ImmersaView® SimVisuals™®

User Guide

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Chapter 1. Introduction

Thank you for selecting ImmersaView SimVisuals, the professional solution for geometric correction and edge blending with exceptional performance and usability.

ImmersaView SimVisuals is designed to give you control over your projected image, allowing you to:

- Project onto curved, flat and domed surfaces
- Blend multiple projectors together to create a seamless display
- Create overlap regions in spanned displays
- Project from difficult angles and different positions

It is designed to operate with all applications on Microsoft® Windows 7/Windows 8 and real-time graphical applications for Microsoft® Windows XP and Vista.

Application areas include:

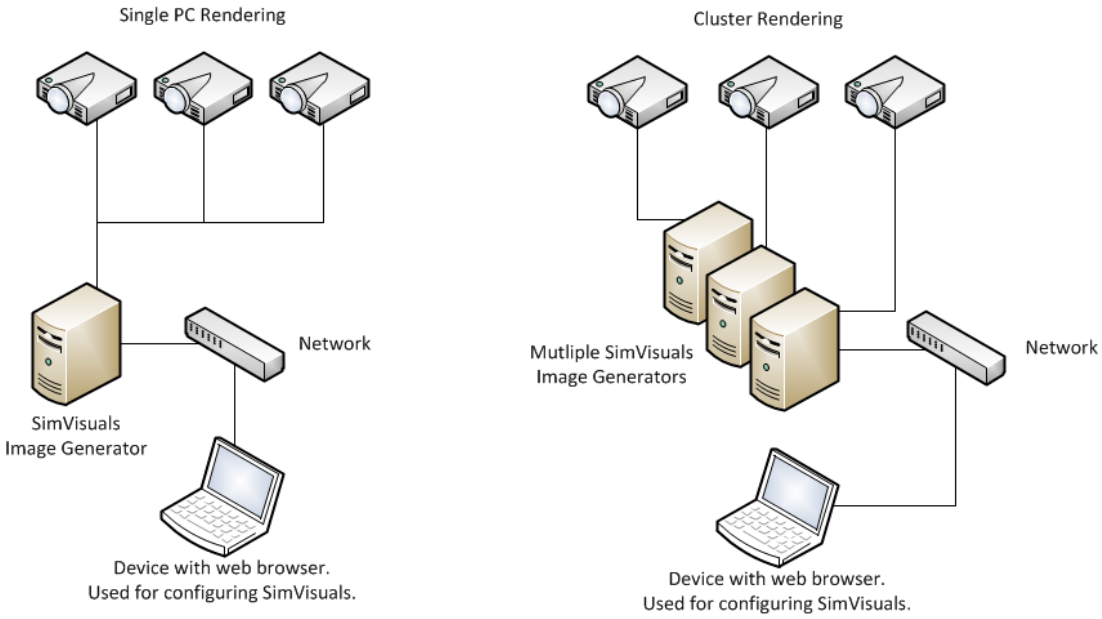
- Simulation
- Visualization
- Command control rooms
- Collaborative environments
- Museums and live events
- Houses of worship
- Immersive entertainment

This user guide describes the installation and operation of the ImmersaView SimVisuals software. We hope you enjoy using it as much as we've enjoyed creating it.

For further information please contact us at sales@immersaview.com

Chapter 2. Network Layout

SimVisuals allows you to remotely configure the display on computers that are responsible for Image Generation. This is made possible by using a web interface that communicates with SimVisuals, aligning multiple projectors to create a seamless display. For this reason, the computers used to drive the projectors must be networked.



It is possible to configure SimVisuals on the computer used to drive the displays; however this can disrupt the display alignment process. Configuring SimVisuals from a remote computer is recommended, and provides the added benefits of being able to:

- control multiple SimVisuals PCs remotely, from one web browser
- configure SimVisuals while a full screen application is running
- configure SimVisuals from a display without the effects of warping

As a web interface is used by SimVisuals, a number of devices can be used to configure the display such as laptops, tablets and smartphones. Essentially, all that is needed is a device that can connect to the internet.

Chapter 3. Installation

This chapter describes the installation process, minimum system requirements and licensing terms of ImmersaView SimVisuals.

3.1. System Requirements

SimVisuals uses the graphics card to perform processing and we recommend purchasing at least a mid-level graphics card for best results. See Table 1 below for a list of supported graphics cards.

The minimum requirements to run SimVisuals are:

- PC with 233 MHz CPU or higher
- Microsoft Windows XP, Windows Vista, Windows 7 or Windows 8 with a supported video card
- 128 Megabytes (MB) of RAM or higher
- 18 Megabytes (MB) of available hard disk space or higher
- Keyboard and mouse with a scroll wheel, or compatible pointing device.

The graphics card must support 3D accelerated graphics.

TABLE 1: SUPPORTED GRAPHICS CARDS

Range	Series	Examples
NVIDIA GeForce	FX and up	6, 7, 8, 9, 200, 300, 400, 500, 600 series
NVIDIA Quadro	FX series	FX 380 and up, Quadro Plex
AMD Radeon	9500 and up	9500-9800, X300-X600, X700-X850, X1300-X1950, HD2400-HD2900, HD3000, HD4000, HD5000, HD6000, HD7000
AMD FireGL	V series	V3100+, V5000+, V7100+
Intel GMA	X3000 and up	3100, X3000, X3100, X3500, X4500, HD 3000, HD 4000

TABLE 2: UNSUPPORTED GRAPHICS CARDS

Manufacturer	Graphics cards
Matrox	Parhelia cards, QDI cards
3DLabs	Wildcat VP cards
NVIDIA	Quadro FX "SDI" series

NOTE: Dual-GPU cards and SLI configurations are not supported.

As ImmersaView SimVisuals relies on graphics card performance, there is no set PC system configuration. Depending on the types of applications running during use, it is recommended to have a mid-range specification. This would comprise of:

- PC with 2.0 Ghz or higher processor
- 2 GB or more RAM
- A motherboard with 16x PCI Express slot, such as
    - NForce 500 or higher chipset with NVIDIA graphics, or
    - AMD 480 or higher chipset with AMD graphics
- A graphics card, such as
    - NVIDIA 9800 GTS and above, or
    - NVIDIA Quadro FX 1800 and above, or
    - ATI Fire GL V5600 and above, or
    - ATI HD 2900 and above

SimVisuals has been developed with a web interface that makes configuring display setups easier. For optimal performance of the interface, the following browsers have been tested and are recommended for use:

- Google Chrome
- Mozilla Firefox 10 or greater
- Microsoft Internet Explorer 6 or greater (IE9+ recommended)

If you are using a firewall, SimVisuals operates its web interface on TCP port 5017 and you will need to ensure this port is open. Please note, while standard Android and iOS browsers may work, not all have been tested. If using a mobile device to configure SimVisuals, it is recommended to run one of the above browsers.

3.2. ImmersaView SimVisuals Full Version

The full version of ImmersaView SimVisuals provides full functionality of the product and is licensed with a USB dongle.

3.3. ImmersaView SimVisuals Evaluation Version

The evaluation version is designed to give a brief introduction to the capabilities and benefits of the product. In this version, the warping and edge blending functions are applied for an initial 10 minutes. After this time, progress can be saved and ImmersaView SimVisuals can be restarted in order to gain an additional 10 minutes.

This manual applies to the fully licensed version and the evaluation version.

3.4. Running the Installer

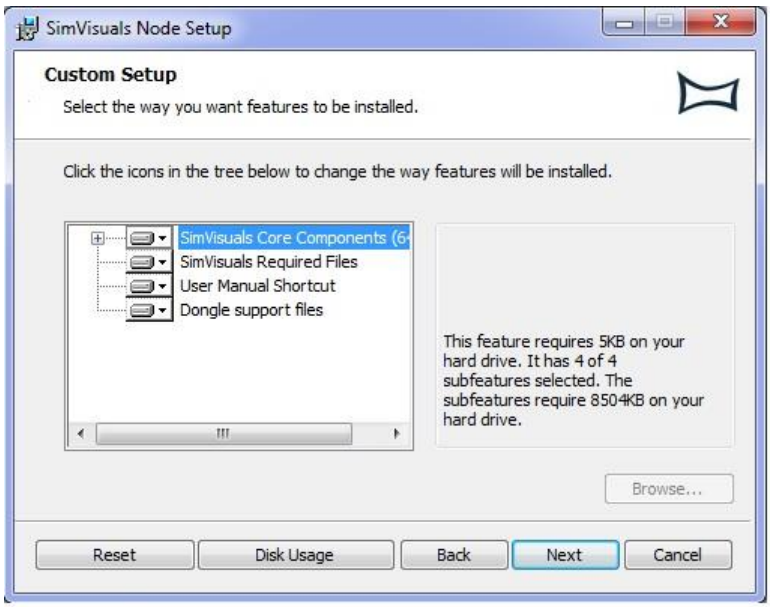
SimVisuals software needs to be installed on all computers that require display correction. In the case of a multi-node cluster (multiple terminals utilized for screen projection), this means that each of the Image Generators connected to a projector will require a SimVisuals installation. SimVisuals does not need to be installed on computers that are being used solely to configure the display settings, as the displays are configured using a web browser.

NOTE: Administrator privileges are required to install ImmersaView SimVisuals. Once installed, the software can be run by any user.

Please read the license agreement before accepting it. This is a legal document that describes the terms and conditions for using ImmersaView SimVisuals.

Upon startup the installer will detect whether you are running a 32-bit or 64-bit operating system and will automatically install the appropriate modules.

