile name in the boxes in the Live View video. To learn more about how to set up Face Recognition, see *Face Capture Page* on page 36. Face recognition allow for the following 3 states:

Off: No face recognition is performed and when the preset is selected, a nearest target is picked. If they move out of the frame and another subject enters the frame within a specified time, then the Chat system tracks them otherwise tracking stops.

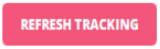
Any: When the preset is activated, the prime subject is the first recognised person found closest to the static zone. If that person leaves

the frame, another recognised person is picked for tracking until the person returns and the tracking will shift to following that person again. In this case tracking can be switched to another person temporarily by clicking on their image in LiveView video.

Specific person: When the preset is activated, tracking will begin when this person is located in the frame.

Liveview graphics settings

Option	Description
	Toggles showing the detection points in the LiveView.
	Show the FPS, or how fast the system is doing tracking; green indicating on and grey indicating off. (This is different from the camera's speed in FPS and can be slower.)
	Enabling this button allows you to change the heights and widths of the static zone (green boxes or ellipses). The minimum width and height is that of the inner zone and the maximum width and height is that of the outer zone. The camera moves only as much to place the white dot representing the target inside the inner zone. When the target moves but is still inside the outer zone the camera does not move. A smaller zone means target is more closely followed, resulting in more camera movement. A larger zone means less camera movement, as the target is free to move around without the tracking reacting. For more information on changing the static zones, refer to *Altering Static Zones* on page 32.

Option	Description
	Toggles showing the green boxes or ellipses for static zones.
	When pressed, the person closest to the middle of the static zone is picked for tracking. (Clicking the preset button also resets tracking.)

Starting Tracking

Enabling tracking on a tracking preset does not automatically start tracking. There are three ways to begin tracking:

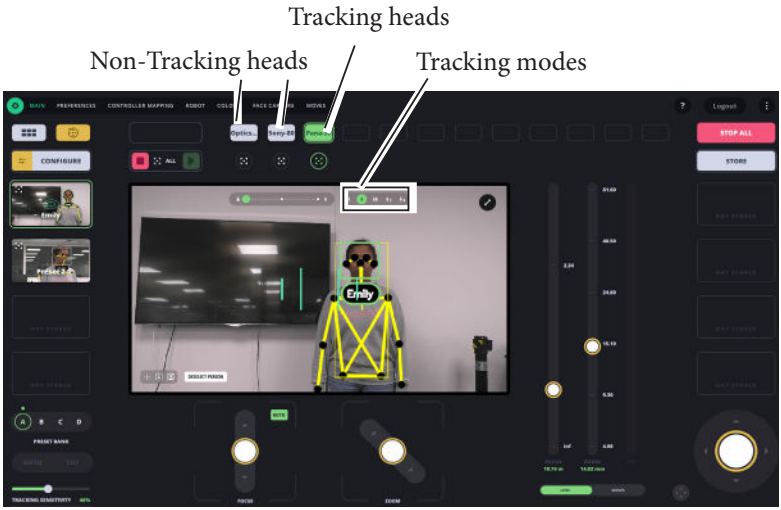
- **Using the tracking presets**: To start tracking, you activate a tracking preset by simply clicking/tapping on one of the tracking preset buttons. Remember a preset can only be used to go to a target and begin tracking when it is enabled. The robotic head will move then to the preset position, obtain the target and begin tracking. Tracking will start using the face nearest the centre of the static zone. The tracking indicator under the head selection button goes green when tracking is on.

  This is the preferred method for starting tracking.

- **Using** **for each head**: Use the MHC controls to position the head to the desired target and the click to begin tracking the target.

- **Using** : Use the MHC controls to position the head(s) to the desired target and the click to begin tracking the target for all heads. Note that this button becomes active only when tracking for at least one head is enabled.

Once tracking has started, a **green border** appears around the active preset. Also, all tracking robotic heads have appear under head select buttons. The tracking modes appear on the LiveView display allowing the user to dynamically change the tracking mode while the head is tracking.



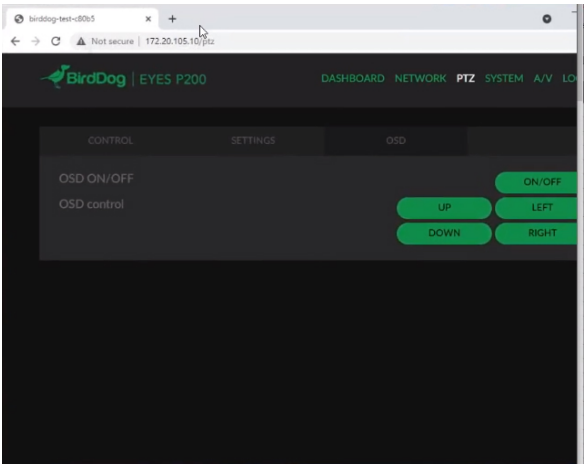
Note that when tracking is on, some of the buttons in the Configure display are inactive. These become active only after you stop tracking. You can still change the name and picture associated with the preset while tracking is on.

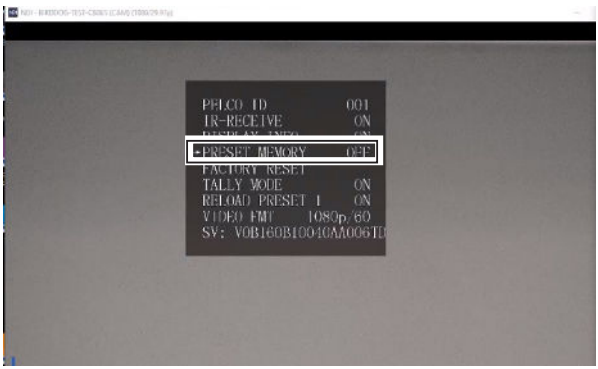
.

Note regarding Birddog Autofocus function

When a preset is saved with AF on, enabling it and changing the AF state will not reflect in the preset when it is enabled again. This happens because of the preset memory function in the Birddog PTZ camera. If set to ON then the complete state of the head will be saved (including AF state) when a preset is saved. If set to OFF then only the pan, tilt, zoom and focus is saved to a preset. This needs to be turned off in the on-screen display. You can access the display via NDI Studio Monitor (password: birddog).

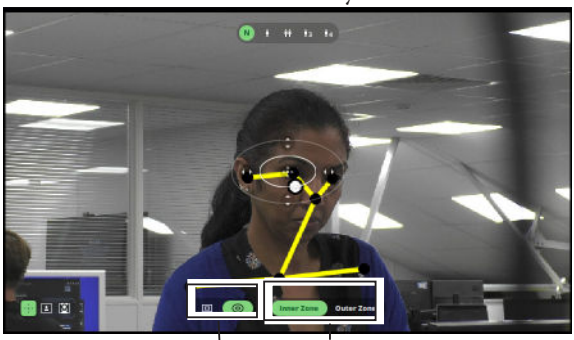
In the OSD, go to SYSTEM → PRESET MEMORY → OFF. Exit the menu and close NDI Studio Monitor.





Altering Static Zones

Selecting SET ZONES in Configure mode for a preset shows a bar in LiveView window which allows you to edit the static zones.



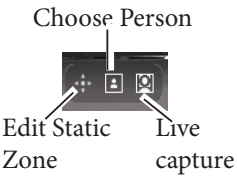
This changes the shape for the static zones to either rectangular or elliptical.

Toggle between inner stop zone and outer stop zone

Set Zones Enabled

Use the appearing arrows on the static zones to change the height or width of the outer or inner zone depending on what is selected. Use the centre arrows to reposition the static zone to another spot. Click the CONFIGURE to exit Configure mode.

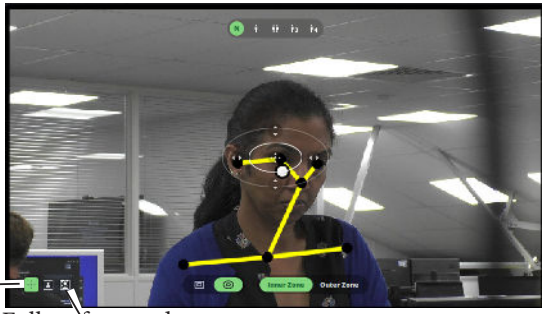
LiveView Controls



Once the preset is created, this control on the bottom left of liveview toggles between **edit static zone, choose person** and **Live face recognition capture**. In addition to the settings available for presets which are applied when a preset is activated, there are some settings which you can change while a camera a tracking a subject. These settings are temporary and will not be saved for any subsequent sessions.

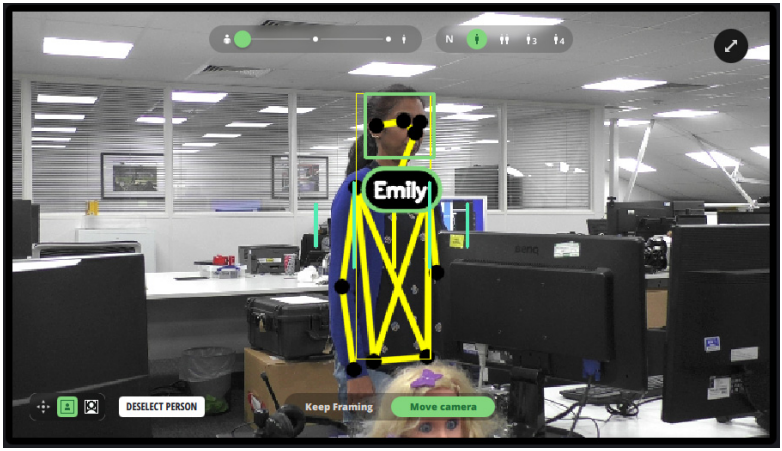
Edit Static Zone

Use the appearing arrows and other options to edit the static zones as required, and then exit the edit mode.



Follow Face

When the little framed person icon is selected the user can choose which person on screen will be tracked. Click on the person's face to select them to be tracked. When you click on a person to move tracking to that person, you have two option: **Move Camera** and **Keep Framing**. Move camera will keep the static zone in the same place so then the camera will move to the new subject. Keep Framing will move the static zone to the new subject so the camera will not have to move.



Live Capture

Simply click the icon and Chat application will execute a live face recognition capture of a person in frame (whose face capture profile is not already captured) from the operator's main page without needing to switch to the Face Capture page.

