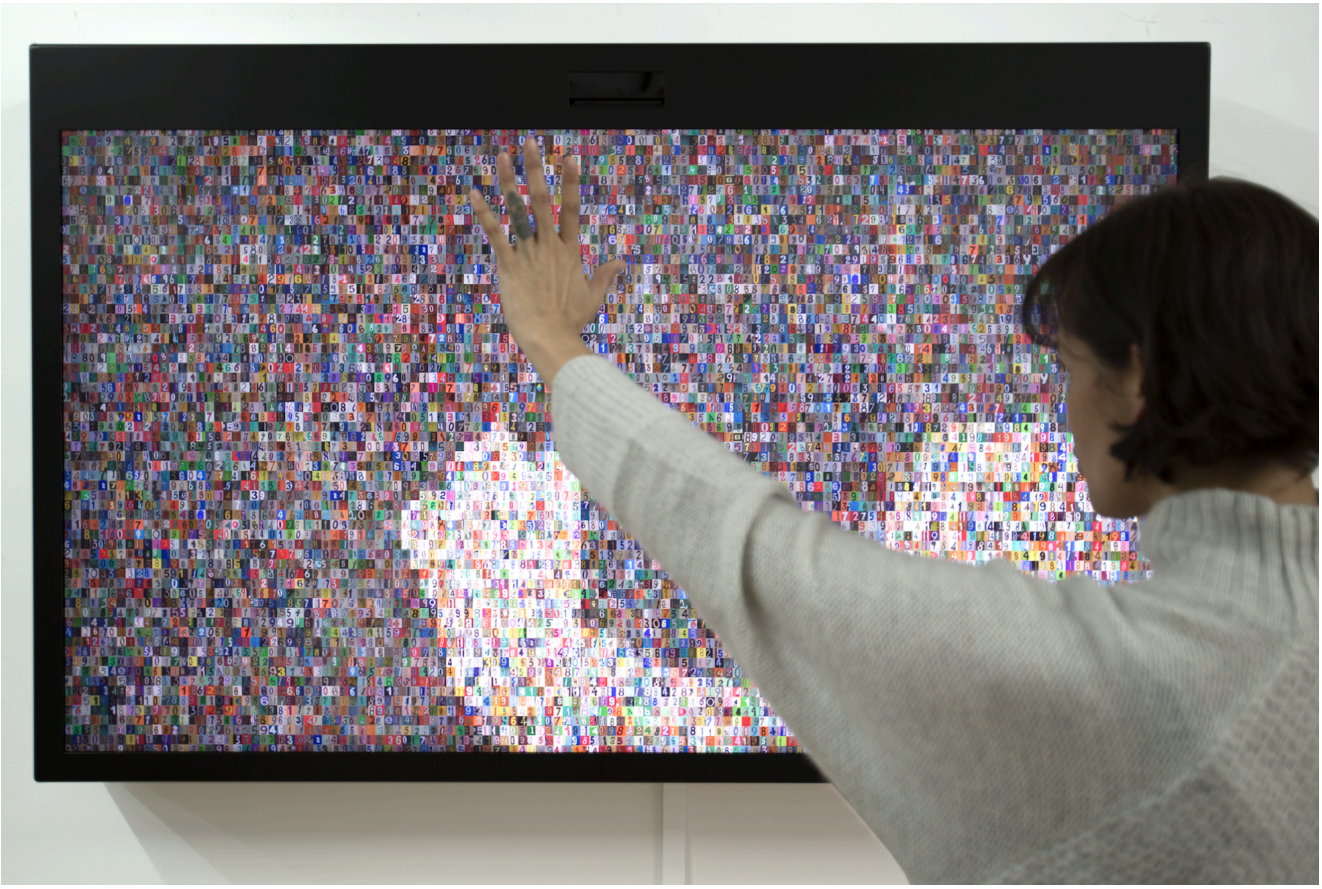
1984x1984, SHADOW BOX 10

BY RAFAEL LOZANO-HEMMER



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GENERAL IMPORTANT INFORMATION

This short section must be read for proper operation.

1984x1984, SHADOW BOX 10 (2014)

BY RAFAEL LOZANO-HEMMER

Technique

Computer, depth sensor camera, display.

Description

"1984x1984" (Shadow Box 10) is the tenth piece in Lozano-Hemmer's Shadow Box series of interactive displays with a built-in computerized tracking system. The piece shows a grid of thousands of random numbers extracted from addresses photographed by Google Street View. Scanned by Google from the front doors of buildings around the world, the numbers have an immense variety of fonts, colours, textures, and styles. As a viewer walks in front of the piece, his or her silhouette is represented within the display, and within its form, all numbers countdown to show the number 1984 repeated throughout. The piece was made as a homage to George Orwell's eponymous dystopian novel, 30 years after his predicted date for the collapse of privacy.

Operation

Please refer to Appendix I - Installation for detailed system information and wiring diagram.

1. Connect all the elements to a power source as shown in the installation's wiring diagram.

2. To turn the piece ON, press the power button of the computer for a second then release it. Important note: Please do not push the button again as this will shut down the piece. Wait at least 2 minutes before pressing it again as the computer might take that long to boot. After 2 minutes (maybe faster), you should see the piece.

3. To turn the piece OFF, press the computer's button all the way down until you've seen the "Shutting down..." screen appearing and fading to a black screen (shouldn't be more than 2 seconds).