After accepting the licensing agreement the 'Custom Setup' box will appear. This will allow you to select the way the features are installed. In most cases, these settings do not need to be changed to install ImmersaView SimVisuals.



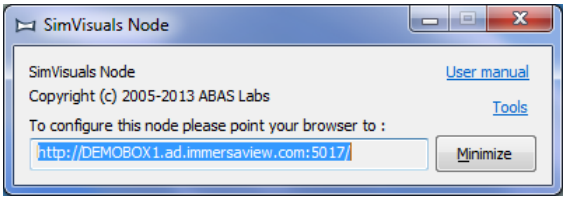
Click 'Next' to install the software. Now you are ready to configure your display.

Chapter 4. Basic Setup

4.1. Starting SimVisuals

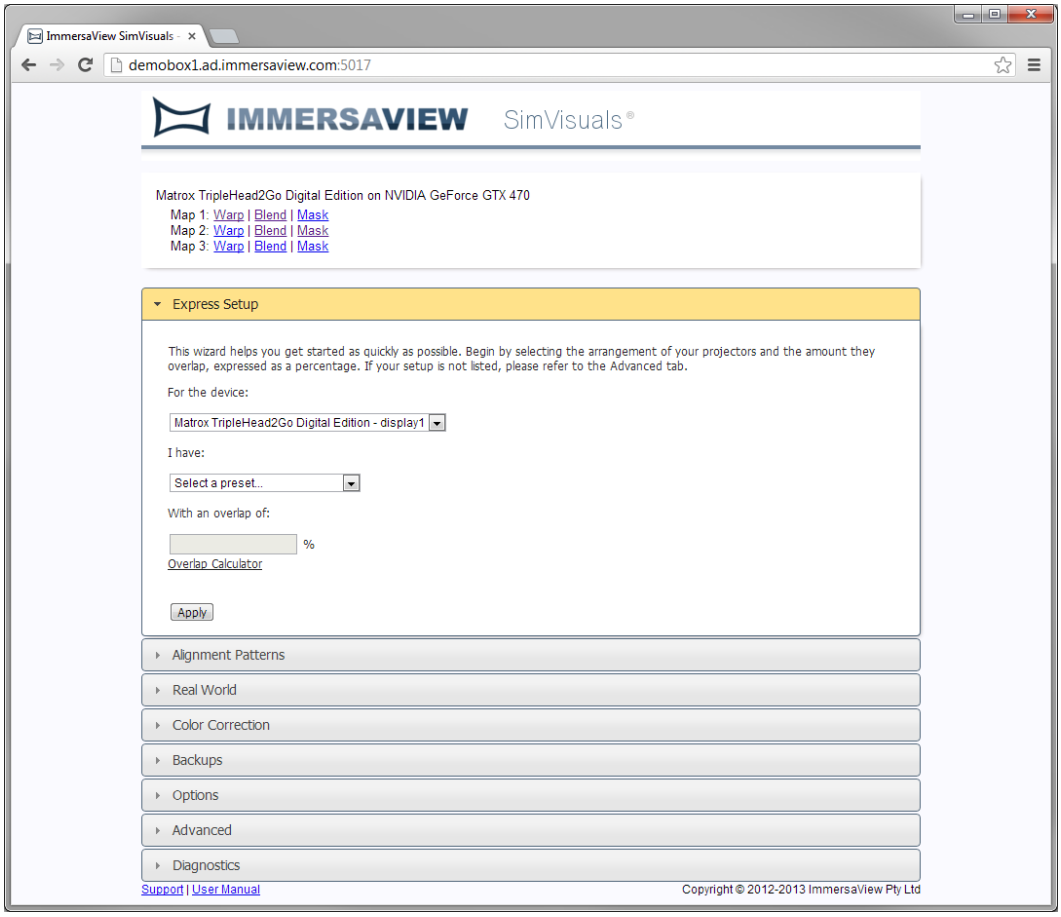
Once ImmersaView SimVisuals has been installed, the software can be launched from the start menu (**Start - All Programs – ImmersaView – SimVisuals Node).** This will need to be done on all machines requiring display correction. Alternatively, right-clicking on the desktop, will access the pop up menu to open SimVisuals.

Upon running SimVisuals for the first time, a dialog box will appear. The URL presented in this box is for the web interface used to configure SimVisuals. To access the interface, enter the address into a browser from the recommended list. You can open the dialog box at any time by clicking the SimVisuals icon in the task tray or by right clicking on the desktop.



In the dialog box, there is a link to the SimVisuals User Manual. This link will open the manual in PDF format. 'Tools' provides the option to choose to enable SimVisuals upon logon. The default setting is to run SimVisuals on startup. To disable this function, click 'Tools' and uncheck 'Run on Startup' in the pop up window.

Please note, due to the interaction between the display and the software, it is recommended to configure SimVisuals from a separate computer located on the same network.



The SimVisuals web interfaced, accessed from the URL.

4.2. Express Setup

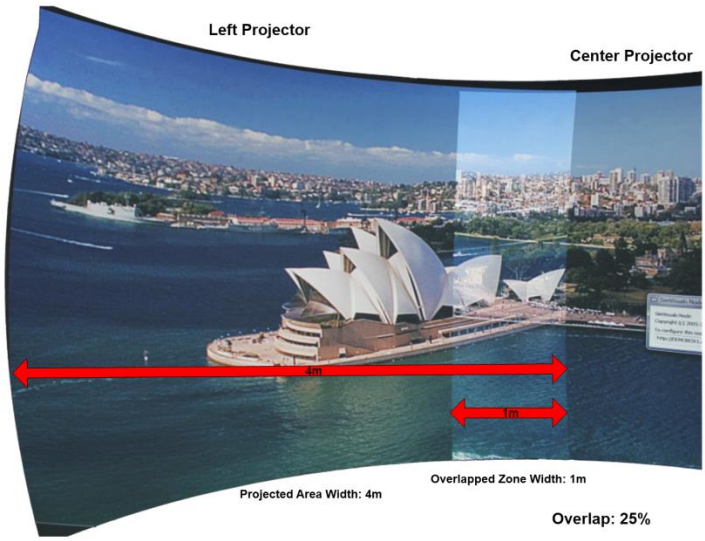
If the display being configured has been aligned previously by ImmersaView software, SimVisuals will check for a previous configuration file and align the screen based on this configuration. This configuration file will then be saved at the default location which can be viewed in the diagnostic report (See Chapter 5.6). If this configuration is not applicable, or this is the first time the computer has been installed with ImmersaView software, Express Setup can be used to align the display.

Select a display device to configure from the "**For the device"** drop down list. This list shows all available display devices that can be configured with SimVisuals.

From the **"I have"** dropdown menu, you can select one of the commonly used configurations. If the required setup is not included in this list, you can manually set up the arrangement of the projectors in Advanced Setup (refer to Chapter 5.5).

The next step is to measure the amount the projected images overlap. To create a seamless display from multiple projectors, the projected images need to overlap each other so that their edges can be blended. This overlap is measured as a percentage and a minimum overlap of 15% is recommended for smooth blends. The larger the overlapping area, the more control there is for the blending functions to merge the projectors.

The overlap percentage can be calculated in SimVisuals by selecting the 'Overlap Calculator' and entering the required measurements. The 'double-brightness area width' is the overlap region of the projectors. Alternatively, if the percentage of the overlap is already known, this can be entered directly into the percentage field.