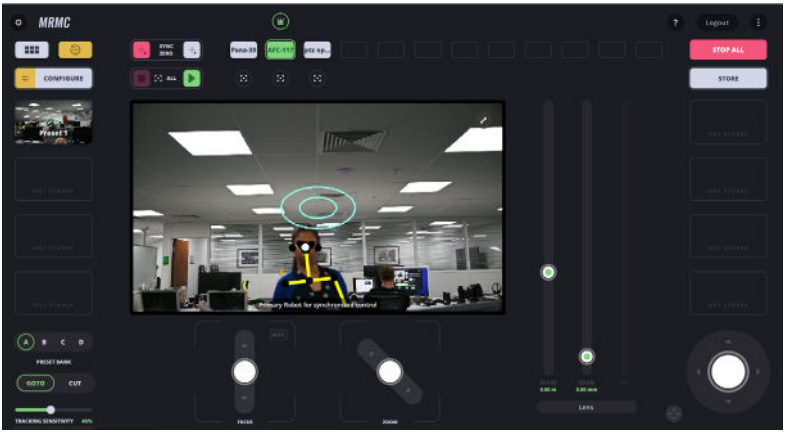
> Tip
>
> Live Capture allows you to add additional photos of person whose profile is already stored. While face tracking, simply click the button to capture live photos to the maximum of 10.

Synchronised Robots

Polymotion Chat v 3.3 has a new functionality for two or more MRMC heads to follow the same movement. It allows one or more secondary cameras to exactly follow the movement of the primary camera. This is useful for multiple camera green screen and AR work also called teleportation.

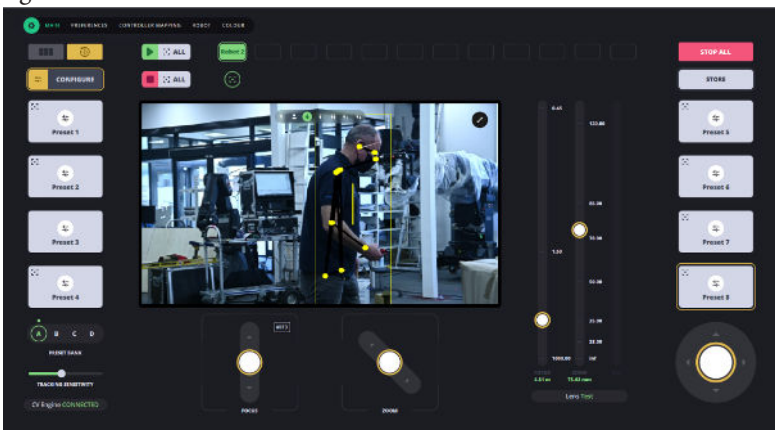
To enable this, perform the following steps for all participating heads:

1. Go to the → **ROBOT** → **CV Engine** tab.
2. In Synchronised Control list, select Group A.
3. Once, you have done these steps for all primary and secondary heads, go back to the operator's main page.
4. appears on top of all heads in the group. Click this icon for the head which you want to assign as 'primary'. appears for the primary head and all other heads in Group A will now be secondary heads.



Motion Prediction

This adds a thin white line depending on which way the target is moving/facing and gives the tracking demand an extra boost depending on the level of the setting in the CV-Engine tab. For more information, refer to page 47.



Stopping Tracking

At any point, you can turn tracking off on all participating robotic heads by clicking/tapping

.

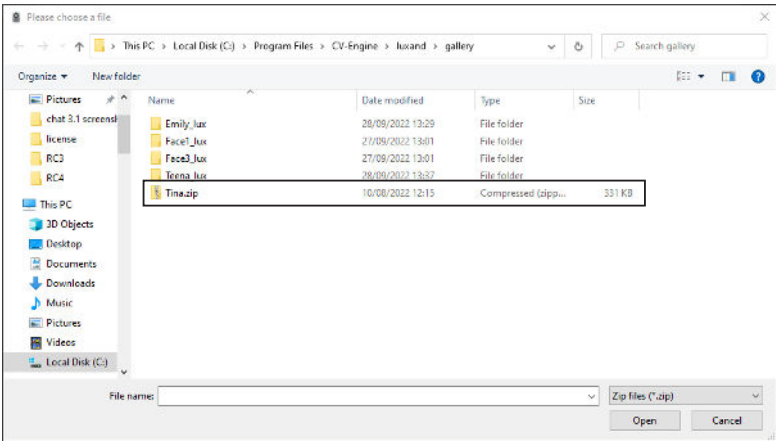
You can stop tracking on the currently selected head by using the pan and tilt joystick control. As soon as you move the joystick the tracking will be disengaged. Another way of stopping tracking on individual robotic heads is by clicking/tapping under the head-select button.

can be used to stop all movement on all robots, akin to an emergency stop button.

Face Capture Page

This page allows you to create a face capture library which can be created in one of the following ways:

Importing a profile: If you have already created a face capture profile at another location, such as another computer, it can be imported by clicking the IMPORT PROFILE and specifying a location of the ZIP file of the profile.



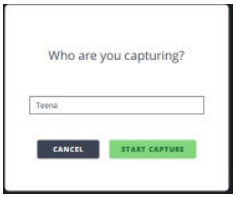
Creating a new profile from images: If time does not allow a face capture before a production then you can import a set of photos of a person's face from a photo library or download from internet for use by the face recognition. Simply click the NEW PROFILE FROM IMAGES button and specify the location of the .zip file with photos.

Performing a face capture: Chat v3.3 allows capturing face in two ways. First is by using the Face Capture page to capture a face recognition profile. Chat v3.3 can also do a live face recognition capture from the

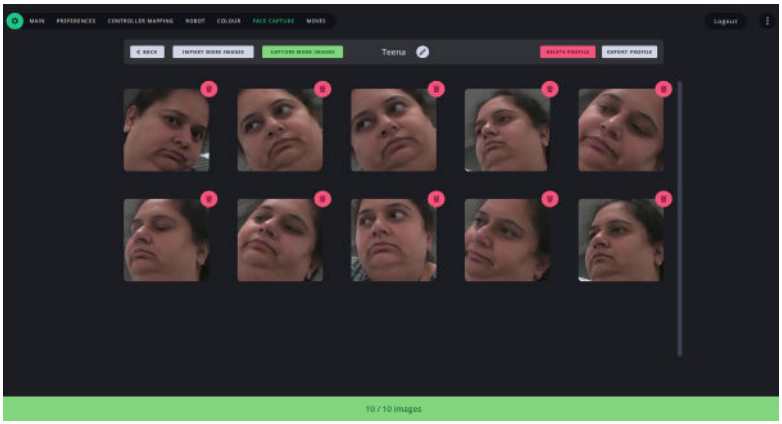
operator main page without needing to go to the Face Capture page, for more details refer to *Live Capture* on page 34.

To capture a profile using the Face Capture page:

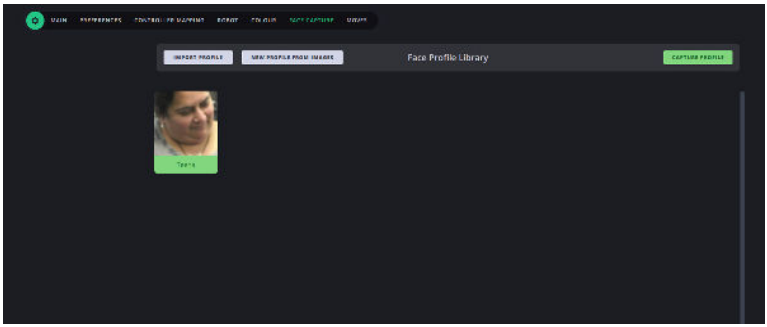
1. Navigate to → FACE CAPTURE.
2. Tap CAPTURE PROFILE and specify a name. Name of every profile should be different to avoid conflict in the Face Capture database.



3. Tap **START CAPTURE**.
4. Read the on-screen instructions and tap START CAPTURING. As the subject changes head positions and facial expressions, the Chat system will automatically capture 10 images to capture a new profile. More images can be added by clicking CAPTURE MORE IMAGES for more accurate face recognition.

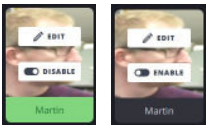


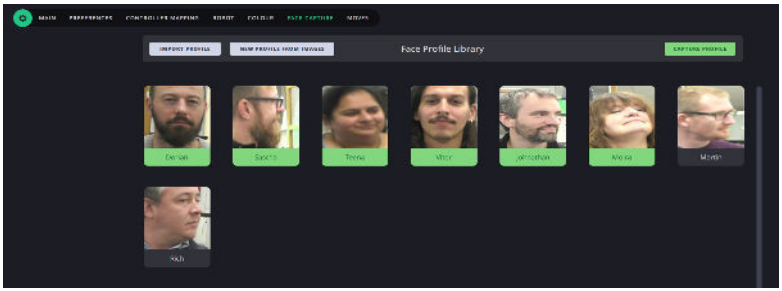
5. Click Back to view the Face Recognition Library.



> Note
>
> There is no limit on the number of people you can have in the database. However, it is recommended that you keep the number of active profiles down to a minimum to keep the processing time down. Each profile can be enabled/disabled in the profile manager

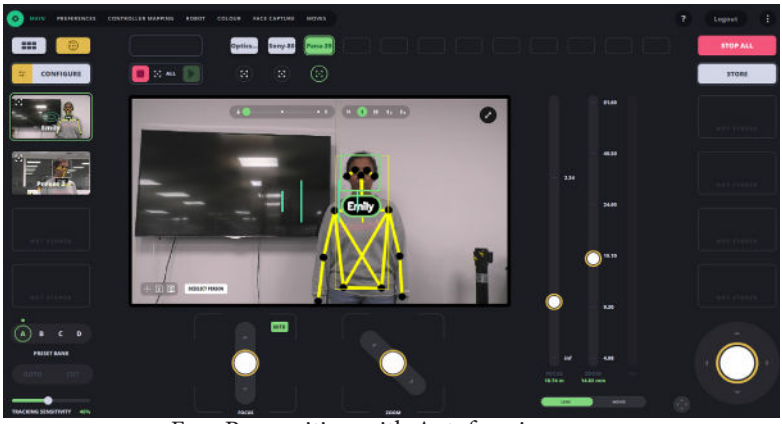
To disable a profile in the profile manager, click/tap a person's profile. When the profile is grey, it is disabled and will not be used for face recognition.