4. If the piece doesn't start within 2 minutes, try to turn 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 3 seconds and press the power button all the way down for 1 second and you should be up and running again.

General Artwork Behaviors

The display shows a grid of thousands of low brightness random numbers extracted from addresses photographed by Google Street View. The grid is organized in counters, 4 digits - therefore columns - wide. A display typically contains 1984 counters. When the artwork hasn't been triggered by someone's presence in front of it for a certain period of time, it falls into a screen saver mode, where the counters actually flip digits to different random numbers.

Interacting with the Artwork

As a viewer walks in front of the piece, their silhouette is represented within the display, and within its form, all numbers countdown to show the number 1984 repeated throughout. The brightness of the silhouette fluctuates depending on how far the person is away from the depth sensor. If the viewer gets too close to the sensor, the system will bloom the silhouette: the silhouette will expand, up to the point where all the cells will be "triggered". The only way to stop the blooming effect is to step back from the depth sensor.

Maintenance

Please do not clean the depth sensor or the display 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, otherwise the sensor could swivel and it will mess up the alignment of the artwork. If the whole artwork is enclosed in a metal shell (shadow box), the metal 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

In landscape mode, the vertical center of the monitor should be hung at 150 cm (59 inches) from the ground. The depth sensor should be installed on top of the monitor, horizontally centered, sitting on it, or on a shelf installed between the monitor and the wall. Ensure that the depth sensor is secure.

In portrait mode using a display smaller than 75" of diagonal, the vertical center of the monitor should be hung at 150 cm (59 inches) from the ground. The depth sensor should be installed on the left, or right, of the monitor, vertically centered at 150 cm (59 inches) from the ground, allowing it to tilt towards the center of the monitor. Ensure that the depth sensor is secure with the provided bracket.

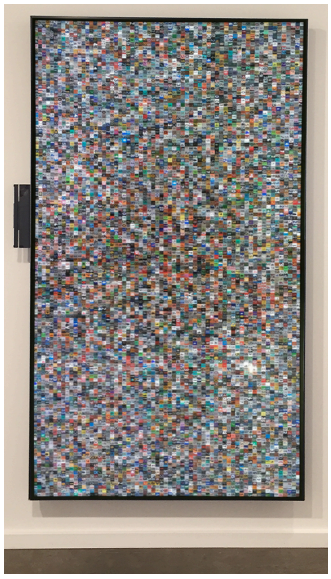
In portrait mode using a display bigger or equal to 75" of diagonal, the vertical center of the monitor should be hung at 130 cm (51 inches) from the ground. The depth sensor should be

installed on the left, or right, of the monitor, vertically centered at 150 cm (59 inches) from the ground, allowing it to tilt towards the center of the monitor. Ensure that the depth sensor is secure.

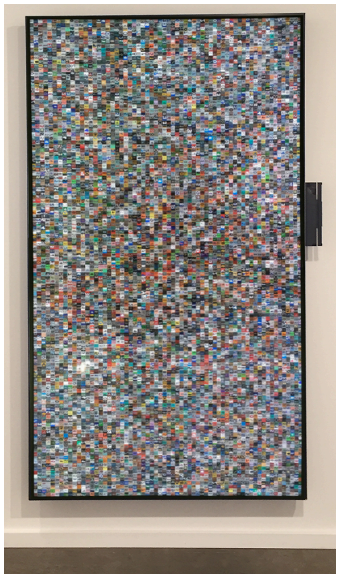
You should not install the monitor too close to a perpendicular wall: otherwise, the wall will be visible into the camera view. The distance between the monitor edge and the closest wall should be at least 1 meter: if you want to have a good depth of field of view, the distance between the edge of the monitor and the wall should be increased to something around 2 meters.

The piece should be then installed like in one of the following pictures:

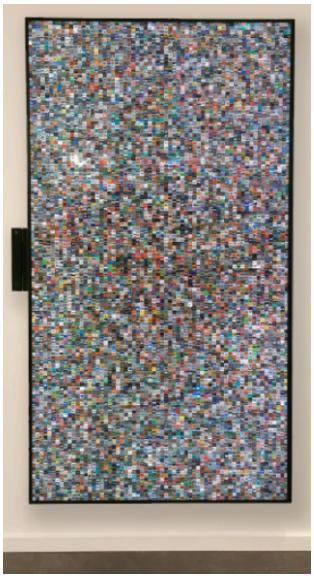
Landscape mode



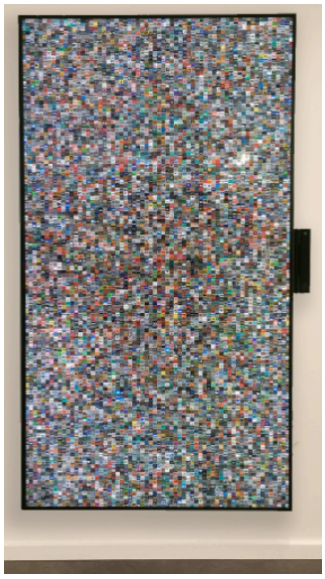
Portrait mode, with depth sensor on the left side with 75” or bigger display



Portrait mode, with depth sensor on the right side with 75” or bigger display



Portrait mode, with depth sensor on the left side with display smaller than 75”



Portrait mode, with depth sensor on the right side display smaller than 75”