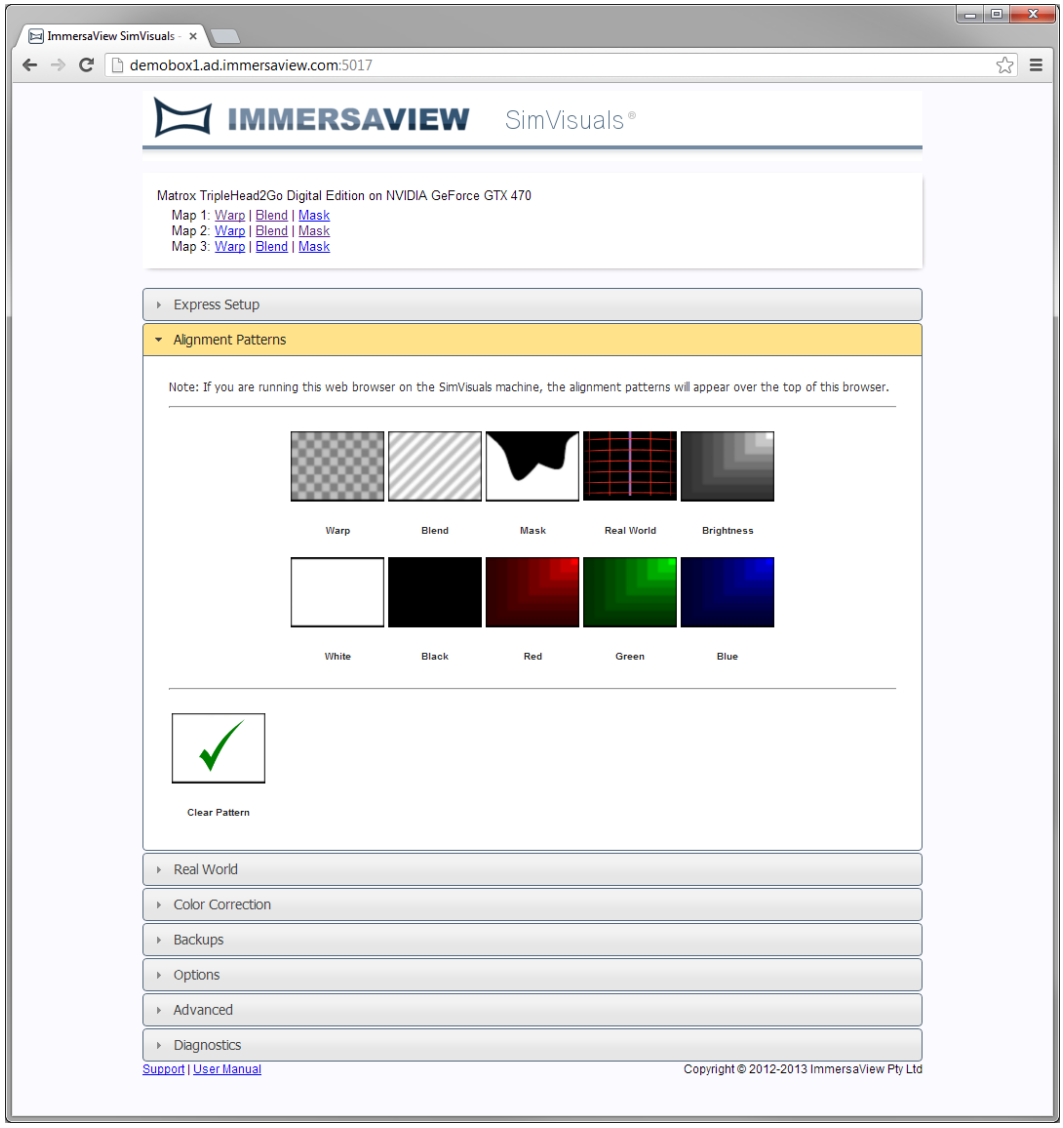


Example!

If the width of the image from one projector is 4m and the smallest overlap (double-bright) area is 1m wide, then the overlap is 25%.

4.3. Alignment Patterns

When blending the display, a point of reference is needed to align the edges of the projectors. For this purpose, a range of alignment patterns can be opened on the display being configured by SimVisuals. These patterns are specifically designed to assist with the different stages of the configuration process and can be launched by simply clicking the desired pattern icon.



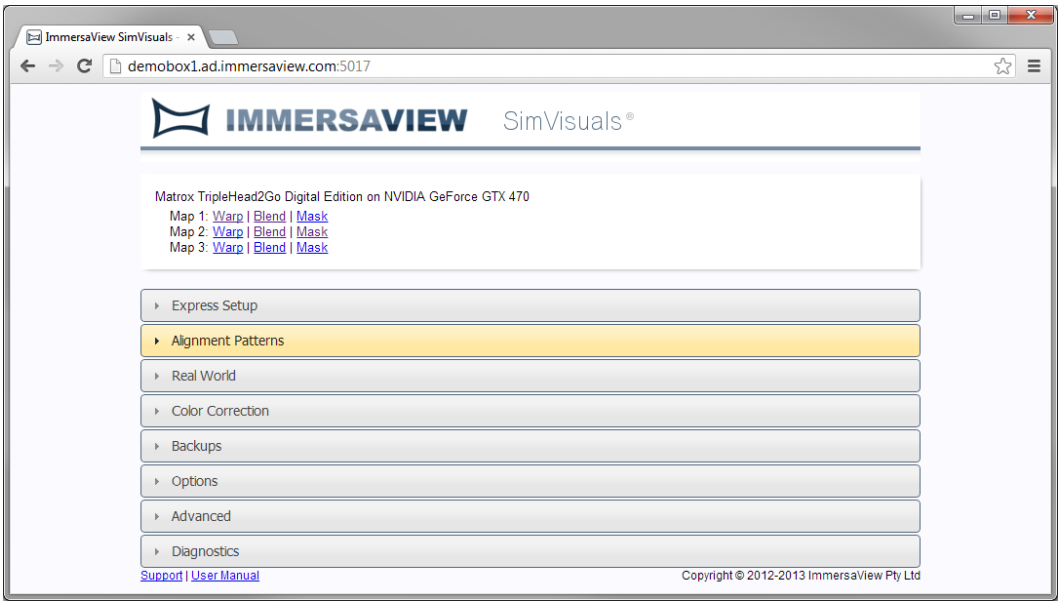
The selected alignment pattern will open in a new full screen window on the display covering any running applications, including the desktop. Therefore, it is recommended to use a different machine to configure the display. One of the benefits of SimVisuals is the web interface that allows the display to be configured from any device that can connect to the internet, including laptops, tablets and smartphones.

Please note, when configuring SimVisuals from the same computer, access to the web interface is limited due to the overlying alignment screen and the display will need to be configured using hotkeys. For more information on the hotkeys, please refer to Chapter 7.

To exit the alignment pattern overlay screen and return to the desktop, select ‘Clear Pattern’.

4.4. Map Configure

After selecting the desired alignment pattern, the projectors need to be aligned to merge the images into a seamless display. A list of devices and map configuration options are available at the top of the web interface.

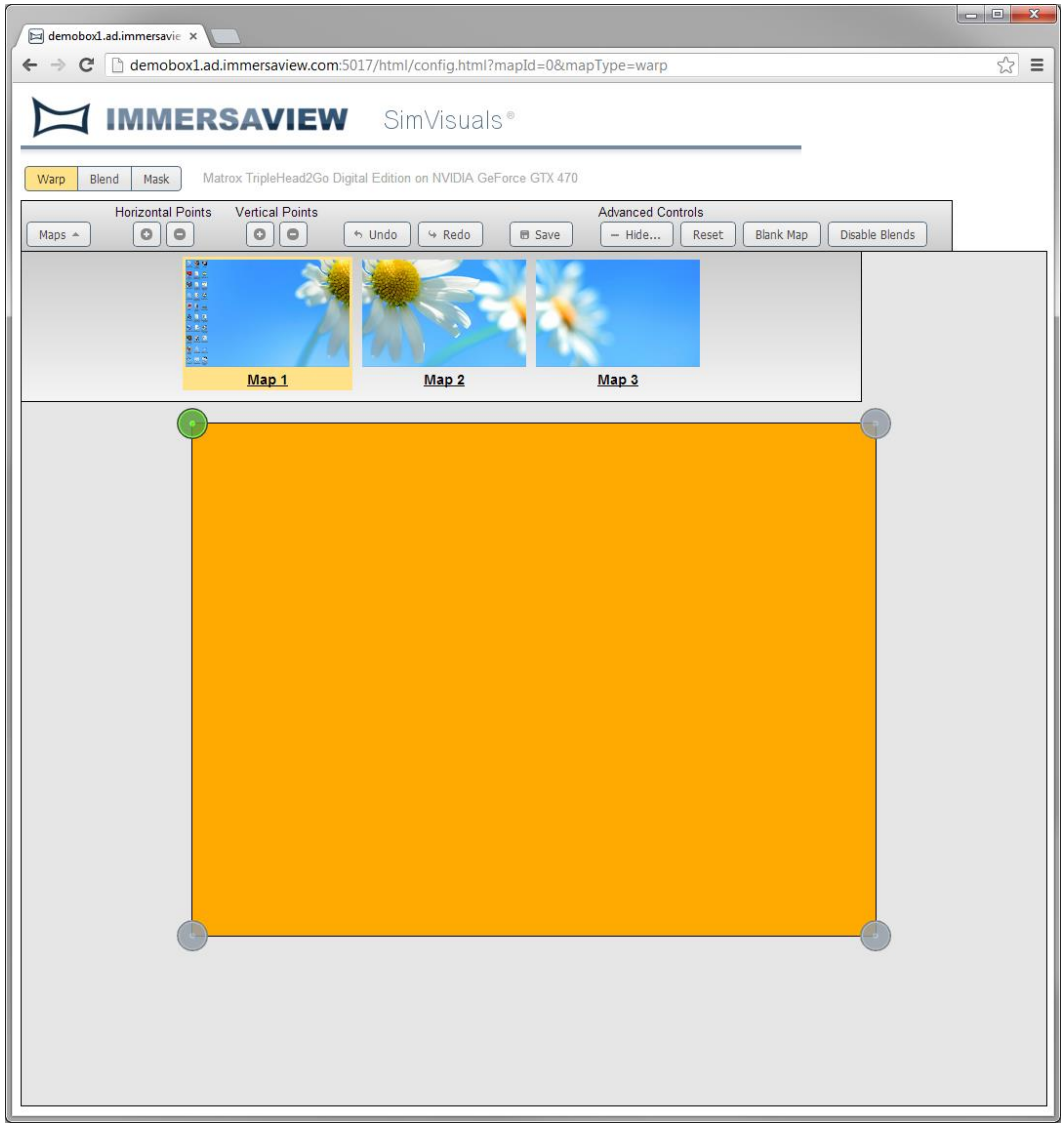


These options allow the user to configure each map's **Warping, Blending** and **Masking** settings.

4.5. Warping

Image warping, or geometric correction, is used to make an image look visually correct when it is projected onto a non-planar surface. SimVisuals offers the ability to perform warping by using a number of control points which can be increased or decreased depending on the complexity of the screen shape. These control points can then be manipulated so an image is aligned correctly to the screen. Warping can also help align the images in the overlap region to create a single seamless display.

To access the warp function for each map, click on the links at the top of the main page of the web interface. The selected map will be highlighted on the display that is being configured to assist in differentiating between maps and provide an outline for how the display will look.