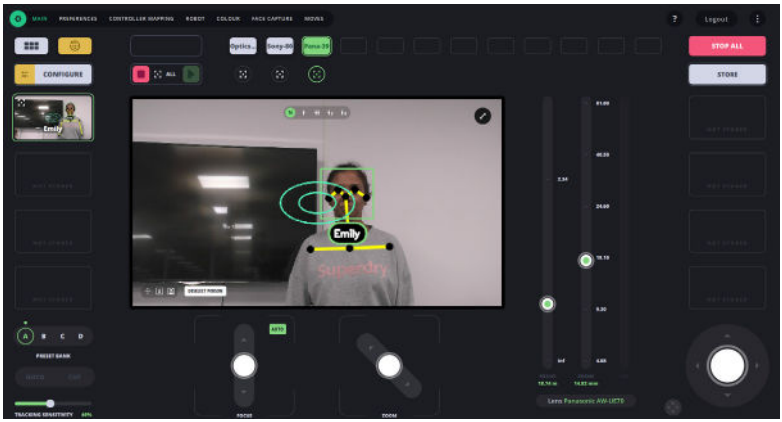


An enabled profile can be selected for face recognition by selecting a name in preset configuration. When tracking is started using this preset,

only that person will be tracked by this preset. Selecting 'Any' will enable tracking of all enabled profiles.



Face Recognition with Autoframing



Face Recognition without Autoframing

An unrecognised person or a disabled profile on the FACE CAPTURE page, displays as 'unknown' in the Live View video on the main page.

Export a Face Recognition Profile

Export allows you to specify where to export the user profile which can be imported later. Exported user profile will be named *profile_name.zip*.

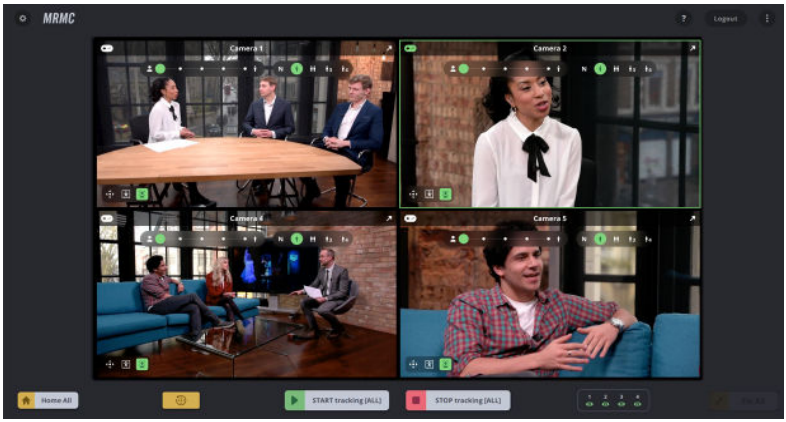
Note: Renaming the exported zip file does not allow you to import a second identical data under a different name profile.

Multi-screen View

If a user is assigned multiple connected heads, the default screen after login is the Multi-screen. Click/tap the Multi-screen view ( ) button to view the live video feed from up to 12 connected heads. By default, live controls for all heads are also available MultiView screen. You can click/tap on the view from any of the connected heads to switch to viewing the feed from that head in the main LiveView window. You can make live tweaks to the tracking controls for each individual robot.

Selecting a head will not alter the current tracking settings on any other head. In other words, the tracking options and presets are head-specific.

If you START tracking (ALL), the multi-view screen will have the tracking controls as below.



Multi-Point Moves

Multi-point moves is a MHC v3.3 feature that allows you to set up multi-point moves that pass through upto 8 waypoints.

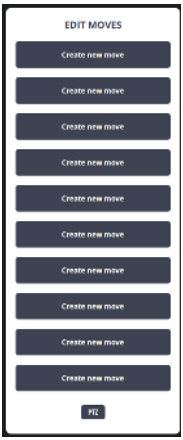
Storing a Multi-point Move

Store a multi-point move as follows:

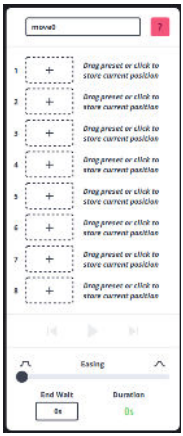
1. Ensure that you have selected the head you want to create a move for.
2. Move the Lens/Moves slider to Moves.

3. Click

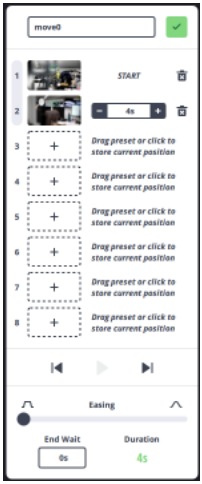
. The EDIT MOVES pane appears.

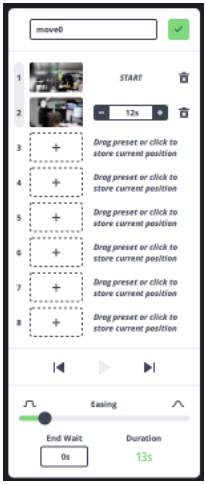


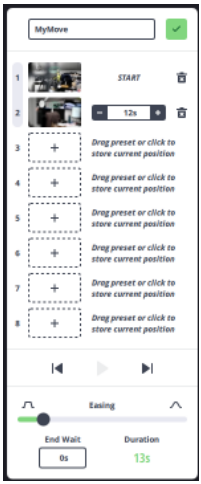
4. Click/tap **Create new move** the new move can be configured in the appearing pane.



5. The move can have upto 8 waypoints. To create a waypoint, either click to store the current poistion or drag an existing preset to it. All empty waypoints are ignored. Each move must have at least two waypoints.







6. Use the '-' or '+' buttons next to the waypoints to change the time taken to reach the waypoint position.

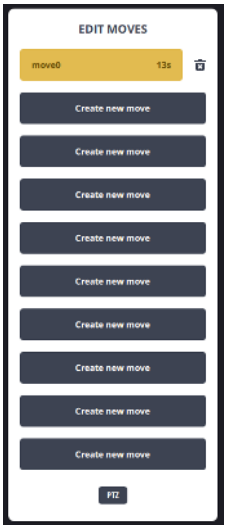
7. Use the **Easing** slider to change the speed of the move.

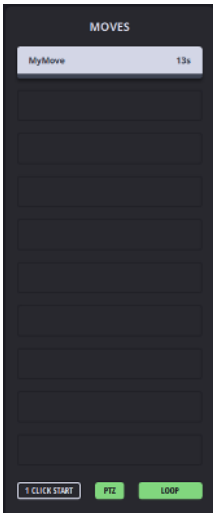
8. Enter the **End Wait** value for a 'Loop' move.

9. Add a name for the move, if required.

10. If required, test the move, is to click ▶ in move edit mode. This will start the move from the current position. ⏮ and ⏭ perform a goto to the first and last waypoints, respectively. If the move is at the last waypoint, using ◀ plays the move in reverse.

11. Click ✓ to save the move. The saved moves appears in the Edit Moves pane. Click the **Configure** button to finish configuring the move.





Activating and stopping a move

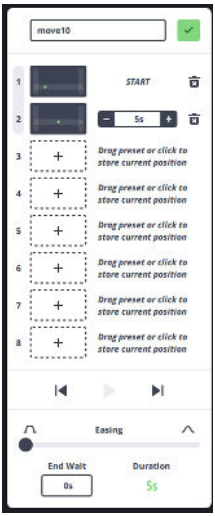
To activate a move, you simply click/tap on the move button. If 1 CLICK START is disabled, clicking the move button will move the robot to the starting position and when the button stops flashing, the move will run.

If 1 CLICK START is enabled, clicking the move button, moves the robot to the starting position and then immediately runs the move.You can also choose to 'loop' a move by clicking LOOP the move progresses from the first waypoint to the last one and then back to the first one and so on. It also waits at the last waypoint according to the **End Wait** time. Clicking the move button again at any point will stop the move.

Child-only Multi-point Moves

If you want to exclude the PTZ axes from a move or move the PTZ head manually while the rail or lift axis or both run a move, you can run a child-only multi-point move in which only the child axes are involved in the move. Polymotion Chat 3.3 allows you to create up to 10 additional such moves. To create a child-only move:

1. Enter the Edit Moves mode by clicking CONFIGURE. Ensure that PTZ is disabled.
2. The 10 additional moves will display in the Moves pane.
3. Click a move button to set up the move.
4. Add waypoints as before. Note that the waypoints will not include PTZ axes and the thumbnails will be added accordingly. Following is an example for a child-only move for an Rail Lift System.

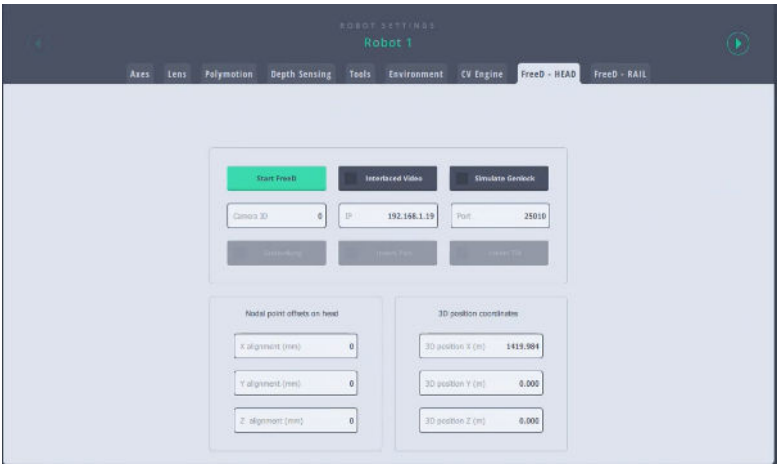


5. Set up the remaining parameters of the move and save the move.

Single-point Tracking

Single-point tracking is a new feature added to MHC v3.3. It enables the setup of a point that the head remains pointing to regardless of the position on the rail and/or lift. For it to work, it requires some configuration:

First, you need to set up nodal offsets. This is done the same way as FreeD heads using → **ROBOT→FreeD-Head**.



Second, you need to calibrate the head to the rail, or lift. To do so:

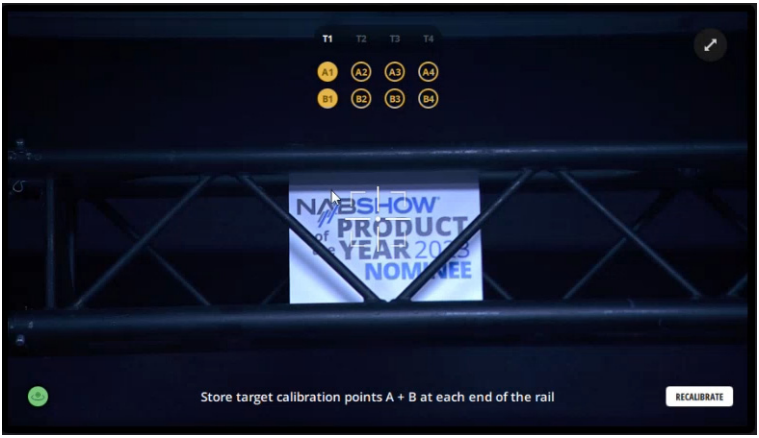
1. On the Chat main page, click CONFIGURE to enter the Configure mode.
2. Turn on single-point tracking by clicking in the LiveView window.
3. Click **MOVE RAIL TO CALIRATION** to move the head to the far end of the rail (or one end of the lift, if calibration the head to lift).