DETAILED TECHNICAL INFORMATION

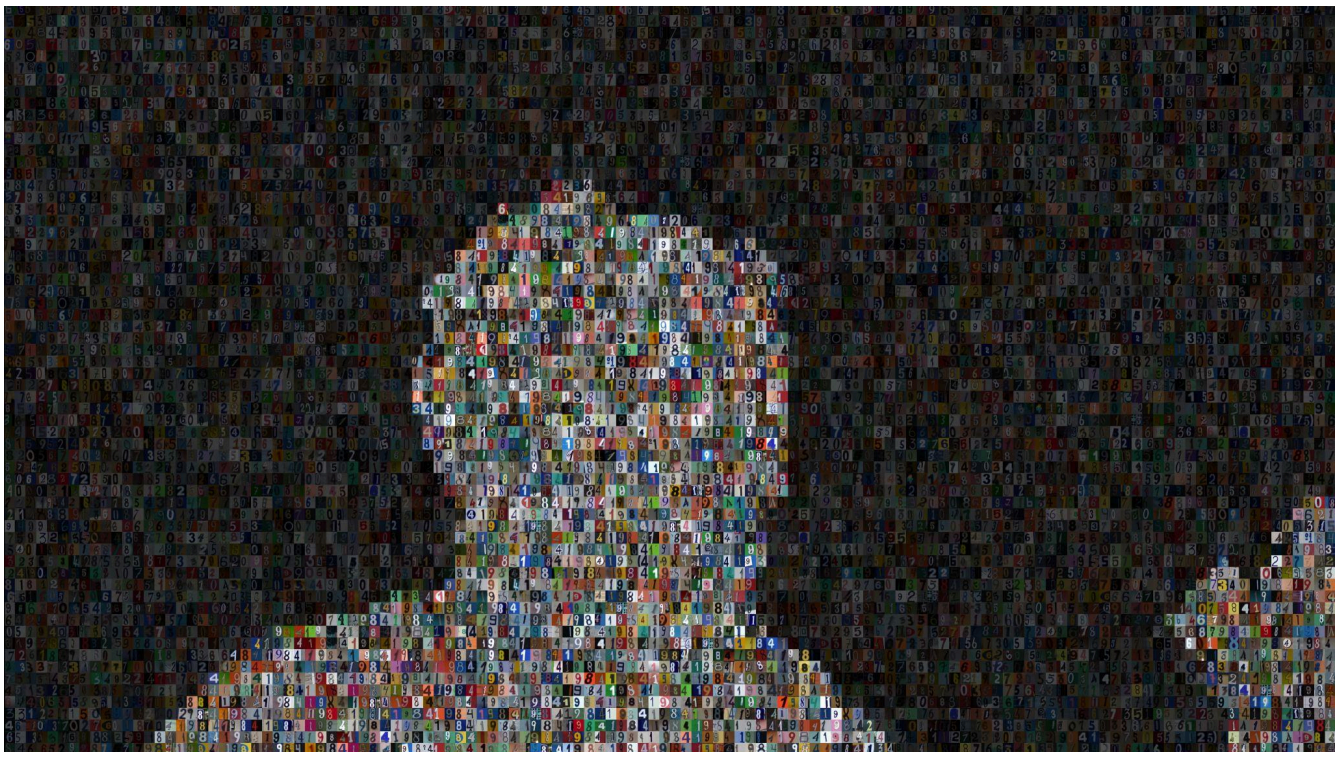
Normal Software Operation

The artwork is set to automatically start when the computer is powered on and the computer is typically set to reboot daily, at night. We do recommend turning off the artwork when you don't plan to look at it for a longer period of time, to extend the lifetime of the components.

The software - typically Project_1984x1984_v#.exe - has been built with Processing: depending on software version, the Processing version differs - from 1.5 to 4.3.

Java Runtime Environment (JRE) is usually required to have the software running properly. Depending on the Windows OS version and the software version, JRE's version will differ - typically 1.7 or 1.8. With newer computers, newer versions of JAva environment may be usable.