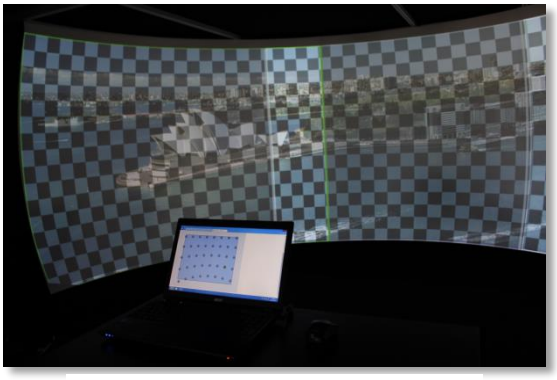
For best results, select the **Warp pattern** from the **Alignment Patterns** tab on the main page. This will launch a checkerboard overlay on the desktop.

Tip!

Remember that you can always return the main page on the web interface by clicking the ImmersaView logo at the top of the page.

The objective is to manipulate the image by moving control points on the map so the pattern appears as a regular checkerboard. When the display has been correctly aligned, each black and white checker will be the same size.

Not corrected. Overlaps do not match



Corrected, overlaps now match

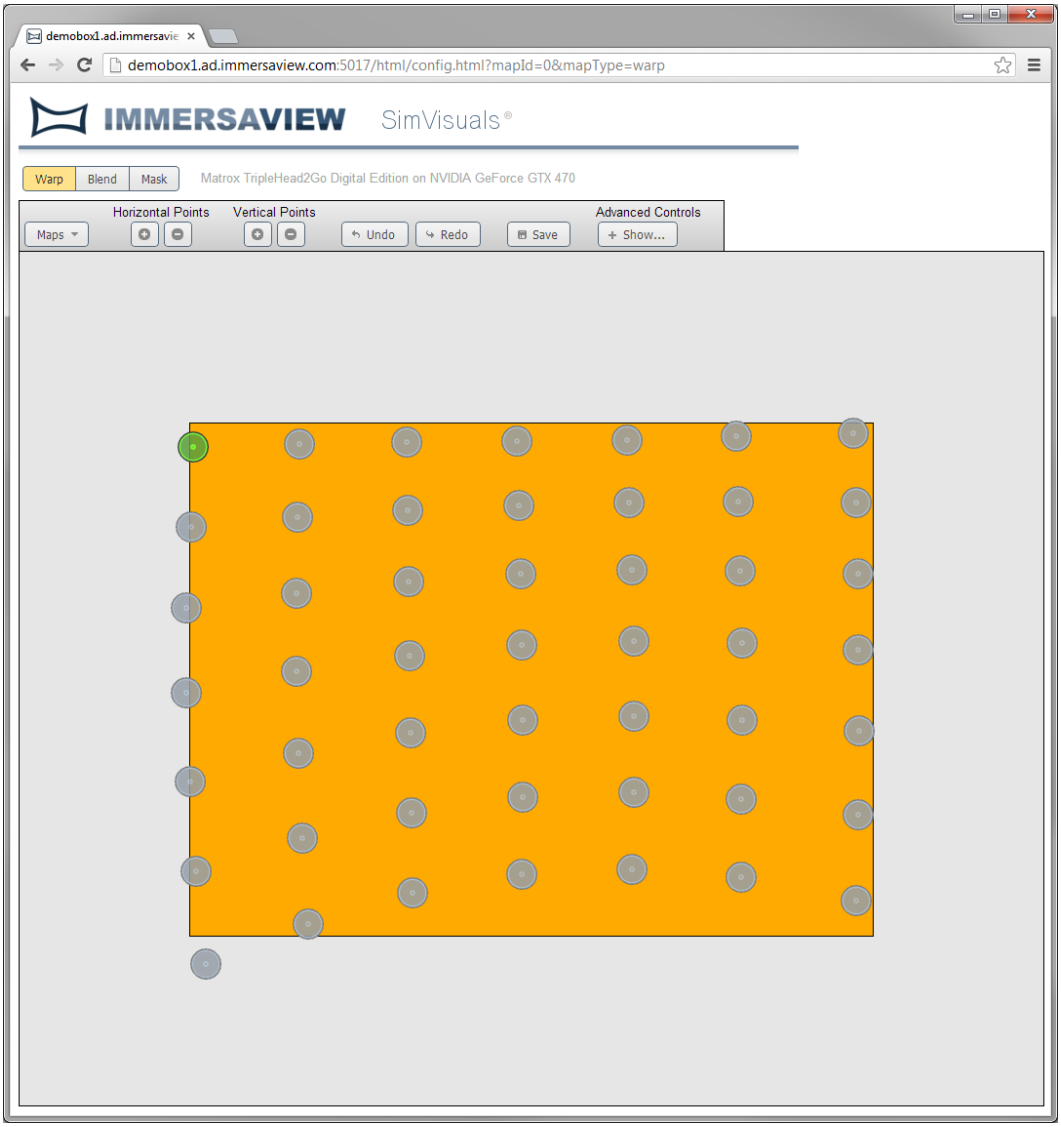
When configuring the display for the first time, a control point will show in each corner of the map, corresponding to points on the display. The current active control point is highlighted in green and can be changed by moving the cursor over another point. Begin by aligning the four corners of the map to match the outline on the display.

To move control points, place the cursor over the point and hold down the **left mouse** button to drag it to the desired position on the map.

Once the corners of the display are aligned, additional horizontal and vertical control points can be added using the button controls above the map.

Tip!

Keep it simple. It is tempting to use more control points than is necessary. For flat walls you may only need four points per map. For curved surfaces, a maximum of nine control points per row or column is recommended. Start with minimal control points and add points as necessary to achieve the required shape



Before adding more control points, check that they are needed as adding excessive points will distort the image further. Too many control points can make the alignment process unnecessarily lengthy and may not provide a better result.

Clicking on the 'Maps' button will produce a drop down window showing all maps in the configuration. Navigate between the maps by clicking on any of the snapshots to move to that map.

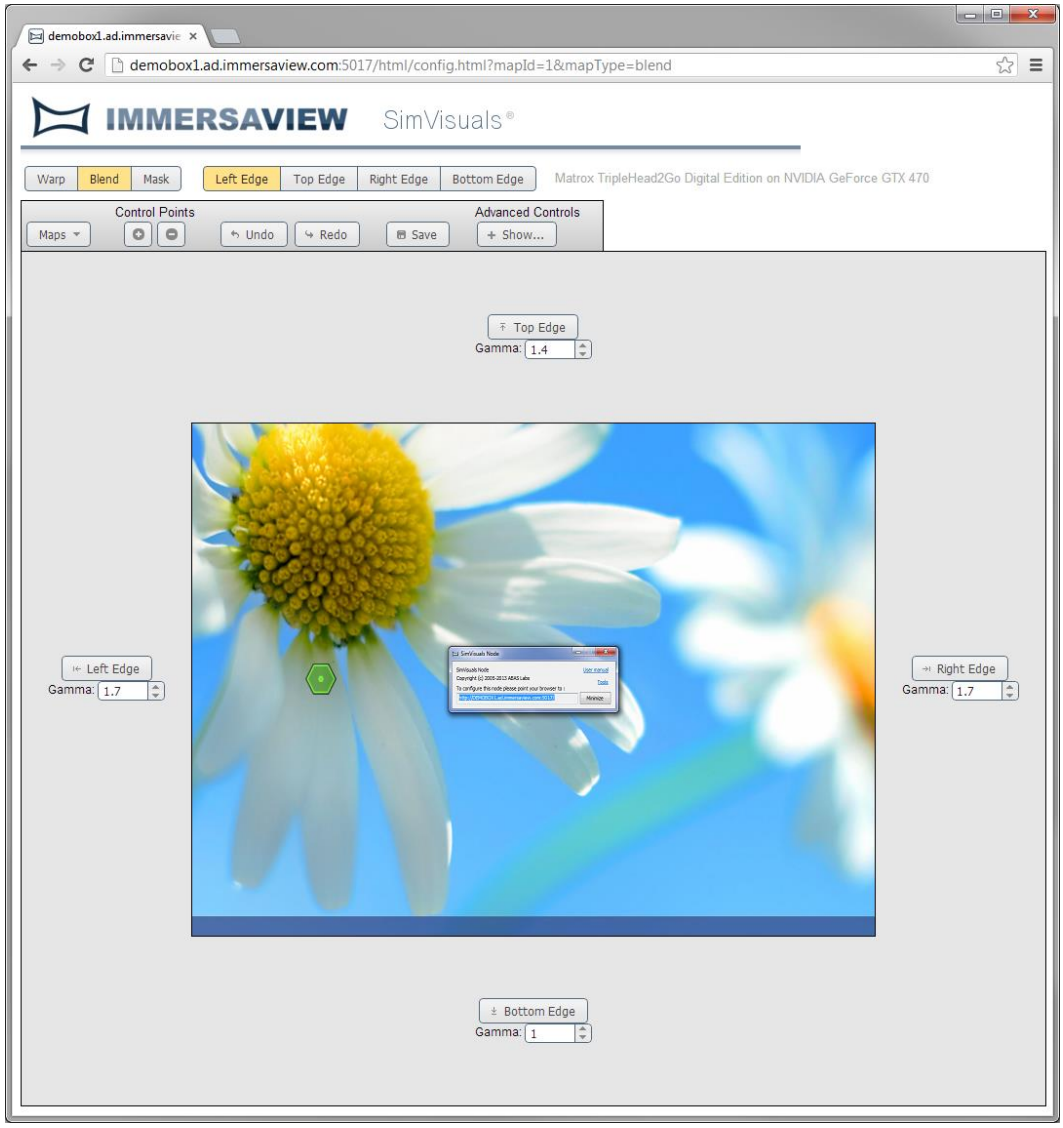
If at any time, a correction needs to be made, the 'Undo' and 'Redo' buttons will go backward or forward one movement. To save the current alignment, click 'Save'. If the alignment needs to be started from the beginning, select 'Show' under Advanced Controls to access the 'Reset' button. This will clear all points from the map except the original four corner points.