4. Put the crosshairs on the target on the other end of the rail (or lift) and then click **CALIBRATE**. In the screen below target is the screw at the end of the rail.

To setup a tracking point:

1. With the head at the same position, point the camera to the target and click the B point.

2. Move the head to the other end of the rail (or lift), point the camera to the same target again and click the A point.



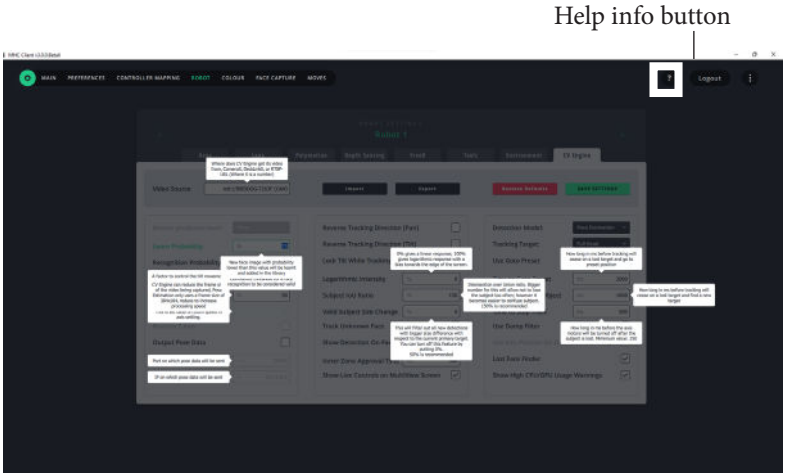
3. Click **Configure** to turn off the configure mode.

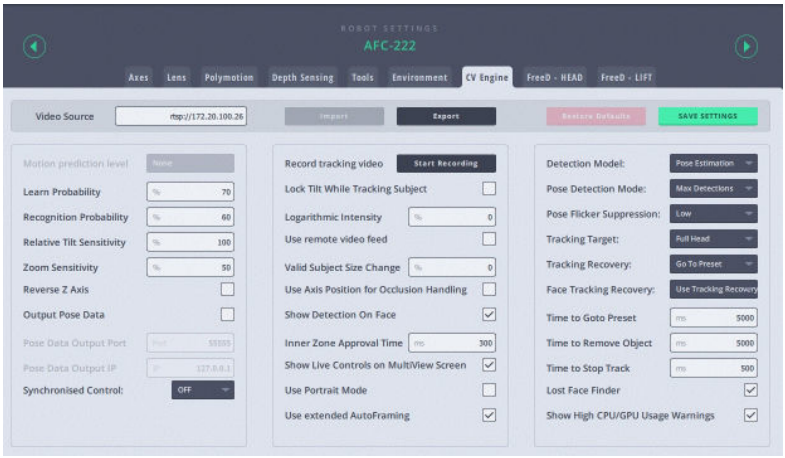
Ensure that Single-point tracking ( ) is turned on. You can start tracking by clicking the tracking point that you set up. Now, if you move the rail position, the target will remain in the centre of the frame.

Changing Tracking Settings in Client View

If you want to quickly change some tracking options whilst you are logged in as a engineer-type user, you can use the → **ROBOT** → **CV Engine** tab.

Click on top-right to display info boxes for all fields.





Video Source: Use this box to change the Video Input for camera tracking. Simply enter the name of the input stream along with the port number (**`x`**):

- USB: **`Camerax`**
- Decklink: **`DeckLinkx`**
- RTSP: RTSP stream address

- NDI: NDI stream address

Motion prediction level: Level of prediction of direction of target movement. Default is None and can be set to Low, Medium or High. Applicable to MRMC heads only.

Learn Probability: New face image probability lower than this value will be learnt and added to the library.

Recognition Probability: Confidence threshold for a face recognition to be considered valid.

Relative Tilt Sensitivity: A factor to control the tilt movement in relation to the pan.

Zoom Sensitivity: Sensitivity of zoom during auto-framing. This is based on zoom speed in axis settings.

Reverse Z axis: Toggle switch to reverse direction zoom axis in response to the moving subject.

Output Pose Data: Toggle switch to send pose data to the Pose Data Output Port and IP.

Synchronised Control: More than one MRMC cameras can be grouped to follow a synchronised movement.

Record tracking video: Click Start Recording to record the video output of CV Engine. This feature is useful when troubleshooting video feed issues.

Lock Tilt While Tracking Subject: When this option is turned on the robot should not tilt after the target is inside the inner stop zone.

Logarithmic Intensity: This will cause the robot to move slowly when the target is at the centre of the screen and quickly at the edge.

Use remote video feed: Allows to use video feed from a remote source.

Valid Subject Size Change: This setting is the minimum target size filter and allows the user to set the size of the target to be detected. Default is 0, which means the setting is off, and any target will be detected regardless of size. However, it is advisable to set it at a non-zero value. For example, if a target in the background is less than half the size of the main subject, and the value is set at 50%, they will not be detected.

Use Axis Position for Occlusion Handling: Turning this feature on will use the axis position of the robotic head to improve tracking performance.

Show Detection on Face: When checked tracking points and lines on face are shown.

Inner Zone Approval Time: Duration in ms when the subject is confirmed to be in the inner stop zone.

Show Live Controls on MultiView Screen: Toggles showing of tracking controls on MultiView video windows.

Use portrait mode: If a camera is mounted in portrait mode selecting this option rotates the input image is by 90 degrees for use by the pose tracking. This also allows the content to be output to streaming media.

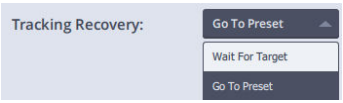
Use extended Autoframing: Enabling this option restricts zooming in on head and shoulder for improved stability. This feature should be used in strictly controlled scenarios where subject would perform only limited movement in controlled studio environment.

Detection Model: Indicates whether the robotic head is a tracking head or non-tracking head.

Pose Detection Mode: This allows users to switch between the algorithm used by the pose detection model to either maximize accuracy or maximize detections. Maximizing accuracy will show fewer detections but would also be less prone to id swaps. On the other hand, maximizing detections will show more detections however will also be less accurate with id swaps.

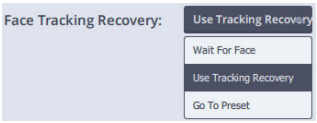
Pose Flicker Suppression: This list of options allows you to select the strength of a filter that is used to avoid flickering detections. The dropdown has four options: off, low, medium and high. The default option is low.

Tracking Target: Position of the detection point (White dot), derived from the pose estimation points.



Tracking Recovery: This list of options allows you to set what the head does when the target the target is lost, namely: Go to preset or Wait at the current position for the target to re-enter the frame.

Face Tracking Recovery: If facial recognition cannot recognise the current subject due to a momentary occlusion or sideways aspect of the face, the options are:



- Wait for the named face to re-appear and start tracking again
- Continue tracking the subject using Pose estimation
- Return to preset

Use Goto Preset: Turning this feature on will move the robotic head to the preset position when the target is lost for more than the time set in Time to Goto Preset field.

Time to Goto Preset: How long in miliseconds after losing the target that the tracking will cease and camera will go to preset position.

Time to remove Object: This is the amount of time from when the target is lost to when the robotic head starts following another target in the frame.

Time to Stop Track: This is the amount of time from when the target is lost to when the robotic head stops moving the motors.

Lost Face Finder: Automatically move the tilt upward if the subject suddenly moves out of the top of the frame.

Show High CPU/GPU Usage Warnings: This option can toggle showing the warning for high CPU/GPU usage.

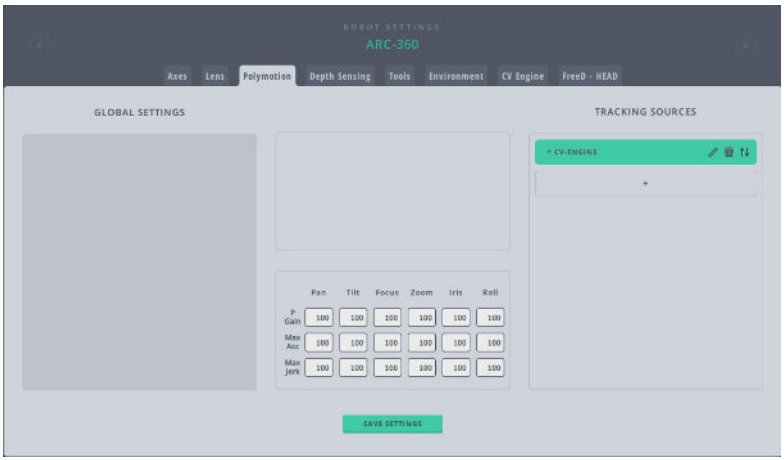
Restore Defaults: Restores to factory default settings.

SAVE SETTINGS: Saves the settings to the current configuration.

Export: Allows you to export the settings to a file. Navigate between heads to save settings for different heads.

Import: Import settings from a file.

Polymotion Tab Settings



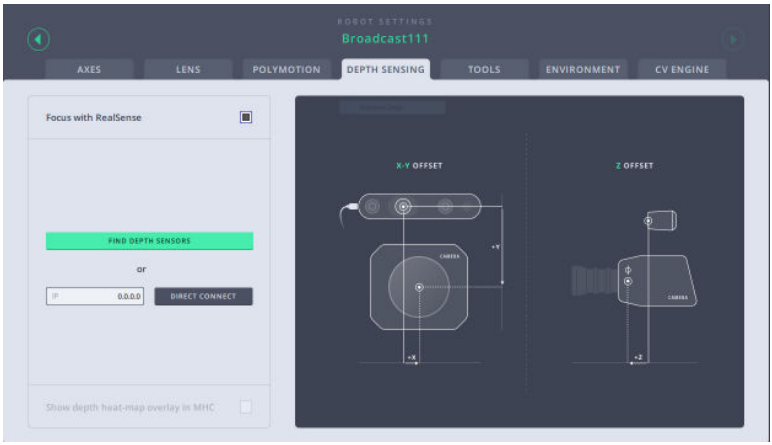
The tracking settings are normally not changed and should be left at '100%'.