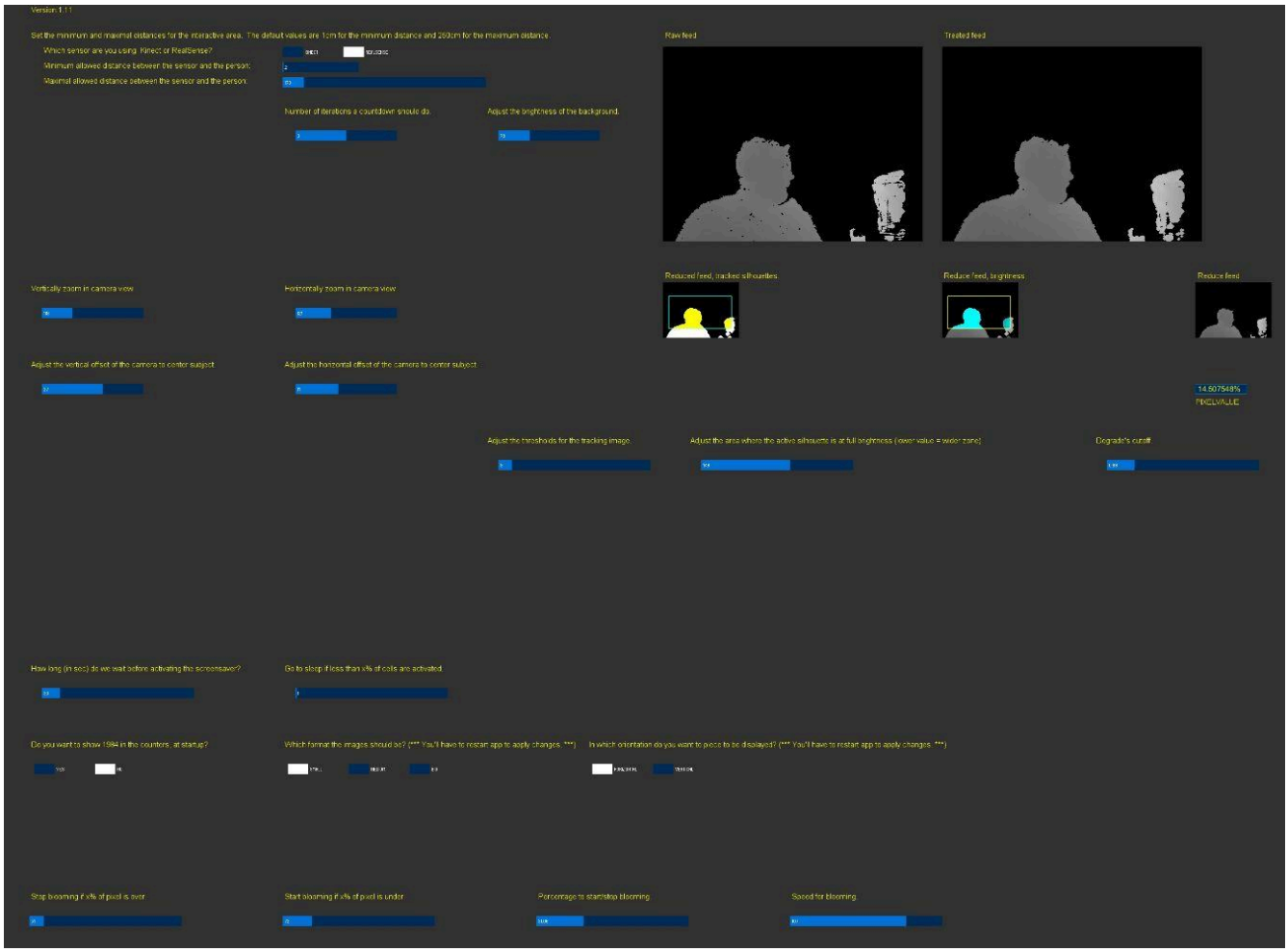
The depth sensor would be precalibrated and if it is well oriented towards the person in front of the display, the artwork should show a silhouette within the grid on the display, while the person stands in front of the display. This should look as follows.