4.6. Edge Blending

The process of visually combining several projected images to make a single seamless display is done by edge blending. Whilst warping alters the image to fit the desired display and aligns the image in the overlap region, edge blending is required to smooth out the overlap and adjust the edges to give the appearance of a single display when using multiple projectors.

As seen when aligning the display with the warp function, the overlap region appears brighter than the rest of the display due to the area having the light from multiple projectors. Edge blending can modify the brightness in this region by gradually dropping off the luminance from one side as it is increased from the other. SimVisuals provides the ability to edge blend adjacent projectors so they present a seamless image.

The blending function of each map is accessible by selecting the link at the top of the main page of SimVisuals. Alternatively, navigation buttons are available in the map configuration screen.



SimVisuals software automatically adjusts your blends when the projector arrangement is completed by using the Express Setup. Blends can also be adjusted manually when using a custom projector configuration, or fine-tuning the Express Setup.

Tip!

The key to perfect blends is to first match the projectors:

- Put up a dark scene (i.e. night) and adjust the brightness so all projectors appear equal.
- Put up a light scene (i.e. clouds or fog) and adjust contrast of all to be the same with good distribution.

The 'Blend' map configuration screen is similar to the warping screen; however the control points are set so they can be manipulated per edge. This limits the need to employ multiple control points to correct the image. A control point will be available on the selected side of the map. These points are selected in the same fashion as those on the Warp configuration page. Dragging the point towards the center of the screen determines the width of the edge blended region. Gamma values for each edge can be entered in the numeric fields. A value of **1.7** is the most common and acts as a good initial value.

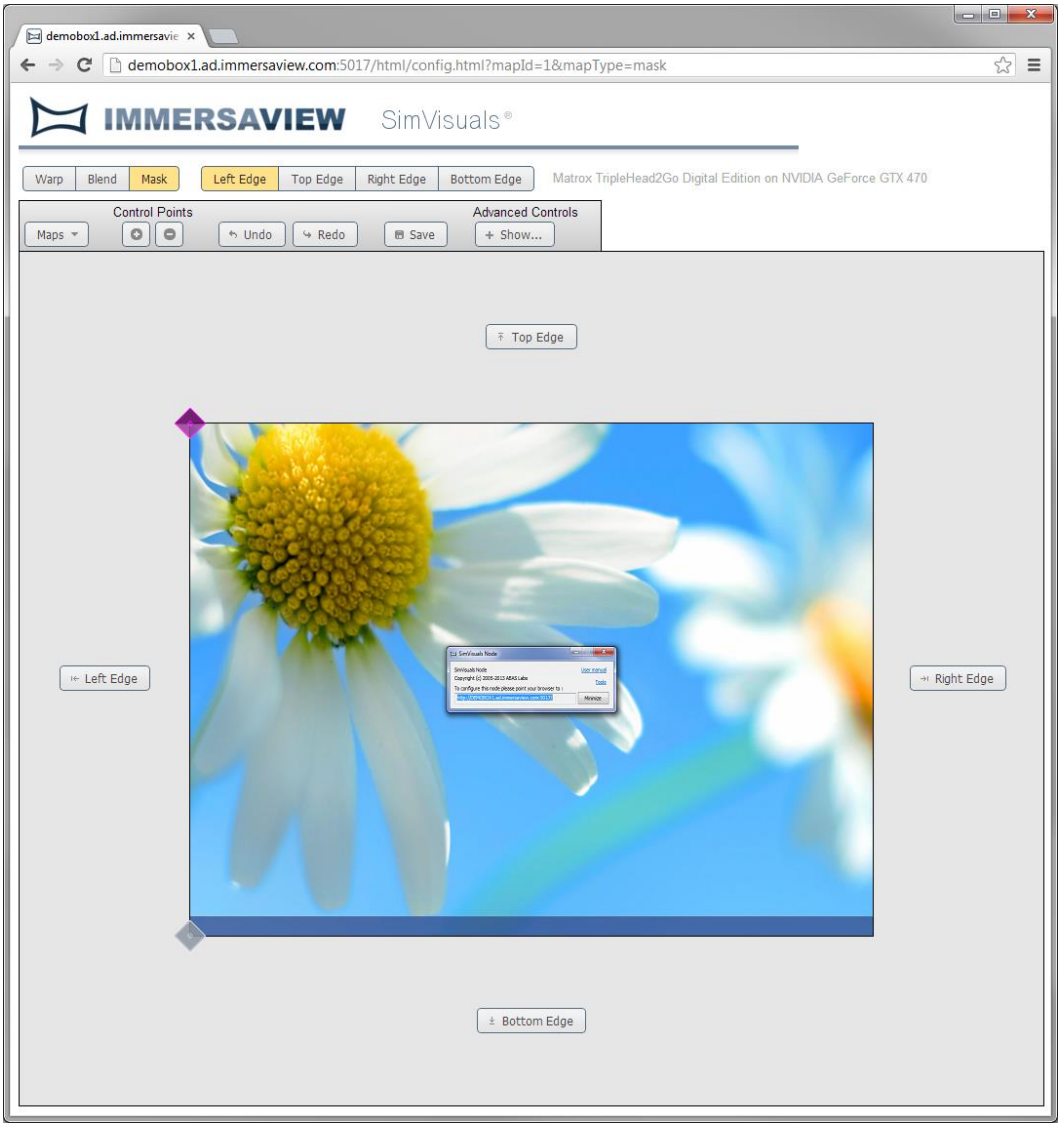
Tip!

If the projectors have individual RGB controls, adjust the gain and offset for each field. To do this you can use a color test pattern for each component in turn. For example, if adjusting the red component, put up a red test pattern with color bars running from black through to pure red in about six steps. Adjust the gain and offset for red until all reds match. Repeat for green and blue. Finally, repeat with gray/white to ensure the colors haven't separated.

4.7. Masking

When using SimVisuals, it may be necessary to remove screen edge overflows, or eliminate reflections on a cockpit in a flight simulator. This can be done by masking, which allows areas of the projection zones to appear black.

Masking can be applied to the edges of each map**.**



Begin by selecting an edge by clicking on the corresponding button. The left edge is selected as the default. Drag the control point across the map until the desired area has been masked. Each point can only move perpendicular to its edge. Additional control points can be added using the point control buttons above the map. When using multiple control points, the area will be masked behind the connecting points.

A mask (black section) created over 2 projected areas.

Chapter 5. Advanced Setup

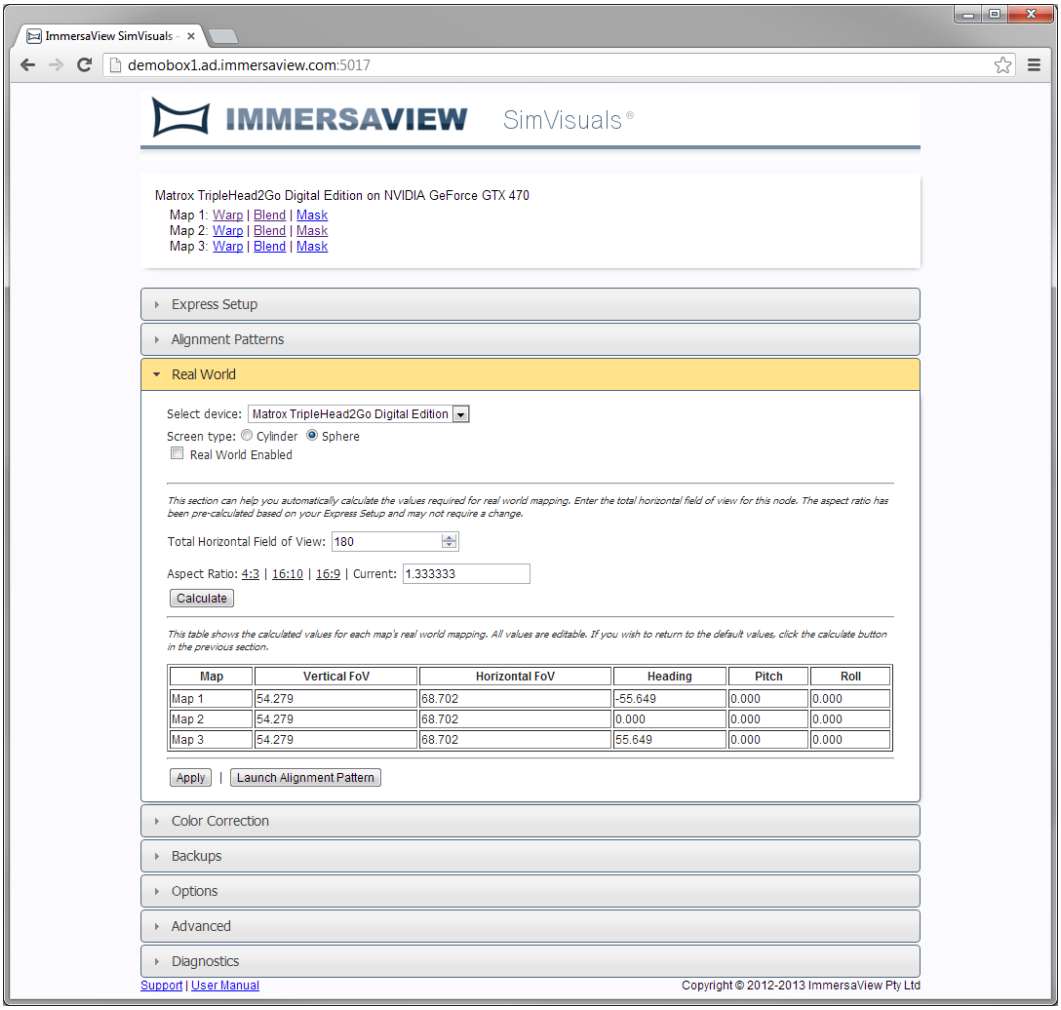
5.1. Real World

Flat plane mapping is used for desktop applications by taking an image and projecting it onto a planar surface. However, it doesn't support viewing the image in 180 or more degrees. In actuality, viewing the image in 160 degrees begins to look stretched. This is due to the fact that once the image is wrapped around the viewer, what is now located perpendicular to the eye is not a true representation of what would be on the viewer's side in the real world.

