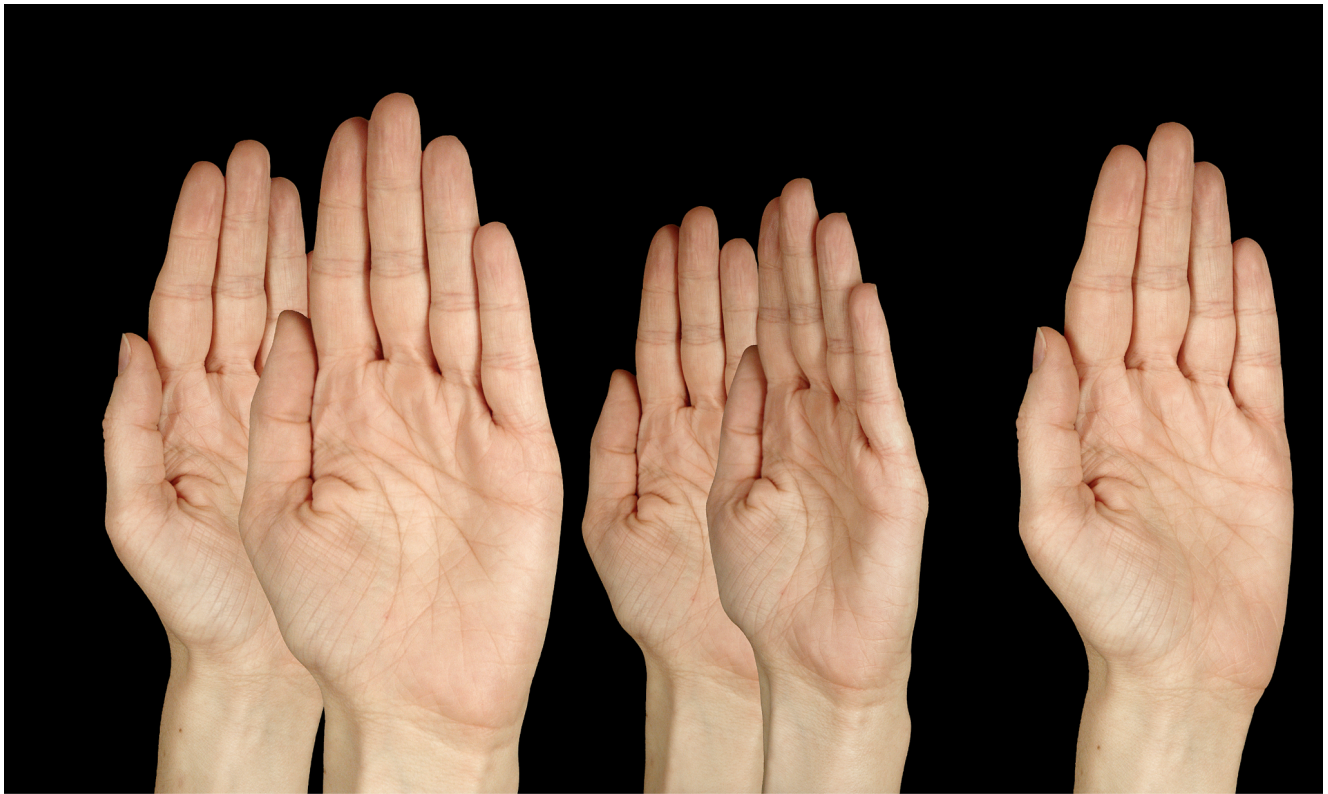


# GLORIES OF ACCOUNTING, SUBSCULPTURE 5

BY RAFAEL LOZANO-HEMMER



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## **GENERAL IMPORTANT INFORMATION**

This short section must be read for proper operation.

# GLORIES OF ACCOUNTING, SUBSCULPTURE 5 (2005)

BY RAFAEL LOZANO-HEMMER

## Technique

Computer, depth sensor camera, displays (monitor or projector).

## Description

Glories of Accounting is an interactive installation with a surveillance system that detects the position of the public in the exhibition room. When someone walks into the room, large hands appear on the screen automatically. The hands rotate along the forearm axis, following the visitor with the open palms always facing him or her. As more people enter the room, more hands appear, and each hand follows a member of the public. Ultimately, the piece is a visualization of electronic detection, using a metaphor that signifies both distance (as in a "stop" gesture) and inclusion (as in the expression "show of hands").