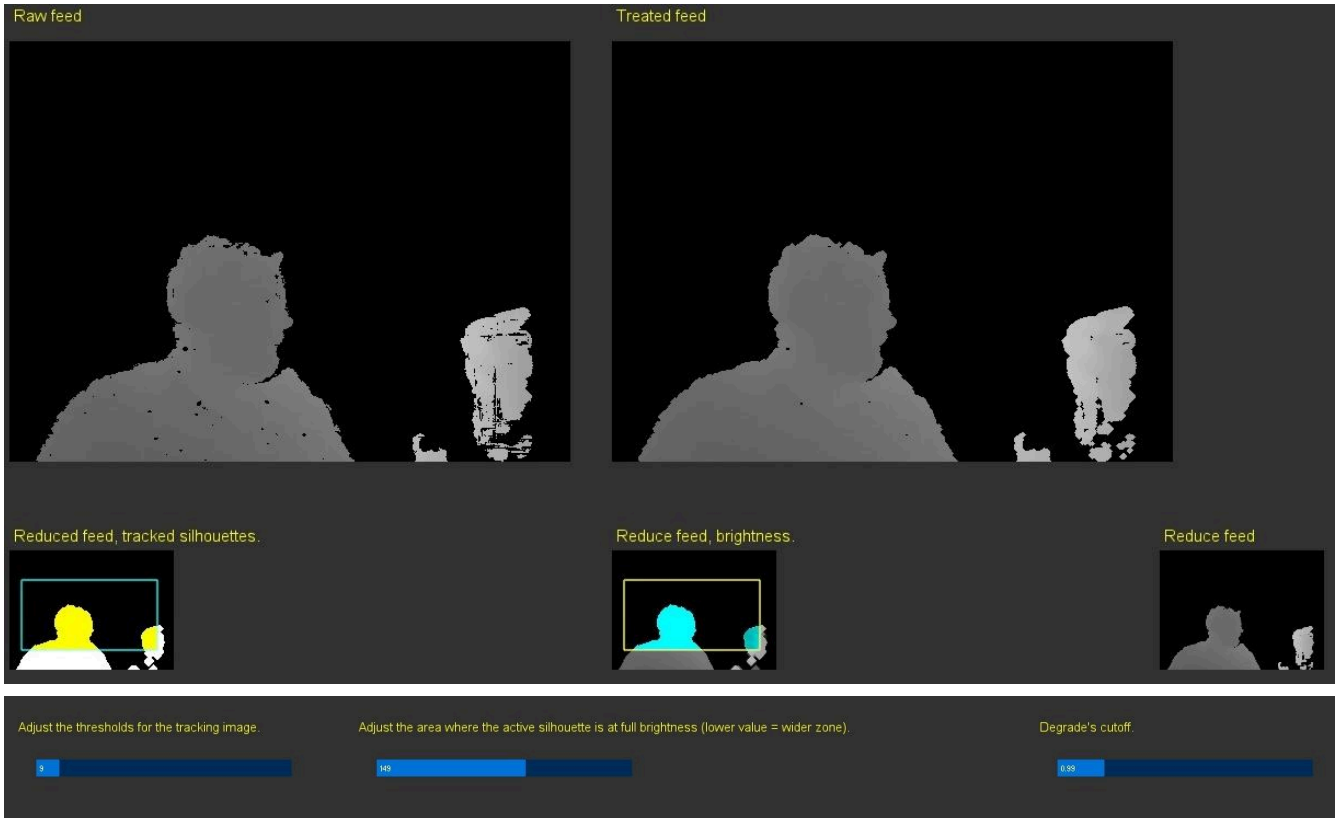
Manual Software Calibration

When the piece is up and running, after 10 seconds, press on any key of the keyboard (except “Escape” or the “Windows key”): the menu will pop-up. The “Escape” key will quit the software.

The first line visible on the top left corner of the display is displaying the software version number.



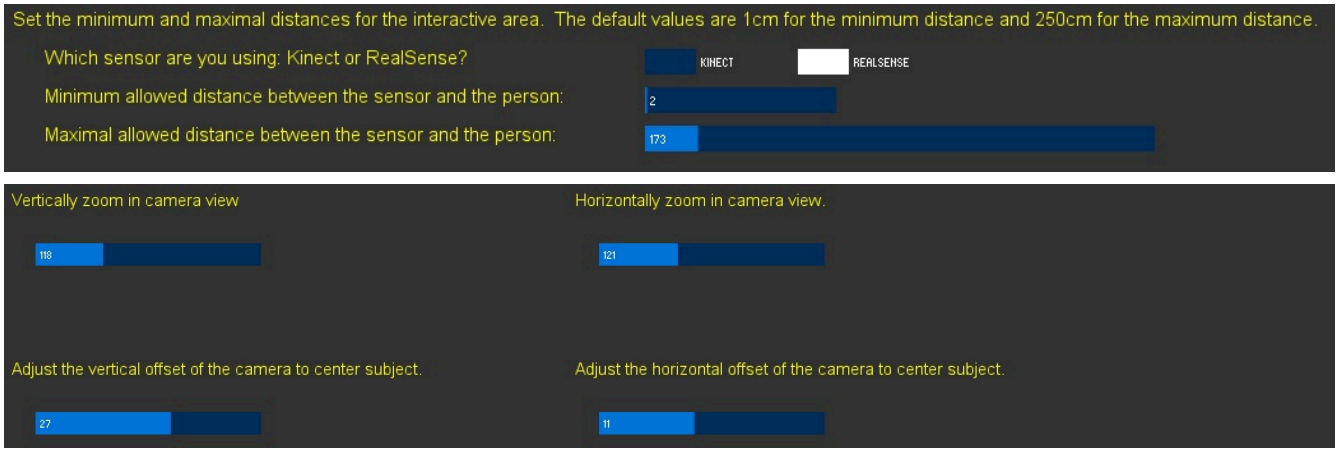
Camera Views



Camera view	Description
Which sensor are you using: Kinect or RealSense	Allows you to select the depth sensor in use, either A Kinect One or a RealSense D455. Once you select a different sensor to use, you have to restart the software in order to apply the change.
Raw feed	The raw feed, from the depth sensor.
Treated feed	Same as the raw feed, this one is slightly modified with some pixel erosion, then dilatation, to make the silhouette prettier.
Reduced feed	The treated feed resolution is then reduced to a width corresponding to the size of the grid displayed in runtime. If a zoom has been applied to the camera view, the reduced feed will grow bigger.
Reduced feed, tracked silhouettes	The reduced feed gets some erosion and dilatation filters applied. The tracked silhouettes image highlights in yellow the pixels that will be displayed in the rendered screen. The