Depth Sensing

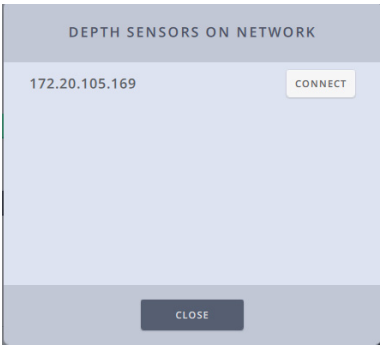
Polymotion Chat 3.0 allows the use of an external depth sensor camera for depth sensing, or sensitivity of the tracking based on the subject moving towards or away from the camera. To start using a depth sensor, mount it on the camera as required and connect it to the same network as the robotic head using a static IP address.

1. Navigate to → **Robot** → **Depth Sensing**.
2. Select **Focus with Depth Sensor**.

3. Select **FIND DEPTH SENSORS** to automatically detect the connected sensor.



4. When the sensor is detected, click **CONNECT** and then click **CLOSE**.

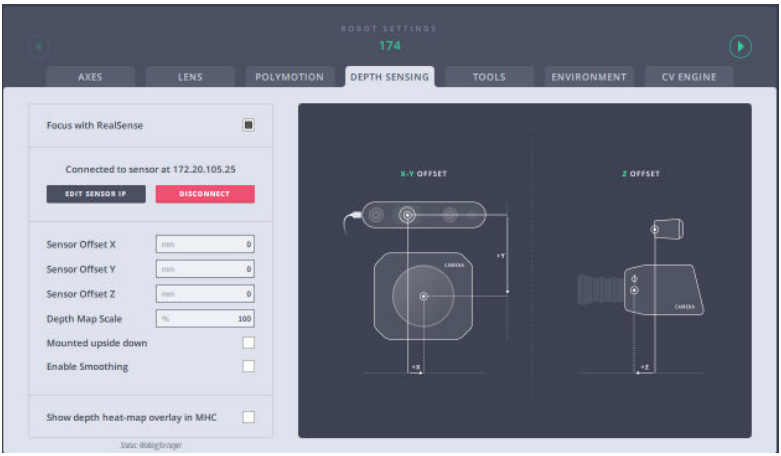


5. You can instead enter the IP address of the depth sensor and click **DIRECT CONNECT** to add it manually.

6. Specify if the depth sensor is mounted upside down relative to the camera.

7. Once connected, specify the X, Y and Z camera offset values. The on-screen diagram represents the position of depth sensor with respect to the camera. If the depth sensor is mounted upside down

in relation to the camera, the diagram would reflect this. Use the diagram to help you measure the offset values.

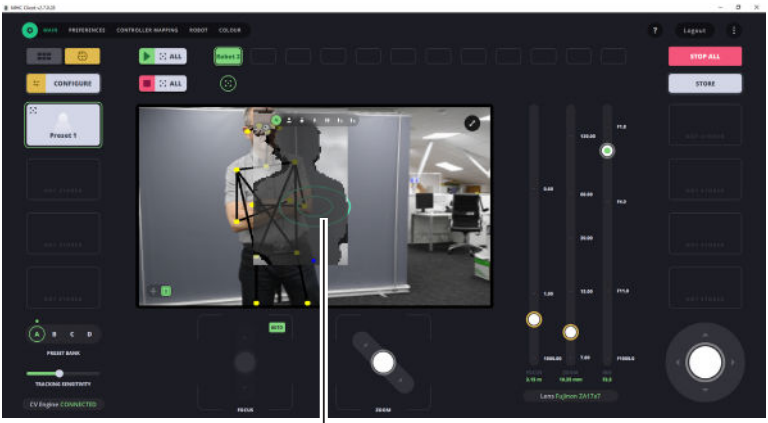


Once configured, these values do not need to be changed if the hardware configuration of the camera remains the same.

> Note
>
> The IP address of the depth sensor can be changed, in the same way the IP address of the robotic head can be changed by clicking the EDIT SENSOR IP button.

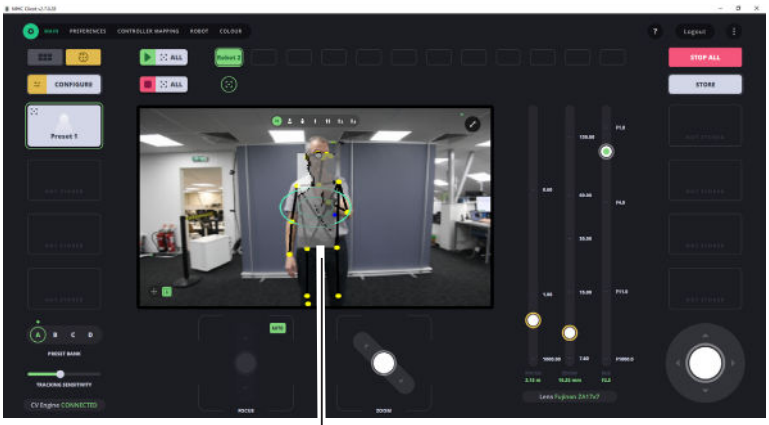
Aligning the Depth Sensing Heat Map

After you have configured the depth sensor, a heat map appears overlapping the image of the target, as follows.

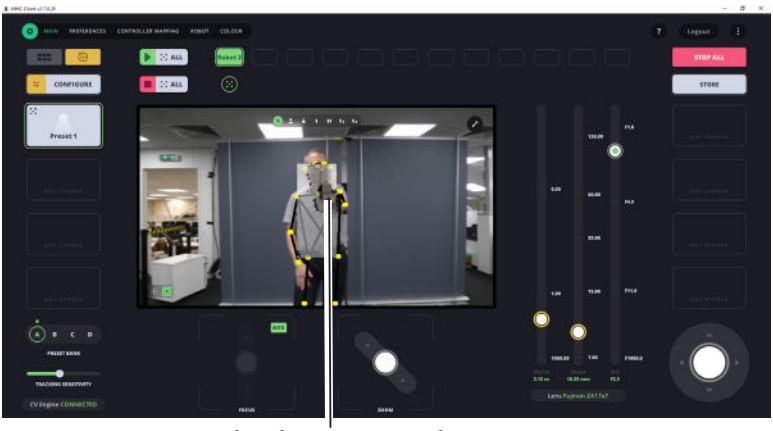


Heat map not aligned

For accurate auto focusing using depth sensing, the heat map should exactly overlap the subject image from the camera. Notice that the heat map is slightly offset from the subject camera image. Adjust the physical position of the depth sensor position until the person in the video is aligned with their silhouette in the heat map. Adjust the depth sensor position until this is achieved. Lens table is must be set up for depth sensing to function accurately.



Heat map aligned



Blue dot stays central

Note

Depth sensing currently works only when there is a single target in the frame.

Polymotion Chat API

Third party software applications can now use an API to control Polymotion Chat. Broadcast studio robotic heads including MRMC robotic heads that are controlled using an existing software can use an API for Chat for subject tracking over the network from the same interface. For more information on how to use an API, contact MRMC.

Appendix 1 **Installation and Backup**

System requirements for Polymotion Chat Studio

- Dell 1U or 2U server
- OS: Windows 10 Pro
- CPU: i9-12900 Processor
- GPU: Nvidia RTX A4000
- RAM: 32GB - advise filling the full width of the memory bus
- SSD: 512GB+
- HDD: 1TB+
- Video Ingest: AJA UTap or Blackmagic Decklink card
- Motherboard or PCIe graphics card with support for OpenGL v4.3+

Installing Polymotion Chat

1. Set up the PC with a static IP address.
2. Using Black Magic Desktop Video setup software to reconfigure all the connectors on your Decklink card to be inputs.
3. Install the two main components of the Chat system, CV Engine and Polymotion Launcher. Use the correct installers depending on the system targeted for deployment:
    - Installer files required for Dell Server based Chat System [Approx. 2.5GB]
        - MHCPolymotionLauncherSetup_x64-v3.3.x.0
        - CV-Engine_Setup_Server_v3.3.x.0.exe
        - CV-Engine_Setup_Server_v3.3.x.0-1.bin
        - CV-Engine_Setup_Server_v3.3.x.0-2.bin

Configuring the Polymotion System

Steps in this section are performed by MRMC as part of the factory settings. However, operators can use these as a reference when troubleshooting any issues should they occur.

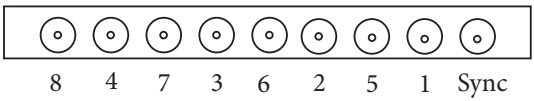
Configuring the Blackmagic DeckLink cards

If you are using Blackmagic Decklink cards for receiving the video feed in your Dell 2U server, ensure that the DeckLink receiver in the media server is configured for receiving the SDI feed from the connected cameras.

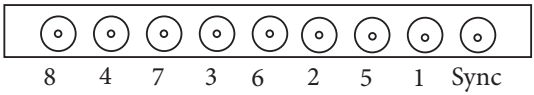
For optimum performance of the Polymotion system, you can have up to five SDI channels connected to the media server.

The port numbers configured by MRMC in the DeckLink cards (from left to right) are:

Card 1



Card 2



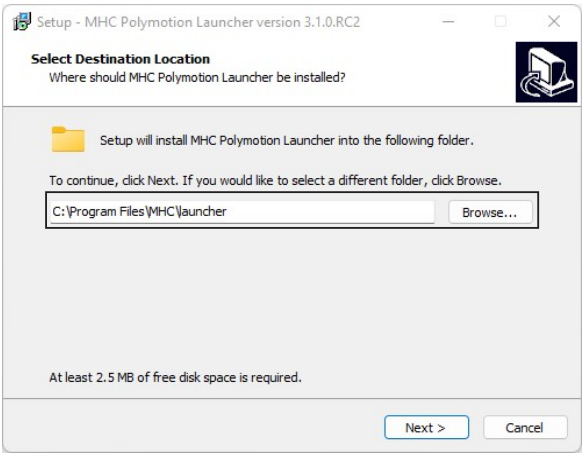
If this data does not accurately appear or does not correspond to the cards that are actually cabled to receive a video input from a camera, then refer to the Troubleshooting section for a workaround.