Traditionally, to project a true representation of an image in 180 degrees or more, a complete alternative set of mappings would need to be configured. These spherical or cylindrical mappings involved using specially crafted test patterns to align the display, multiple cameras angles to capture the image, followed by masking off the areas of the projected image that spilled over. It was an entirely parallel configuration to flat plane mapping and was often a lengthy and tedious process.

SimVisuals introduces Real World Mapping™, which automatically maps a spherical or cylindrical image at the click of a button. It uses the information from flat plane mapping, along with additional software, to perform the necessary calculations so you don't have to. As with the historic method of spherical or cylindrical mapping, Real World Mapping uses multiple cameras with different headings and merges these into a single image to create a seamless surround display.

Real World Mapping can be spherical or cylindrical, depending on the shape of the screen. For dome, spherical, or toroidal screen shapes, '*Spherical*' mode is needed. For cylindrical screens, use '*Cylindrical*' mode.



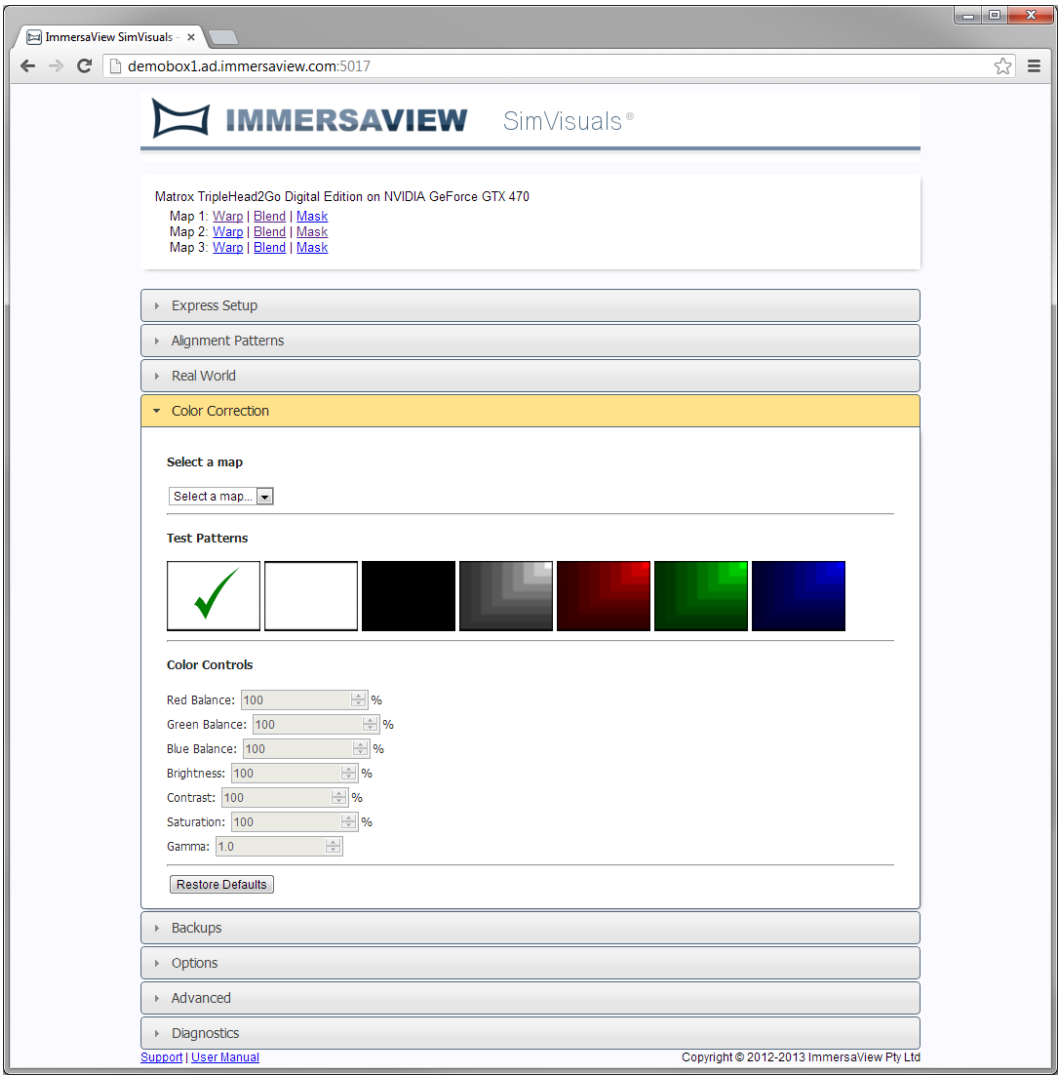
Select the device and screen type of the display and ensure the 'Real World Enabled' box has been checked. Supply the 'Total Horizontal Field of View' (in degrees) and the aspect ratio of the projectors (width/height in pixels), click Calculate and SimVisuals will fill in all the values in the table below. Click 'Apply' to allow the calculations to take effect.

- For single node setups, where the PC running SimVisuals is responsible for rendering all the cameras, the horizontal field of view should be the screen's total horizontal field of view. Overlap generation will automatically be switched off when Real World mode is active, as the overlaps come from the overlapped camera frustums; the flat plane overlap amounts will only be used to derive the angular overlaps between the cameras.
- For multiple node setups, where the rendering is distributed among multiple PCs in a cluster and each PC is connected to only one projector, enter the horizontal field of view each node is rendering. E.g. For a 3 node setup with a total field of view of 180 degrees, each node renders a horizontal field of view of 60 degrees.

Three cameras provide full 180° view. Before applying Real World mapping applied.

After Real World mapping is applied.

5.2. Color Correction



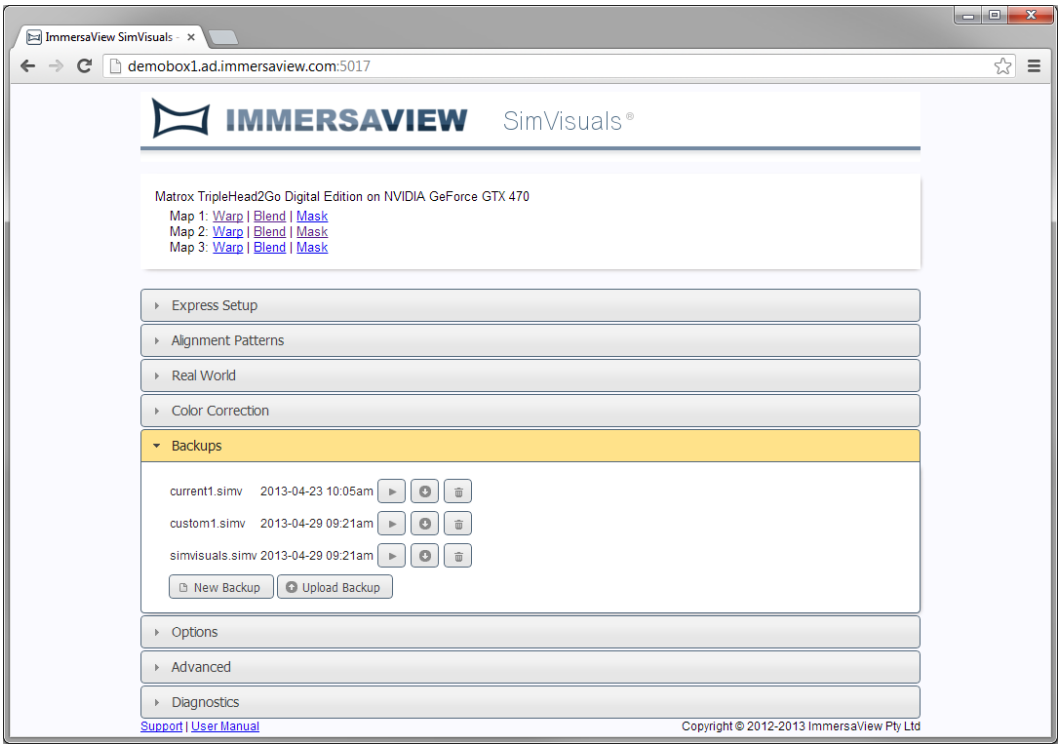
Most modern projectors allow the user to adjust the color settings directly on the projector. As these adjustments can affect the dynamic range, it is recommended to modify the color settings on the projector. Please refer to the projectors user manual for information regarding these settings.

If the projector being used does not have this option, SimVisuals provides the functionality to make the adjustments directly from the web interface. Color adjustments can be made to each map by selecting the desired map and entering the relevant values.

5.3. Backups

SimVisuals lets the user save and store their preferred configuration making it easier to restore the desired settings. The 'Backup' tab gives the options to save a new configuration and load a saved configuration. There is also the ability to download a configuration file to the computer being used to configure SimVisuals.