## Operation

Please refer to [Appendix I - Installation](#) for detailed system information and wiring diagram.

1. Connect the computer, the depth sensor and the display(s) to electrical power. Use the supplied power cables.
2. To turn the piece ON, press the power button on the computer for one second, then release it. Important note: *please do not push the button again as this will shut down the piece.* Wait at least two minutes before pressing it again, as the computer might need this long to reboot. After two minutes (or less), you should see the piece. Since this artwork is installed on a PC system, the computer Bios **could** be set on a schedule, but this setting wouldn't be handled by the studio. Another way to schedule the artwork display would be to use monitor(s)/projector(s) schedule settings.
3. To turn the piece OFF, press the power button on the computer button.
4. If the piece doesn't start within two minutes, try turning on the piece again. If it still doesn't turn on, then hold the power button all the way down for 10 seconds. Then, wait at least three seconds, then press the power button all the way down for one second, and you should be up and running again.

## **Maintenance**

Please do not clean depth sensor camera surfaces with Windex or soap. Use a lint-free cloth and LCD screen liquid cleaner, such as Kensington Screen Guardian found in most computer stores. While cleaning the depth sensor, avoid applying too much pressure onto its surface, to prevent scratching the plastic, or causing the depth sensor to swivel as it could misalign the artwork.

The metal support structure can be cleaned with regular all-purpose cleaner. Do not use harsh cleaners or rough sponges.

We recommend cleaning the piece at least every two months.

## **Placement Instructions**

The placement of the artwork depends on the venue space and display(s) dimensions. Discussions should be held between the studio and collector or institution prior to installation. Generally, the displays would have their vertical centre aligned at 150cm (59") from the floor. Depth sensor should be installed above displays.

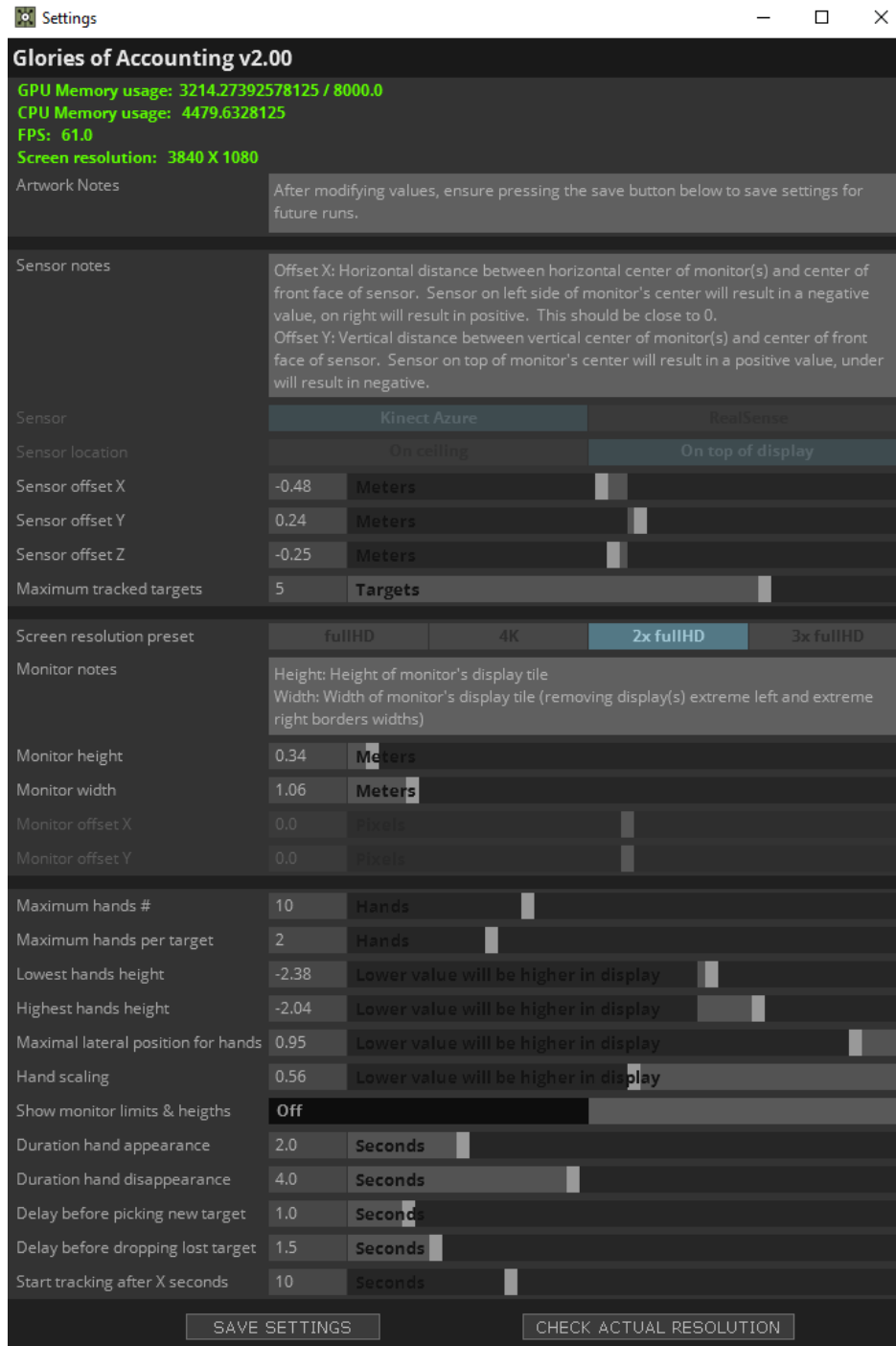
The depth sensor should be centered with the horizontal center of display(s) set and its front face requires to be parallel to the display(s) plane. If the depth sensor cannot be centered on the display(s) center, the software can be set to compensate for it, but keep in mind the misalignment would be perceptible.