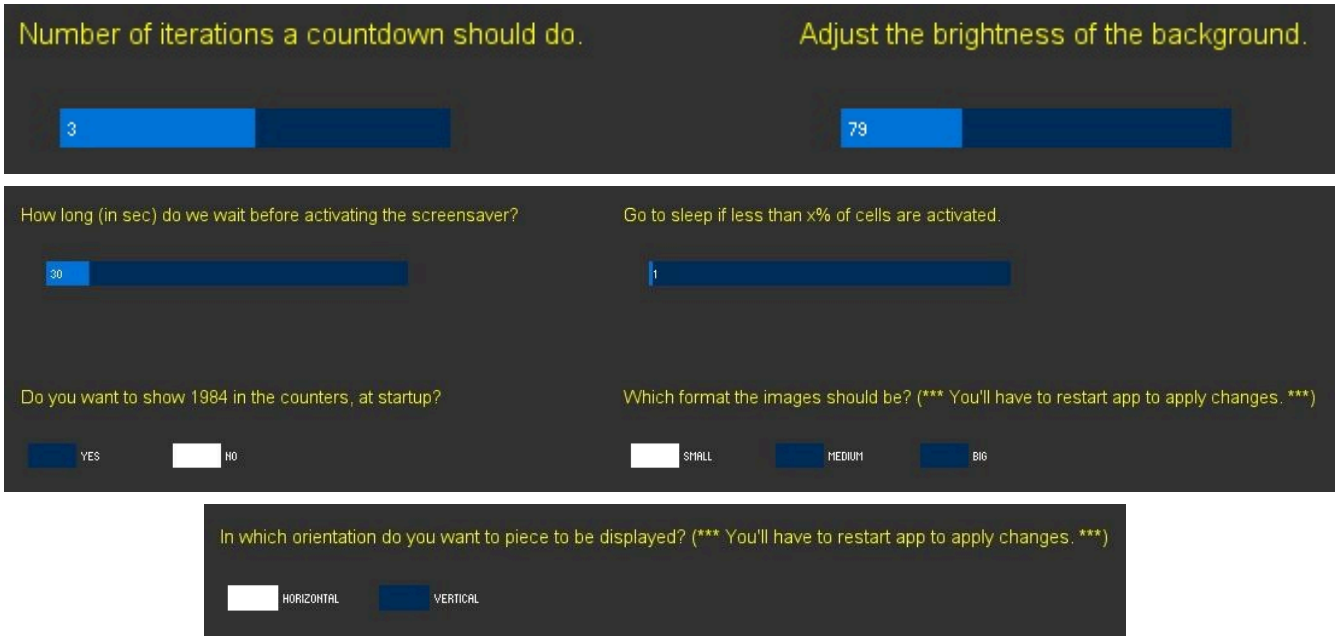
Camera view	Description
	cyan rectangle outline shows the window of interest from the camera view that will be shown in the runtime mode.
Reduced feed, brightness	The reduced feed gets some erosion and dilatation filters applied. The brightness image shows in cyan the brightness of the tracked silhouettes, affected by the distance of people in front of the sensor. The yellow rectangle outline shows the window of interest from the camera view that will be shown in the runtime mode.
Adjust the thresholds for the tracking image	This setting controls the depth of tracking. It creates a range within the depth sensor's range: called active silhouette. What will be within this range will make the cells brightness change and trigger the countdowns: what will be out of it will only make the cells brightness change. **It should stay at a value around 5, and never at 0.** We should cut the background as much as possible before adjusting this value. A bigger value will give a smaller depth in the tracking while a small value gives the opposite effect.
Adjust the area where the active silhouette is at full brightness	Within the active silhouette, we apply a range to split the silhouette in two areas. The setting will set the limit between both areas. The range between the depth sensor's face and this limit will be shown at full brightness, while the other area will have a dégradé applied between full brightness near this limit and background's brightness at the backend. **The default value is 128.**
Degradé's cutoff	Will affect how the dégradé will be impacted. The bigger the value is, the brighter the dégradé we will be. The smaller the value is, the darker the dégradé will be. **The value should stay at around 0.95.**

Depth Sensor Settings



Settings	Description
Which sensor are you using	Kinect or RealSense, should match the depth sensor you got with the artwork.
Minimum allowed distance between the sensor and the person	Sets the distance between the depth sensor face and the closest point where the piece should react. This value usually is 1, but could be bigger if you would like to avoid elements placed close to the depth sensor. This value should be smaller than the maximal value.
Maximum allowed distance between the sensor and the person	Sets the distance between the Kinect face and the furthest point where the piece should react. This value usually is 250, but can go up to 700, depending on what the space in front of the monitor looks like and how it is rendered in the software. This value should be bigger than the maximal value.
Vertically zoom in camera view / Horizontally zoom in camera view	These settings allow you to zoom in the Kinect view, in order to either avoid unwanted objects: something hanging from ceiling or sitting on floor, or something unmovable from the left/right sides.
Adjust the vertical offset (and horizontal offset) of the camera to center subject	These settings control the region of interest that will be displayed in the runtime mode. **These values will vary depending on the position of the Kinect and what will be in front of the artwork.** The desired region of interest is represented with rectangles within the reduced feeds.

Grid Layout and Animations Settings

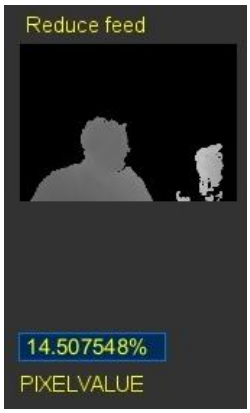


Settings	Description
Number of iterations a countdown should do	This setting controls the way a countdown is done. A countdown iteration consists of going from number A to number B (e.g. from 5 to 1: 5-6-7-8-9-0-1). The software randomizes the number of iterations between 1 and the set value. **The default value is 3.**
Adjust the brightness of the background	This setting controls the default darkness of the grid, when no one is in front. A value around **115-125** is recommended.
How long (in sec) do we wait before activating the screensaver	This setting adjusts how quickly, when no one is in front of the artwork, the piece will go to it's screensaver mode. **This value should be set between 30 and 60 in calm locations, while it should be around 10 in busy locations.**
Go to sleep if less than x% of cells are activated	This setting is the maximum allowed percentage of cells that can be triggered without preventing going into the screensaver mode or waking up the piece from the screensaver mode: this way, any possible noise won't wake up the screensaver mode or prevent the piece from going in this mode. **This value should stay at 10.**
Do you want to show 1984 in the counters, at startup?	This value is used for debugging. If Yes is selected, the piece, by default, will show 1984 in the counters. If No is