Once a preferred configuration has been established, it is recommended to save the file for future reference. The following otions are available in the Backups tab on the web interface:



To **Save** a configuration:

1. Select ‘New Backup’ from the Backups tab
2. Enter the desired name for the file
3. Click ‘Create’

The file will be saved in the location of the default configuration file. This address can be found in the diagnostic report in the ‘Diagnostics’ tab (Chapter 6.5)

To **Load** a saved configuration from the backup list:

1. Choose the desired .simv file from the backups list
2. Select the ‘Load Backup’ button
3. SimVisuals will ask for confirmation to load the file as it will overwrite the current configuration
4. Click ‘Load’ to restore the selected configuration.

When choosing to load a configuration file, ensure the current configuration has been saved or is not required as the restored file will replace it.

To **Download** a configuration file to an external computer:

1. Select the configuration file to be downloaded
2. Click the ‘Download Backup’ button next to the file
3. The file will automatically download and save in the users ‘Downloads’ folder

Note: Opening this file on any computer with SimVisuals software will launch the configuration on that display.

To **Upload** a configuration file:

It is possible to upload configuration files to each computer running SimVisuals, applying the changes in the process. If a desired configuration file is located on a different computer, this function allows the user to transfer the file to any computer running the software.

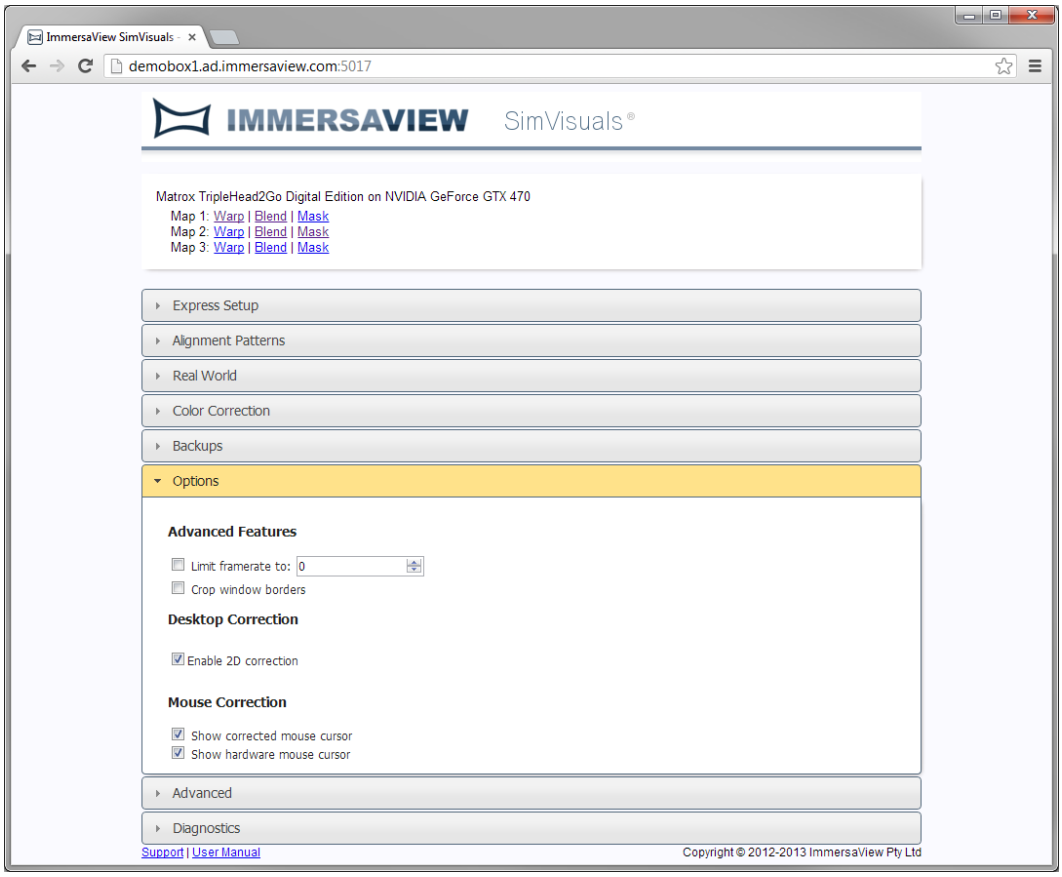
1. Click ‘Upload Backup’ in the backups tab
2. Choose ‘Browse’ in the pop up window
3. Select the desired file and click ‘Upload’
4. A pop up window will appear asking for confirmation to replace the current configuration
5. To upload the file and run the configuration, click ‘Load’
6. Selecting ‘Cancel’ will upload the file but not load the configuration

To **Delete** a configuration file:

Please note: Deleting a configuration file will delete the file from the computer running SimVisuals, and from the list.

1. Select the file to be removed
2. Click the ’Delete Backup’ icon next to the selected file 
3. A pop up window will appear confirming the deletion
4. Click ‘Delete’ to remove the file, ‘Cancel’ to return to the web interface

5.4. Options



The Options tab can assist in fine-tuning the display with some advanced features. Often it is desirable to have a smooth frame rate. SimVisuals can help achieve this by capping the maximum frame rate of the display. Microsoft Flight Simulator is an example of an application that benefits from this approach.

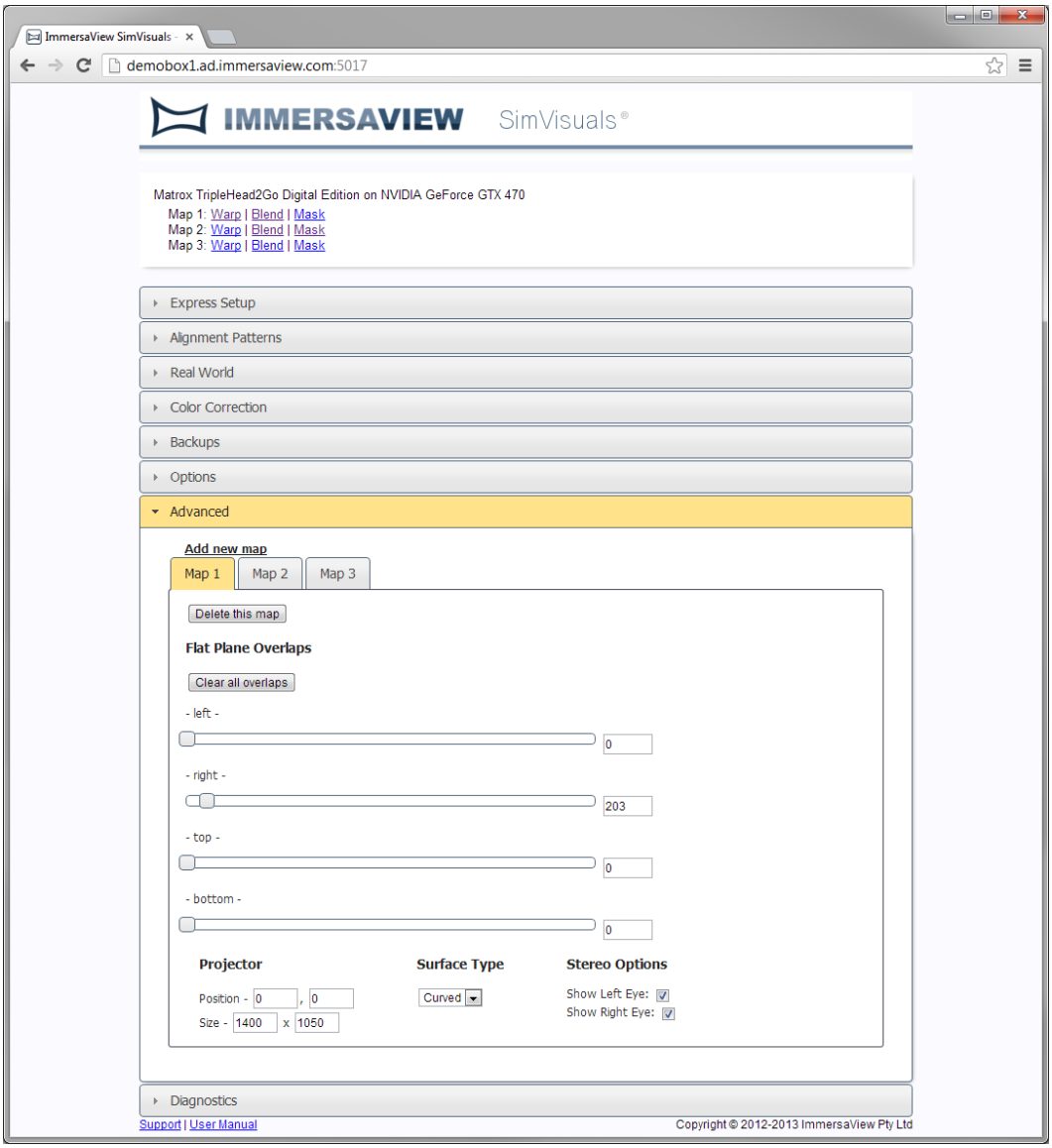
Sometimes users of flight simulation software will run undocked instrument panels from a rendering node. In this instance the window borders interfere with the seamless nature of the visual display. ImmersaView SimVisuals can remove the border.

For computers running Windows 7 and 8, it is recommended to enable 2D correction in the Options tab. This will apply the desired alignment to the Windows desktop on the machine being configured by SimVisuals. It will also disable warping and blending of windowed applications to avoid double warping. Please note, 'Enable 2D Correction' is only compatible with **Windows 7 and 8** installations.