Installing Polymotion Launcher

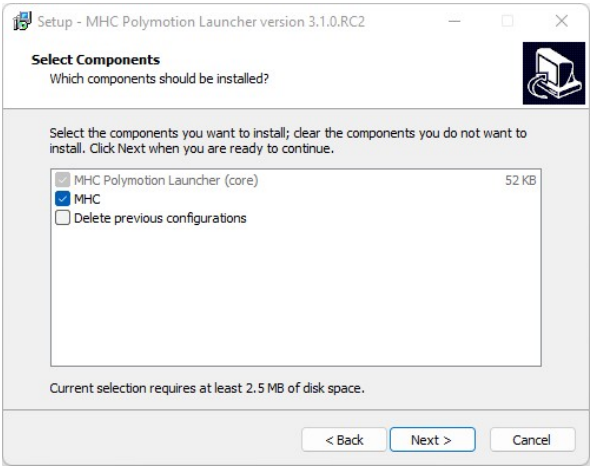
> Note
>
> This procedure is for a fresh installation of Polymotion Launcher v3.3.x or upgrading from v3.3.x. If you are upgrading from a Polymotion Launcher v2.8, refer to *Upgrading from Polymotion Chat v2.8 to v3.3.x* on page 70.

Polymotion Launcher is a utility that allows you to install additional instances of MHC corresponding to each Polymotion system, such as Polymotion Chat and Polymotion Player. Follow the instructions to install Polymotion Launcher:

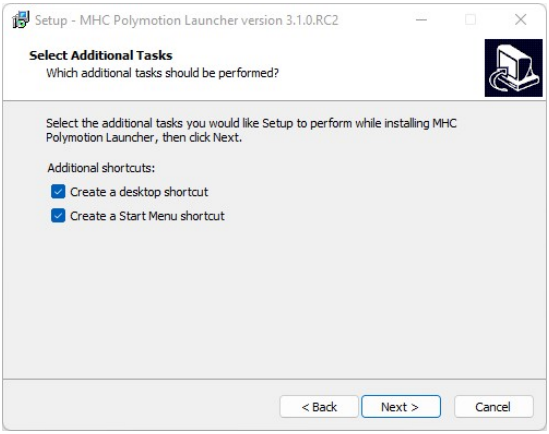
1. Double-click **`MHCPolymotionLauncherSetup_x64-v3.3.x.0.exe`** to launch the installer.
2. If not already removed, delete the MHC Server and MHC Client shortcuts from the Desktop screen.
3. Specify the location of the MHC application on your hard drive. By default it is installed in **C:\Program Files\MHC\Launcher**. Click **Next**..



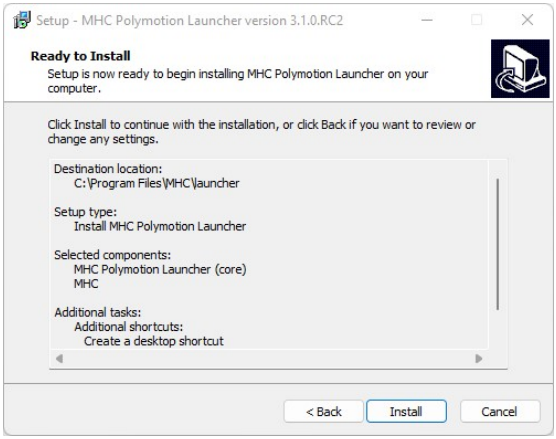
4. On the next screen, select MHC. Click **Next**.



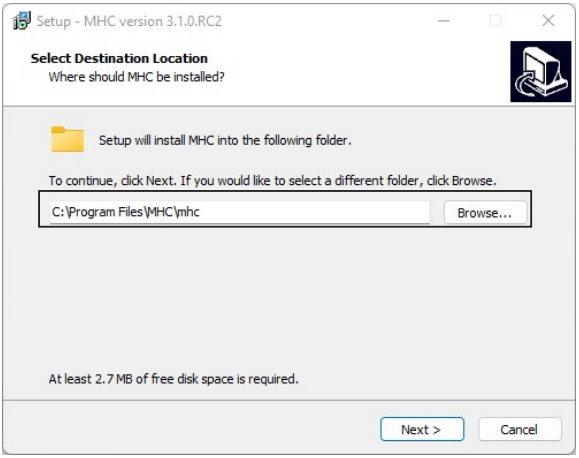
5. Click **Next**.



6. The next screen summarises the components selected for install. Click **Install** to install the MHC Polymotion Launcher (Core) - the default component of all Polymotion products.

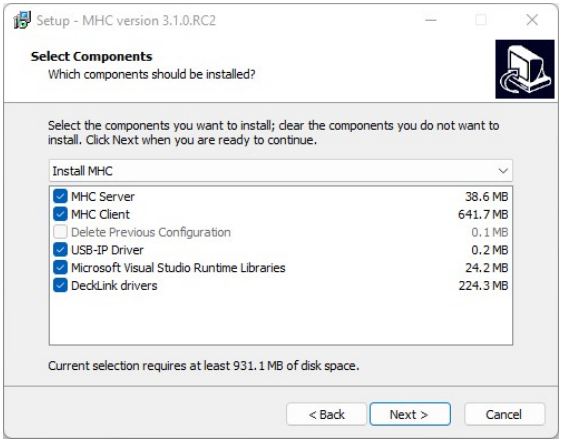


7. Ensure that you choose the install location as one within the MHC folder to install MHC. Click **Next**.

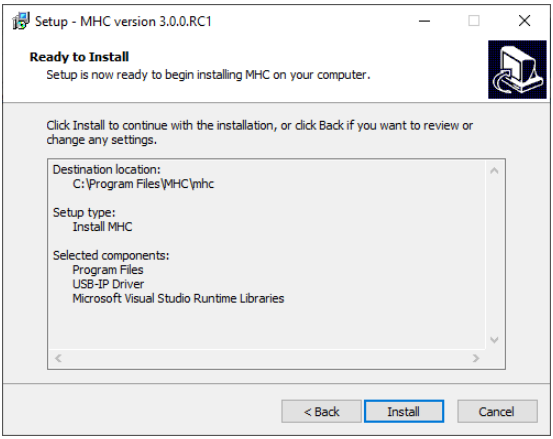


8. Specify whether the installation is upgrade or a new installation and select components to install. The installer auto-selects the components depending on whether its a new installation or an

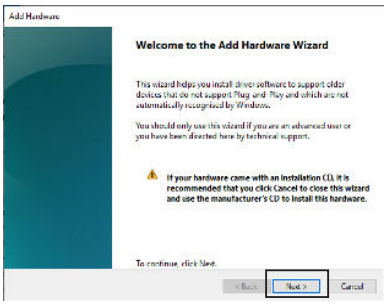
upgrade. You can also choose to do a **Client-only** installation in this dialog box.

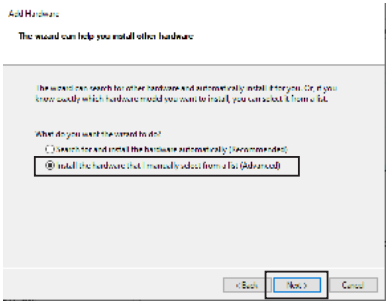


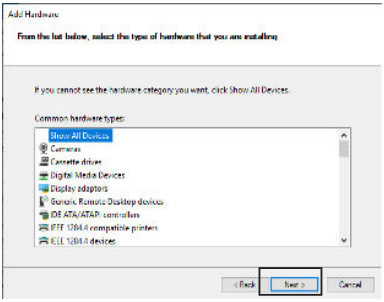
9. The next screen shows the components that are ready to be installed.

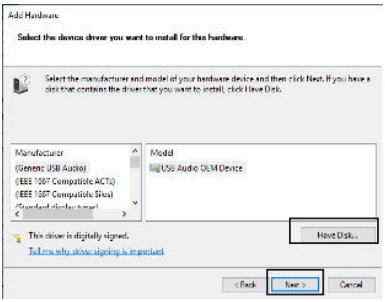


10. Follow the on-screen instructions.

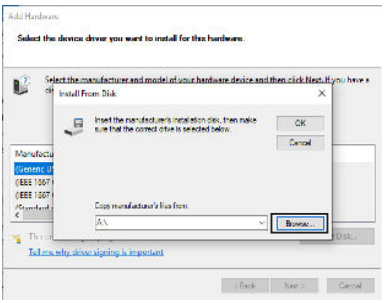


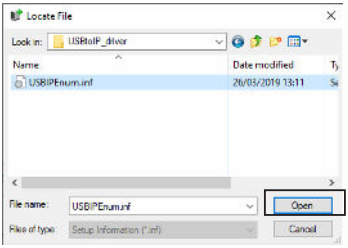


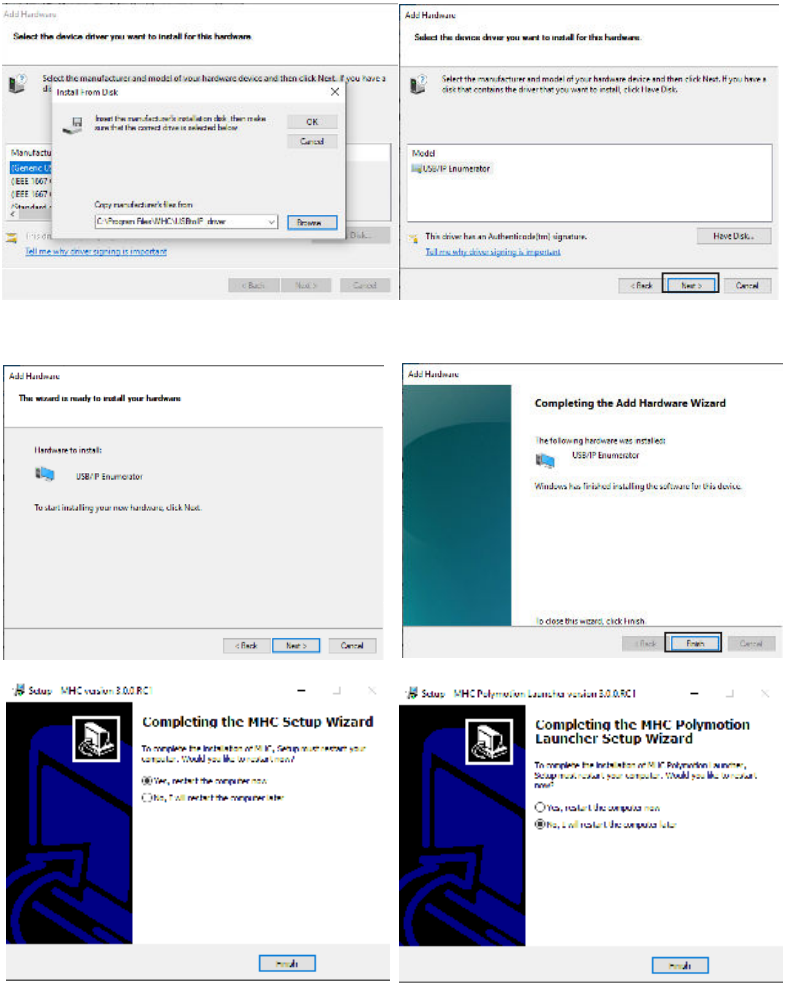




11. Click **Browse** and navigate to `C:\Program Files\MHC\USBtoIP_driver\USBIPEnum.inf`.



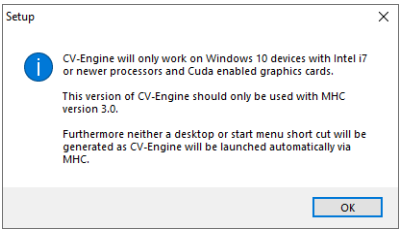




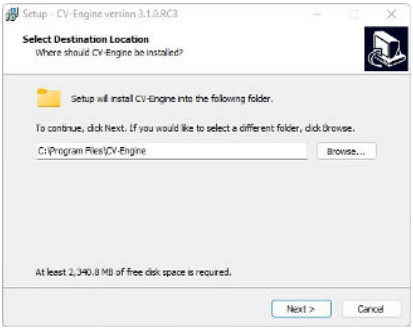
Installing CV Engine

1. After installing Polymotion Launcher, double-click **`CV-Engine_Setup_Server_v3.3.x.0.exe`** to start the installation. When a message appears asking for confirmation, click **Yes**.