Settings	Description
	selected, the piece will show random numbers in the counters. **As the piece do countdowns to 1984, this value should remain at No.**
Which format the images should be? (* You'll have to restart app to apply changes. ***)**	In there, you have 3 options, small, medium and big. The terms refer to the size of a single digit image. Small should be picked in most setup: using smaller sized digit image to display a grid populated by at least 1984 counters (a group of 4 digits that forms, at some point, the number 1984). Medium will use regular sized digit image to display a grid of 720 counters. Finally, Big will use bigger sized digit image to display a grid of at least 496 counters. **Once you select a new image format, you must restart the software in order to apply the change.**
In which orientation do you want the piece to be displayed?	This setting allows you to rotate the piece in landscape (horizontal) or portrait (vertical) mode. Once you select a new image format, you have to restart the software in order to apply the change. You may want to adjust the Microsoft Windows screen settings as well in order to match the piece orientation in Windows settings.
In which orientation is set the sensor?	Located under the piece orientation setting, this setting is only visible and used when the piece is set in vertical (portrait) mode. This will allow you to set the orientation of depth sensor's feed in the software. If you see your silhouette upside down, change the setting to the other option, left or right.

Blooming Effect Settings

Blooming is a feature where we “bloom” the cells when the viewer gets too close to the Kinect camera. In order to properly set the effect, first fix the camera zooms, camera offsets, maximal/minimal allowed distances, threshold for the tracking image and the degrade’s cutoff as they will impact the procedure setting the blooming effect.



Settings	Description
Stop blooming if x% of pixel is over:	This setting is used when the depth sensor is a Kinect. In order to find the value for the stop blooming, position your mouse pointer over the reduce feed image, right at the center. Then, move your palm to see it in the reduced image and stop once the tip of the mouse pointer is located in the middle of your palm. Keep this position and move it back and forth towards the Kinect, while keeping the palm around the pointer’s tip. While doing that, you will notice the value change in the pixelvalue textbox: it will go from 0 to 255. Once you reach 0, slowly move your hand away from Kinect until you see the value jumping from 0 to a higher value (between 50 and 130). This is the edge where the hand is getting detected by the Kinect. Take this value (let say you read 70), add 10 to it and it will become your “Stop blooming value”. In this hypothetical case, it would be 80.
Start blooming if x% of pixel is under:	For this value, take the value you used in “Stop blooming”, add it 20: in the previously exposed hypothetical case, it would be 100.

Settings	Description
Percentage to start/stop blooming	When using a Kinect as depth sensor, this is the x% referred to in settings start/stop blooming. **Value should remain at 1.00**. When using a RealSense as a depth sensor, this value will actually be set differently. Move your hand closer to the RealSense sensor, to the position you consider being "too close" to the sensor, where you'd like the blooming to start. While keeping this position, read the value in the pixelvalue textbox. This would give you the percentage to use in here.
Speed for blooming	As the name says, this value impacts the speed of blooming. **Should stay around 110 when using small images.**
Pixelvalue	When using a RealSense, this will display the amount of pixels considered to be too close to the sensor (the device returns a distance of 0cm away from the sensor). When using a Kinect, if the mouse pointer isn't located above the Reduce feed image, the textbox will display N/A, if the pointer is above the image, it will return the brightness value of the pixel at the tip of the pointer. If the element present under the mouse pointer is close to the sensor, the textbox will have a value closer to 0. However, if the element is closer to the maximal allowed distance, the brightness value will be closer to 255.

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 do 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 7/8/10/11, OSX), the procedure to set the computer online will vary. Please look online for tutorials, if necessary.

Preliminary Troubleshooting Steps

After pressing the button, 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 projector is powered and try to turn it on with a remote control. Also, check that the display's source is set to the same port where the cable is plugged in — HDMI, VGA, DVI, etc.

The piece doesn't react to people in front of the artwork.

Ensure that the Kinect or RealSense is well connected to the computer. For a Kinect, you should also ensure it is also well connected to the power.

If a Kinect is well connected and while the artwork software runs, you should see 3 red spots inside its front face.

If a RealSense is well connected and while the artwork software runs, you should see subtle orange dots emitting from the sensor's lens that looks different than the 3 other lenses.

Ensure the camera is properly angled towards the space, having no object obstructing its field of view. If the display seems stuck into the "blooming mode", you may verify the blooming effect settings, they might be too sensitive.

The image displayed isn't in the right orientation.

First of all, ensure that the computer resolution is matching the monitor's resolution. In Windows Screen resolution, it should be using a resolution of 3840 x 2160.

- To access Windows Screen resolution: right-click a blank part of your desktop and choose Screen Resolution.
- To change the screen resolution, click the Resolution drop-down list and select 3840 x 2160.
- Once you have the right resolution set, click on Apply then click on Keep Changes.

If the monitor is installed in landscape (horizontally) on the wall, ensure the following:

- The Screen resolution in Windows should be set to horizontal or horizontal (flipped) mode;
    1. Right-click a blank part of your desktop and choose Screen Resolution.
    2. Click the Orientation drop-down list and select one of the above options.
- The software's "In which orientation do you want the piece to be displayed?" setting should be set to HORIZONTAL.