The following paragraph only applies if your depth sensor camera is a Kinect Azure. If the Kinect can be partially nestled into the wall, it should be installed so that the bottom of the Kinect sits on top of the display(s) and should have its front face aligned on the front face of the display(s). If it's not possible to nestle in the wall, the Kinect should be installed on its surface mount bracket, at least 30cm (12") away from display(s)' top edge, but shouldn't be higher than 225cm (88") away from floor to ensure proper skeleton tracking for better artwork reaction. The Kinect being installed higher would result in losing shorter people's tracking (such as kids) when they're getting close to display(s).

# DETAILED TECHNICAL INFORMATION

## Software

The runtime mode of the software displays a black background, fullscreen, with hands reacting to the presence of people in front of the artwork. To adjust settings, use the keyboard and press the ALT + G combination to gain access to the GUI menu. To quit the software, press the Escape key and close the Touch Player software.



## General and Sensor Settings

Setting	Description
<b>GPU Memory usage</b>	<p>Displays the usage of the graphic card memory (in Mb) done by software. If the first number is close or above the second, it is highly recommended to reduce the screen resolution and get the software (and computer) to run at a smaller screen resolution.</p> <p><i>* Note that the 4K resolution is the one which is more expensive on computer resources, followed by 3x fullHD, 2x fullHD, fullHD.</i></p>
<b>GPU Memory usage</b>	<p>Displays the usage of the computer memory (in Mb) done by software. If the number is close or above 70% the maximum memory size of your computer, it is highly recommended to reduce the screen resolution and get the software (and computer) to run at a smaller screen resolution.</p>
<b>FPS</b>	<p>Displays the frames per second of the software. We ultimately aim for a value above 30FPS, but should easily reach 60FPS. If the software seems to be topped at a 30FPS value, check the display(s) frequency and ensure that all of them are using a frequency of at least 60Hz.</p>
<b>Screen resolution</b>	<p>While this isn't a setting to be controlled, you can see here the resolution used by the software.</p>
<b>Sensor offset X</b>	<p>Horizontal distance between the display(s) set horizontal center and the sensor front face center. Ultimately, this value should be 0, but we can control it in cases when the sensor cannot be perfectly centered. If depth sensor is on the left of center, value will be negative, while if on the right, it would be positive.</p>
<b>Sensor offset Y</b>	<p>Vertical distance between the display(s) set vertical center and the sensor front face center. While having the depth sensor above the display(s), this value will be positive.</p>
<b>Sensor offset Z</b>	<p>Depth distance between the display(s)' plane and the sensor front face. Value should always be negative and never higher than -0.25.</p>
<b>Maximum tracked hands</b>	<p>Limiting the number of skeletons tracked by the sensor.</p>