2. Click **OK** on the Setup message.

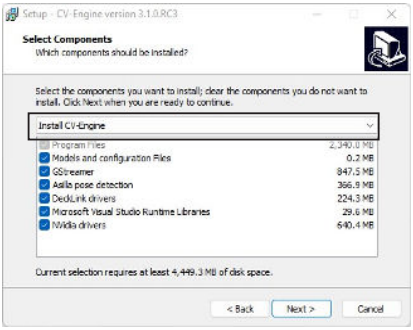


3. Select the installation folder and click **Next**. You should normally not need to change the default path.

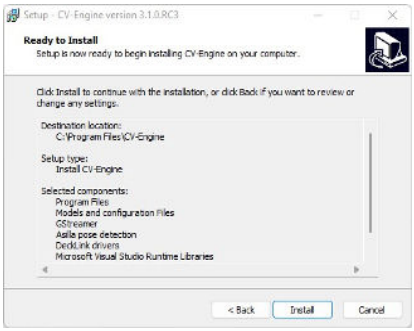


4. Click **Yes** if a message appears that the folder already exists.

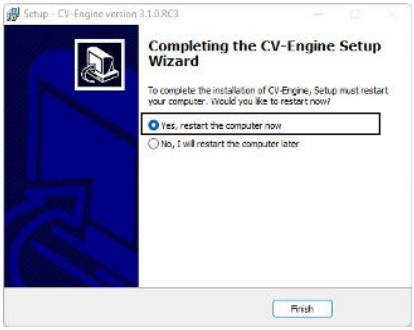
5. Click **Next** to conform installation of all the components. If this is not a new installation and you want to upgrade an existing installation, select Upgrade CV Engine from the dropdown list.



6. Click **Install** on the next screen of the installation wizard.

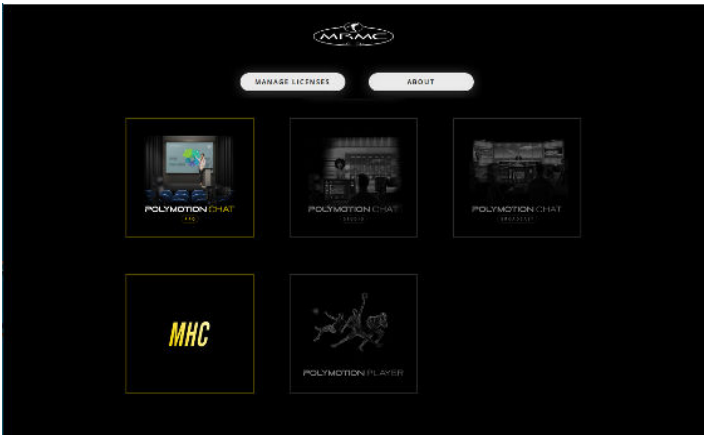


7. It is recommended that on the final screen you select the option to restart the computer and click **Finish**.

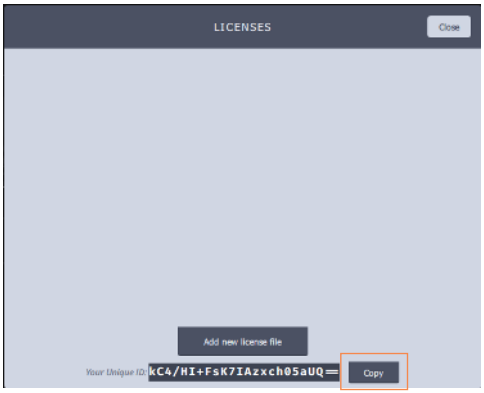


Licensing your Polymotion Product

If you have recently installed MHC, when you launch MHC Polymotion Launcher, click **Manage Licenses**.



On the Licenses window, click the Copy button the bottom of your MHC screen to copy the UID and paste it your license request including any other products such as Polymotion Chat or Polymotion Player to broadcast.support@mrmoco.com.



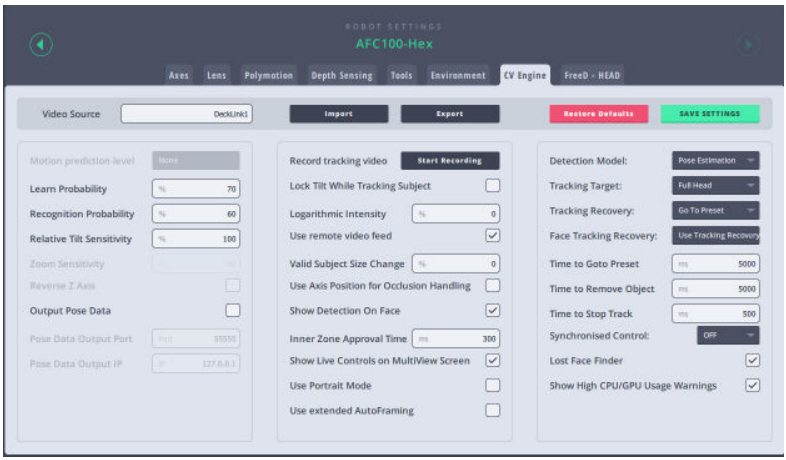
On the receipt of your license file, save it on to the disk, launch Polymotion Launcher. Click the **Add new licence file** button and select the new license file. Once the license is added, you will be ready to use the product.

Upgrading from Polymotion Chat v2.8 to v3.3.x

1. Before installing the new version of Chat ensure that you backup your existing MHC and CV-Engine folders.
2. Uninstall MHC and CV-Engine using 'Apps & features' in Windows Settings.
3. Copy the installer files for MHC and CV-Engine together into a single folder on the target machine.
4. Run installer **`CV-Engine_Setup_Server_v3.3.x.0.exe`** (install to new folder).
5. Run installer **`MHCPolymotionLauncherSetup_x64-v3.3.x.0.exe`** (install to new folder).
6. To keep the existing configuration from v2.8, copy all **`.xml`** files from the MHC v2.8 backup in the **`MHC\<mhc product>\Server`** folder to the new MHC 3.3.x installation at **`MHC\<mhc product>\ServerConfig`** folder (For example **`MHC\Chat Studio\ServerConfig`**).
7. Start Polymotion Launcher from the desktop icon created during install.
8. As this is a major software version update, a new license is required. Request a new license using the form in the application and install the new license file that you will receive by email using the procedure in *Licensing your Polymotion Product* on page 69.
9. Press the appropriate launch button to start your licensed version of Chat.
10. Check that your robot configuration is correct in the Admin screen.
11. If the configuration is not as expected, close down all running programs and restart the MHC product again using the launcher, this will allow the configuration files to be updated to the new format.
12. Go into Chat Wizard and click on Start CV-Engine for the first robot (if not already started).

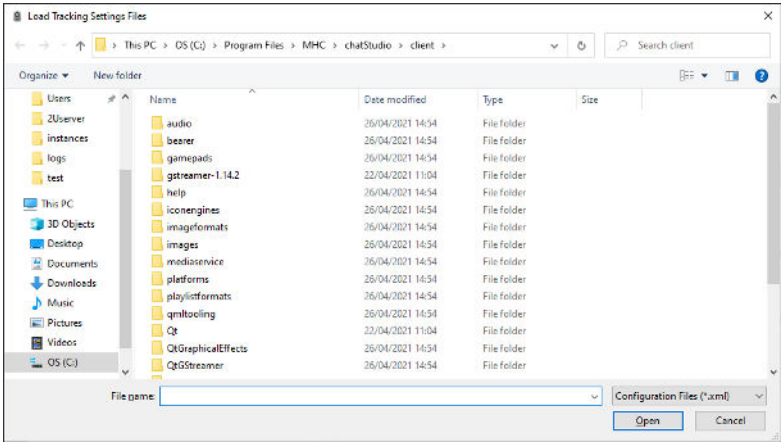
Backup and Restore of CV Engine Settings

The two buttons at the top of CV Engine tab allow you to backup and restore CV Engine settings.



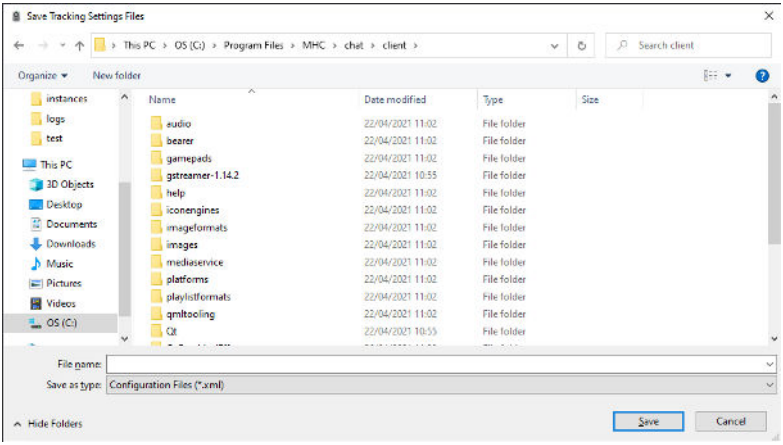
Import

Clicking the Import button opens a new window. If you had already exported your tracking settings for a head as a <***Your CV-Engine config***>**.xml** file using Export button before, you can import the exported settings.