SimVisuals offers the user the option to hide the mouse cursor when using full screen applications. Under 'Mouse Correction', the user can choose to have the mouse cursor aligned with the display or move over individual projectors. Check the 'Show Corrected Mouse Cursor' box to enable the mouse in the seamless display. Unchecking the 'Show Hardware Mouse Cursor' will hide the cursor when using full screen applications.

5.5. Advanced

If the required projector setup is not available in the drop down list of the Express Setup tab, the 'Advanced' tab allows the user to create a custom setup by adding and deleting maps, manually adjust overlaps, and modify projector settings.



Devices located on computers configured with SimVisuals will show in Advanced.

To adjust the overlap amount for the current map, use the left, right, top and bottom sliders, depending on the position of the map. The values range from zero to the width of the display. The overlap values are equal to the overlapping region and are measured in display pixels. For example, a value of 50 in the right-hand box means that the map should include an additional 50 pixels from the logical display area to its right.

The *position* and *size* specify a subsection of the Windows logical display that will be used for this map. In the most common case, the size will be the resolution of the projector, and the position will be its virtual position within the Windows logical display.

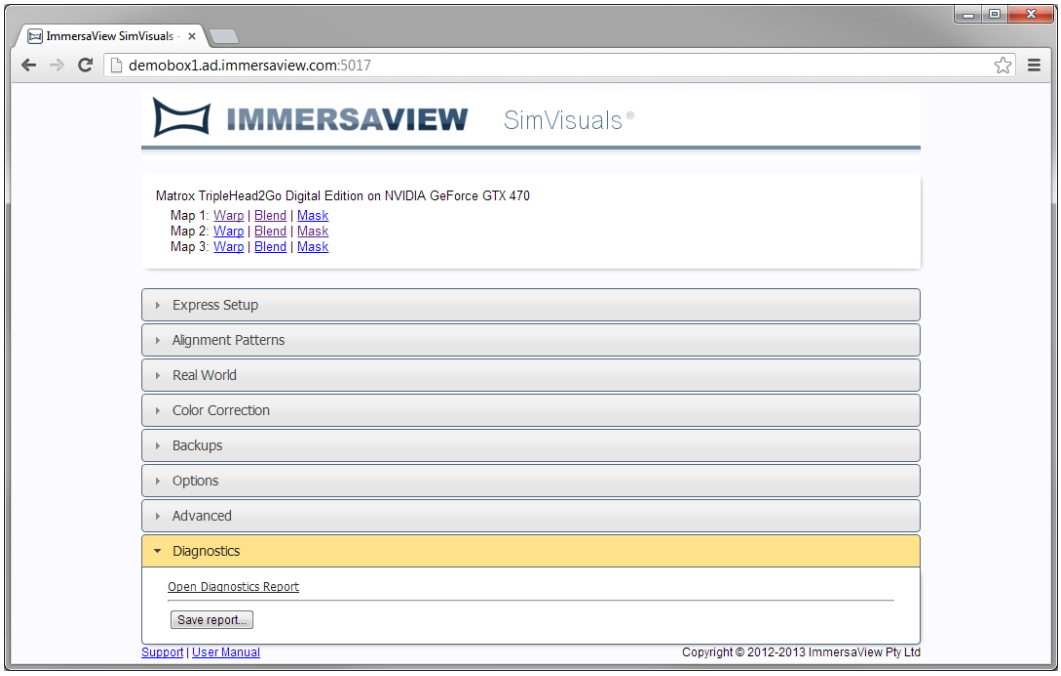
The *surface type* specifies the surface fitting algorithm that is used to match the surface to the control points. We provide two options: *curved* and *linear*. Use *curved* for curved screen displays and *linear* for flat or segmented (e.g. wedge) displays.

In Stereo Options choose which eye(s) this map should be shown for.

If new maps are required for a device, click **Add New Map** under the desired device name. The current map can be removed by clicking the **Delete This Map** button.

All overlaps for a map can be reset to **0** by clicking the **Clear All Overlaps** button.

5.6. Diagnostics



The diagnostics tab gives information on the machine being configured with SimVisuals. From here you can open the diagnostics report and view it as a web page.

Clicking on 'Open Diagnostic Report' will provide information such as:

- The version of ImmersaView SimVisuals running
- Windows details and version
- Display details including monitor, resolution and graphics cards
- Name and location of the configuration file
- Subsystems being requested by applications (when full-screen applications are running)

The ‘Save Report’ button allows a user to save these details, which can be helpful when submitting support requests. The report saves as a .diag file which can be forwarded to the ImmersaView Support Team to assist.

Support request can be logged by clicking the ‘Support’ link at the bottom of the web interface. The ImmersaView home page will open in a new tab and the user can login to submit a request.

A PDF copy of this manual can also be opened via the ‘User Manual’ link.

Chapter 6. Getting Further Information

Internet	For product information, please visit our website. http://www.immersaview.com
Whitepapers	For technical articles covering a range of topics, please visit the whitepapers section of our website. http://www.immersaview.com/whitepapers
Email	To contact our friendly customer service team, please email us at: sales@immersaview.com

Chapter 7. List of Key Commands

SimVisuals gives the user the flexibility to perform functions directly on the display by using the keyboard of the computer being configured. Below is a list of commands accessible via hotkeys.

Key	Description
←, ↑, →, ↓	Move the selected control point in the direction of the arrow
Ctrl-←, Ctrl -↑, Ctrl -→, Ctrl -↓	Select the nearest control point in the direction of the arrow
Shift-←,Shift-↑, Shift-→,Shift-↓	Move the whole checker board pattern in the direction of the arrow (lens shift)
B	Blank the currently selected map
Shift-B	Blank all but the currently selected map
Esc	Exit configuration overlay screen
F1, F2	Remove/add horizontal control points
F3, F4	Remove/add vertical control points
F5, F6, F7, F8	Decrease/increase the control points by subdivision
I	Show map identifiers
Shift-I	Invert colors between even and odd projectors
L	Load configuration from the last saved file
M	Toggle curved or linear mapping
O	Load an image to act as a test pattern or reference pattern
P	Cycle through the alignment patterns
R	Reset all settings to default
S	Save configuration
Spacebar	Toggle between warping and blending configuration screens
Tab	Selects the next control point
Shift-Tab	Selects the previous control point
U, Ctrl-Z	Undo
Shift-U, Ctrl-Y	Redo
Z	Show/Hide the control points
Num /,Num *	Decrease/increase horizontal checker/stripe count
Num -,Num +	Decrease/increase vertical checker/stripe count
+, -	Zoom in/out (coarse adjustment)
Shift +, Shift -	Zoom in/out (fine adjustment)
Alt, Ctrl, Shift, F10	SimVisuals Kill Switch

Moving the mouse will automatically select the control point the cursor hovers over. The following mouse controls affect the current active control point:

"**Left Mouse Button**" Hold down the left mouse button to move control points

Some functions are available to access via hotkeys when using the web interface. The following keys can be used in the map configuration pages.

TABLE 3: KEYBOARD SHORTCUTS FOR THE WEB INTERFACE CONFIGURATION PAGES

Key	Description
←, ↑, →, ↓	Move the selected control point in the direction of the arrow
ctrl-←, ctrl -↑, ctrl -→, ctrl -↓	Select the nearest control point in the direction of the arrow
S	Save map configuration.
1, 2	Remove/add horizontal control points (warp)
3, 4	Remove/add vertical control points (warp)
1, 2	Remove/add control point to selected edge (blend/mask)
3, 4	Select next edge clockwise/anticlockwise (blend/mask)
R	Reset all settings to default

Chapter 8. Steps for the Perfect Alignment

To assist in attaining the perfect configuration, we have included a 'How To' guide that will enable you to get the most out of the software.

1. After the initial setup of the projectors and installing SimVisuals, begin by measuring the overlap region (double bright area) and the width of one full projectors image.
2. Input these measurements into the overlap calculator in the web interface and click the percentage symbol.
3. Ensure you have selected your preset projector configuration and click 'Apply'.
4. In the 'Alignment Patterns' tab, select the warp configuration pattern.
5. Using the keyboard for the display being configured, press 'P' to cycle through the alignment patterns until you get to the plain black and white checkerboard.
6. Next, use 'Shift I' to invert the colors between the odd and even projectors. This will show the overlap region in a negative aspect to differentiate between the areas.
7. Returning to the web interface, navigate to the first map via the links at the top of the page.
8. Using the mouse, align the four corner points on the map to match the green border on the display.
9. Once completed, click on the drop-down 'Maps' box to move to the next map. Align the corner points on all remaining maps.
10. Return to Map 1 and add additional horizontal control points, preferably no more than nine points for curved displays.
11. Align these points to match the top and the bottom of the display. Repeat with all maps.
12. Once the top and bottom edges of the projectors have been aligned go to the first map and add the same number of vertical control points that were added horizontally.
13. Align the vertical edges of the map by following the green borders and repeat for all maps.
14. Adjust the control points in all the overlap regions so that the squares line up over the top of each other with minimal gaps between checkers.
15. Using 'Shift I' right the colors between the odd and even projectors to return to one full black and white checkerboard.
16. Check to ensure the overlap region is aligned and then move the remaining control points so they are evenly spaced and each black and white checker is the same size.
17. Upon completion of the alignment, go to the 'Backups' tab and create a new backup with the new alignment.

Additional Tips

- Use 'Shift' and the directional arrows on the display keyboard to move the whole checkerboard if the alignment is out by a bit in a whole row
- Directional keys are perfect for minor adjustments as they move the control point in small increments vertically and horizontally
- Using F5, F6, F7 and F8 on the display keyboard will decrease/increase the control points by subdivision, for small adjustments.