## Monitor Settings

Setting	Description
<b>Screen resolution preset (fullHD, 4K, 2x fullHD, 3x fullHD)</b>	<p>When modifying the display(s)' resolution under Windows or graphic card settings, ensure that all displays are set with the same resolution, a frequency of at least 60Hz and are perfectly aligned to make a horizontal and uniform plane/rectangle. Then, within the software, we have a 4 buttons preset that can be pressed to get the software to deploy settings according to the computer's new "full" resolution. When 1 of the 4 options is selected: the software will automatically deploy pre-recorded values. Quit the software and launch it again to have it displayed accordingly.</p> <p>If you want to run in a different resolution than the presets, please refer to the <b>Check actual resolution</b> button.</p> <p><i>* Note that the 4K resolution is the one more expansive on computer resources, followed by 3x fullHD, 2x fullHD, fullHD.</i></p>
<b>Monitor height</b>	<p>Dimension of the display(s) height in metres. This is the height of the active portion of the display, excluding the frame(s).</p>
<b>Monitor width</b>	<p>Dimension of the display(s) width in metres. This is the width of the active portion of the display, excluding the frame(s). When using several displays, please include the inner frames width (frames touching each other) in measurements: we simply measure from inside the left display's left edge to the right display's right edge.</p>

## Software Reaction Settings

Setting	Description
<b>Maximum hands #</b>	Maximum number of hands that can be visible simultaneously. We want to avoid this value being too high. Rule of thumb: this value will be close to the number of displays, multiplied by 5.
<b>Maximum hands per target</b>	The maximum number of hands that can track a target. Besides exception, this value <b>should be set at a value of 2</b> . Only 1 target could eventually have that amount of targets, the others being maxed at this setting, minus 1 and so on. Eg: value is set to 5: only one target could trigger 5 hands, only one could trigger 4 hands, only one could trigger 3 hands, etc.
<b>Lowest hand height</b>	Controls the lowest point a hand could appear in display(s). With "Show monitor limits & heights" activated, you'll see at around $\frac{1}{3}$ of the monitor's width a partially transparent hand. Controlling this setting will move this reference hand up and down. Lowest hand image should display the whole hand and a little bit of the wrist. Hands tracking a target will have their height randomly located between lowest and highest hand height.
<b>Highest hand height</b>	This controls the highest point a hand could appear in display(s). When "Show monitor limits & heights" is activated, you'll see at around $\frac{2}{3}$ of the monitor's width a partially transparent hand. Controlling this setting will move this reference hand up and down. Highest hand image should allow the whole image to be displayed (whole hand, plus wrist and part of forearm) and the image should take up around 80-85% of the display height.
<b>Maximal lateral position for hands</b>	Adjusts the left and right boundaries used for hands images display. When "Show monitor limits & heights" is activated, you'll notice white lines near edges of displays. The hand tracking target could ultimately be centered on these lines: we want the lines to be far enough from edge to allow the hand to not be fully displayed at times, overflowing just past the edge.
<b>Hand scaling</b>	This controls the maximum hand size. Size should be big enough to allow the highest hand height to occupy 80-85% of display height.

<b>Show monitor limits &amp; heights</b>	When toggled on, this will give a visual representation of the outer edges and the lowest/highest images heights.
<b>Duration hand appearance</b>	After the picking delay, the hand will appear from “under” the display, going up towards its final height. This setting will control the time, in seconds, it will take the hand to travel the distance. <b>The default and preferred value is 2.</b>
<b>Duration hand disappearance</b>	After the dropping delay, the hand will disappear from its current height moving “under” the display. This setting will control the time, in seconds, it will take the hand to travel the distance. <b>The default and preferred value is 4.</b>
<b>Delay before picking new target</b>	This setting will control the delay, in seconds, it will take for the hand to react to a newly tracked target. <b>The default and preferred value is 1.</b>
<b>Delay before dropping lost target</b>	This setting will control the delay, in seconds, it will take for the hand to react to a tracked target loss. <b>The default and preferred value is 1.5.</b>
<b>Start tracking after X seconds</b>	This setting will control the delay at the startup of the software, in seconds, where the sensor will not track people. <b>The default and preferred value is 10.</b>

### Control buttons

Button	Description
<b>Save settings</b>	When clicked, this button will save the currently displayed settings for future runs of the software. If you want to save the current settings before modifying anything to keep as a reference, you should save a copy of the software prior to clicking the button.
<b>Check actual resolution</b>	When using a resolution that is different from the new possible presets, you can click this button. This will read the computer settings and save them in software before quitting and restarting the software to deploy these new settings. It's recommended, when wanting a new resolution, to first deploy a preset that is closer to the factor we want to set. Presets form factors are: 16:9 (fullHD and 4K), 32:9 (2x fullHD) and 16:3 (3x fullHD).