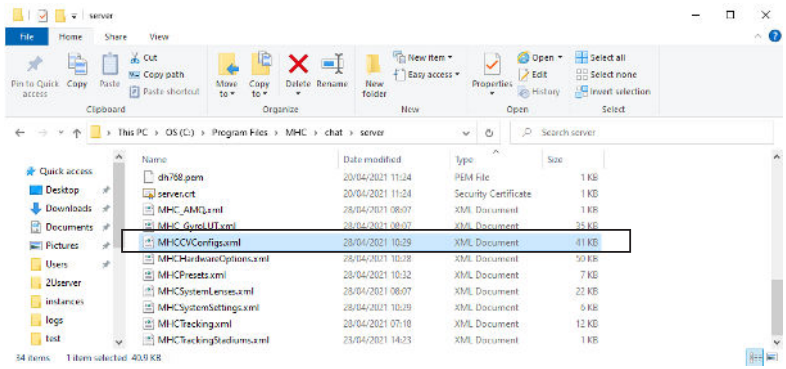
Export

When you want to back up your current tracking settings, you can export an XML file using the Export button. Later, you can load the settings using the Import button. Note that the Chat software version from which you exported the setting must be identical to the one you import.



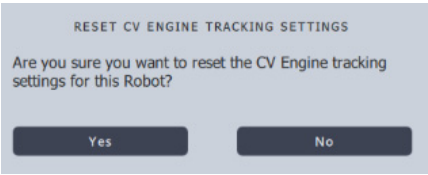
Save Config

Clicking Save Config button will save CV Engine settings in <***path to MHC server***>**\MHCCVConfigs.xml**. If you want to back up current tracking settings of all heads and load it up later, you can copy **MHCCVConfigs.xml**, and load settings later using the Import button.



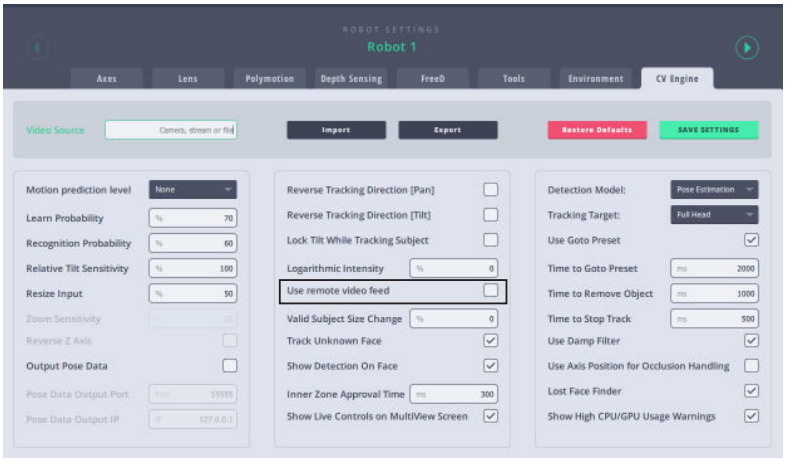
Restore Defaults

After clicking the Restore Defaults button, you will be prompted for confirmation if you really want to reset all CV Engine config. A confirmation will remove all your current settings and restore factory default values. So remember to export the settings if you need a backup because “MHCCVConfigs.xml” file saved by “SAVE SETTINGS” button will also be cleared up.

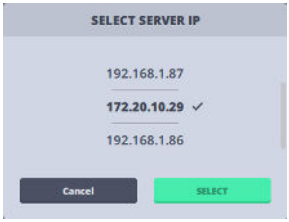


Remote Client Configuration

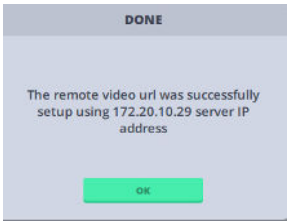
1. Install MHC as normal on the MHC Server machine and note that machine's IP address.
2. Install MHC with the “Client only” option on the remote client.
3. Start up client and server on their respective machines.
4. In the CV Engine tab of a MHC client, select Use Remove Video Feed.



5. If multiple servers are detected then a popup will appear to select the desired MHC server IP. Select the correct MHC server and click **SELECT**.



However, if there's only one MHC server detected, a confirmation popup appears.



MHC has now automatically configured remote video feeds for all robots.

6. Go to Chat wizard and setup the required video input feed in to CV-Engine.

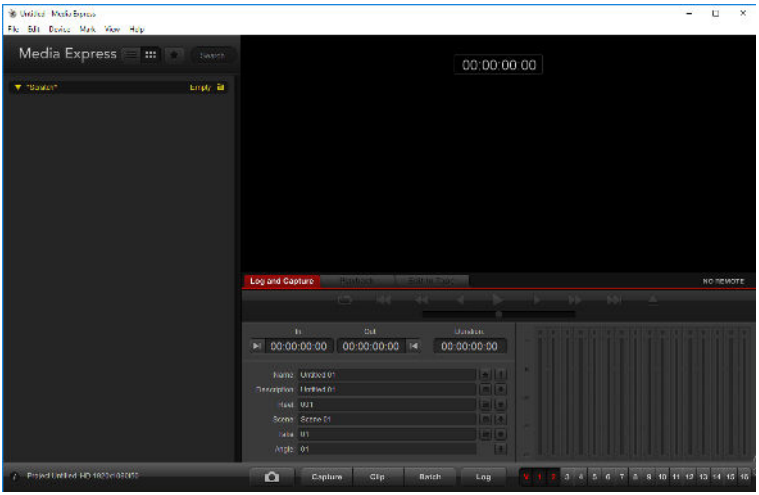
Notes

Appendix 2 **Troubleshooting**

Resolving Video Feed issues

Blackmagic Media Express can be used to verify that decklink video feeds are connected to the correct input ports. Use the device menu to switch between inputs and view the incoming video feeds. Make sure that incoming video format is compatible with the installed Blackmagic Video Ingest card:

1. Open Blackmagic Media Express from the Windows Start Menu.
2. Select **Device> DeckLink Duo (n)**, or the port that has connection issues.
3. Select **Log and Capture** tab.

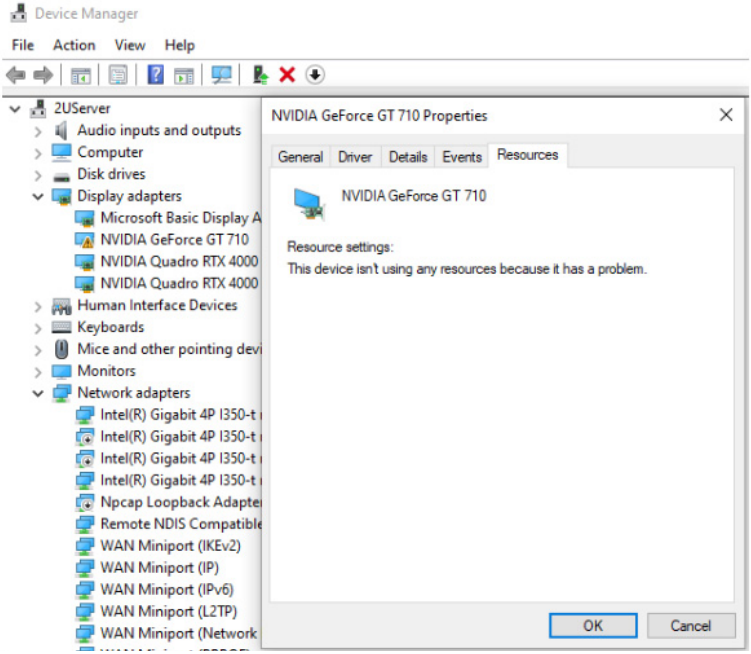


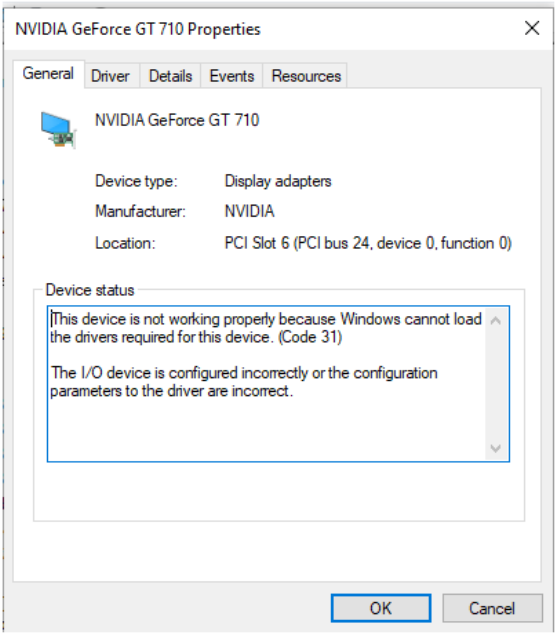
Step through the other ports to find a misplaced video feed.

Graphic Card Device Driver Issues

The CV Engine install restarts your system and after this has happened you should verify in the Device Manager display adapters that your cards

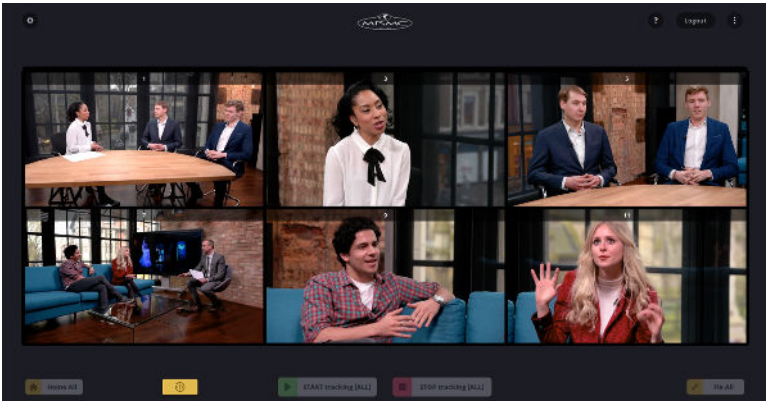
are not showing driver errors like the one below. If they are, then uninstall the device driver and then restart your machine.





Typical symptoms, causes, and actions

Symptoms	Cause and/or action
Warning appears that the tracking source is disconnected. MHC server is shut down but CV engine is still running.	Force CV Engine close via Windows Task Manager
USB Camera selected but Chat system not able to receive video.	Check Windows Firewall settings are not blocking the USB cameras.



Mark Roberts Motion Control Ltd.
Unit 3, South East Studios, Blindley Heath, Surrey RH7 6JP
United Kingdom
Telephone: +44 (0) 1342 838000
info@mrmoco.com
www.mrmoco.com