## Show monitor limits & heights

When this setting is set to **On**, the software will display the left and right edges up to where the hands could be horizontally aligned while tracking a target, plus 2 dimmer hands showing the lowest hand height and the highest hand height (respectively at  $\frac{1}{3}$  and  $\frac{2}{3}$  of monitor's width), as shown in the following image.



## **Remote Access to Artwork's Computer**

There is a software installed on the computer running this artwork that allows the studio to connect remotely to the artwork. This feature is helpful when you require assistance from the studio, as we can remotely connect to it, do a quick inspection, and conduct a debugging session of your components, if needed. In order to enable this feature, the computer has to be connected to the internet at all times. Depending on the computer's operating system (Windows 7/8/10, OSX), the procedure to set the computer online will vary. Please look online for tutorials, if necessary.

## **Preliminary Troubleshooting Steps**

### **After pressing the power button, when nothing seems to happen.**

Do you hear any sound coming from the computer? If so, the computer is running and the projector should display the piece shortly. If not, check that the display(s) is(are) powered and try to turn it(them) on with a remote control. Also, check that the display(s) source is set to the same port where the cable is plugged in (usually HDMI but could be DVI, DisplayPort, SDI, VGA, etc.)

### **There is no hand reacting to anyone in front of the artwork.**

Ensure the sensor is well connected to power and to the computer. You might be able to see a small led light on the sensor front face that should tell you the sensor is well connected.

### **The software interaction is slow or delayed.**

A few things could produce a jittery or slow/delayed software reaction.

First, fully quit the software (and Touch Player) and ensure that the display(s) resolution settings in Windows (or graphic card controls) use(s) a resolution and frequency of at least 60Hz. The software relies on this spec to pace its speed.

Then, start the software again and look at the reactions. If it is still jittery or slow, go to the settings menu and look at the yellow details: if any of the CPU/GPU values are excessive, you might want to give a shot at reducing the resolution of the software using the presets (4K -> 3x fullHD -> 2x fullHD -> fullHD). Rendering a smaller resolution should free up RAM and GPU resources and ensure a more fluid experience.

## Troubleshooting Assistance

Prior to contacting the Antimodular Studio with a problem about your artwork, please ensure that you went through the preliminary troubleshooting steps outlined in the previous section.

**The troubleshooting process will vary depending on the problem. In order to make the process easier, it is recommended that you collect and send the following information to the studio:**

- Date and time when the problem first happened;
- Description of the problem;
- Actions taken so far and conclusions;
- Detailed photographs (or videos) displaying the problem;
- Detailed photographs (or videos) of the suspected faulty component;
- Detailed photographs (or videos) of the whole artwork and its surroundings;
- Personnel involved.

## **Support (Contact Us)**

If you would like support for the piece, please feel free to call Lozano-Hemmer's studio in Canada:

Antimodular Research  
4060 St-Laurent, studio 107  
Montréal Québec H2W 1Y9 Canada  
Tel 1-514-597-0917  
Fax 1-514-597-2092  
info@antimodular.com  
www.antimodular.com



# APPENDIX I - INSTALLATION

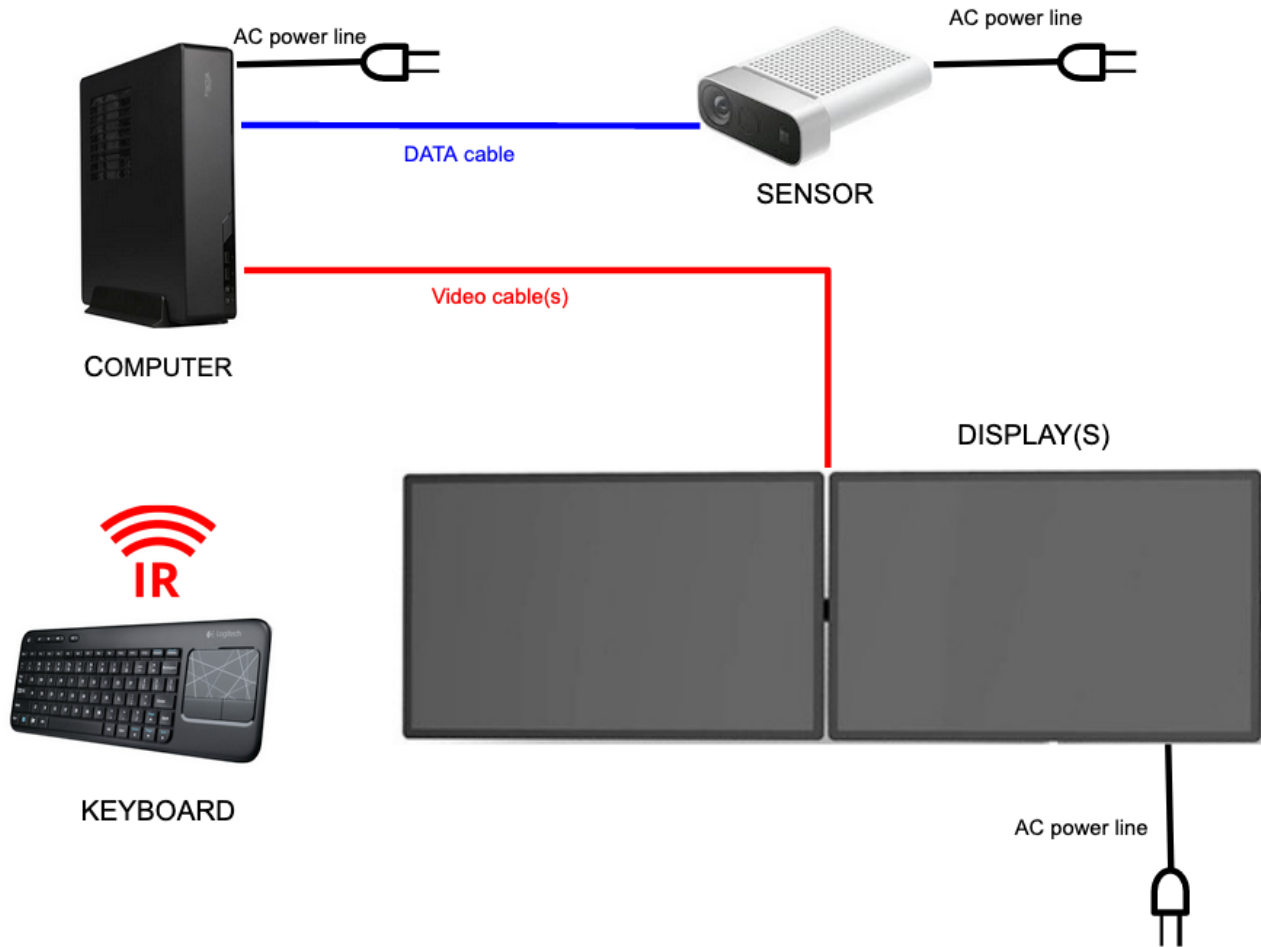
## Description of Components

This artwork requires the following components:

Component	Description
<b>Computer</b>	Computer running on Windows 8 OS at least, with a NVidia graphics card (at least GTX 1080).
<b>Depth sensor</b>	Either a Kinect Azure or a RealSense sensor, this is the unit that allows the system to track individuals present in front of the artwork. It connects to the computer through a data cable and might be powered by a power supply connected to an electrical outlet.
<b>Data cable</b>	Might vary depending on the used sensor, but generally is a USB-C cable that interconnects the computer and sensor.
<b>Video signal cable</b>	Connects the computer to the display (usually it is an HDMI cable.)
<b>Display(s)</b>	1 to 3 projector(s) or monitor(s), at least capable of FullHD (1080p) resolution at 60Hz. Ideally, the display(s) should be as bright as possible and if they are monitors: the bezel should be as small as possible and shouldn't show any brand.
<b>Keyboard</b>	While not required for normal use of the artwork, it allows you to calibrate the system prior to exhibition.

## Wiring Diagrams and Connections

In order for the piece to run properly, the computer should be connected according to the following diagrams.



## APPENDIX II - TECHNICAL DATA SHEETS

### Microsoft Kinect Azure

<b>Color Camera</b>	Up to 3840x2160 or 4096x3072, MJPEG/YUY2/NV12 color formats, at 5, 15 or 30 frames per second
<b>Depth Camera</b>	WFOV unbinned: 1024x1024, at 15 frames per second
<b>Minimum Depth Distance</b>	0.25-0.5 m
<b>Maximum Depth Distance</b>	2.21-5.46 m
<b>Horizontal Field of View</b>	90 degrees (color), 120 degrees (depth)
<b>Vertical Field of View</b>	59-74.3 degrees (color), 120 degrees (depth)
<b>USB Standard</b>	USB-C 3.0