If the monitor is installed in portrait (vertically) on the wall, ensure the following:

- The Screen resolution in Windows should be set to portrait or portrait (flipped) mode;
    1. Right-click a blank part of your desktop and choose Screen Resolution.
    2. Click the Orientation drop-down list and select one of the above options.
- The software's "In which orientation do you want the piece to be displayed?" setting should be set to VERTICAL;
- Depending on the Kinect positioning and orientation, adjust the software's "In which orientation is set the Kinect?" setting to either LEFT or RIGHT

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:

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H2J 2L1
Tel 1-514-597-0917
info@antimodular.com
www.antimodular.com

APPENDIX I - INSTALLATION

Description of Components

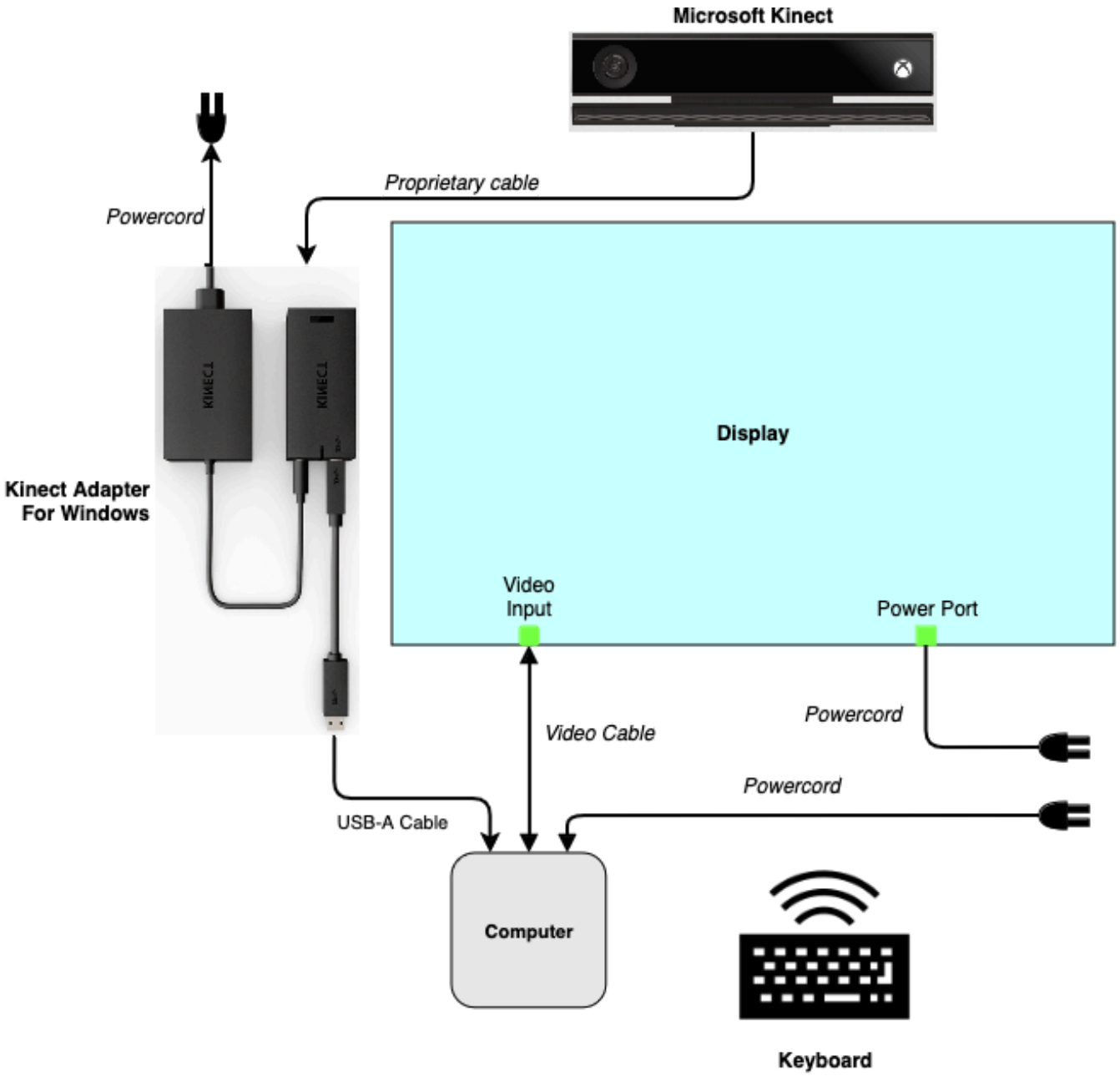
This artwork requires the following components:

Component	Description
Computer	Computer running on at least Windows 7, with an NVidia graphics card (at least GTX 960) and USB 3.0 ports
Depth Sensor	This is the sensor that allows the system to track people present in front of the artwork. Could be a Microsoft Kinect One or an Intel RealSense D455 unit.
Microsoft Kinect Adapter for Windows	Only used when the Depth Sensor is a Kinect One. This device allows the Kinect One to be connected to the computer and a power source at the same time.
Data cable	If the Depth Sensor is an Intel RealSense, a USB-C cable (USB-C connector in the sensor port, USB-C or USB-A on the computer port) would be in use. If a Microsoft Kinect is in use, then the Microsoft Kinect Adapter contains all required cabling.
Video Signal Cable	Connects the computer to the display. Usually it is an HDMI cable.
Display	Typically an UHD (4K) display of at least 55” of diagonal. Ideally the monitor would be as matte (non-reflective) as possible, as slim as possible with bevels as small as possible.
Keyboard	While not required for normal use of the artwork, it allows you to calibrate the system based on your actual location.

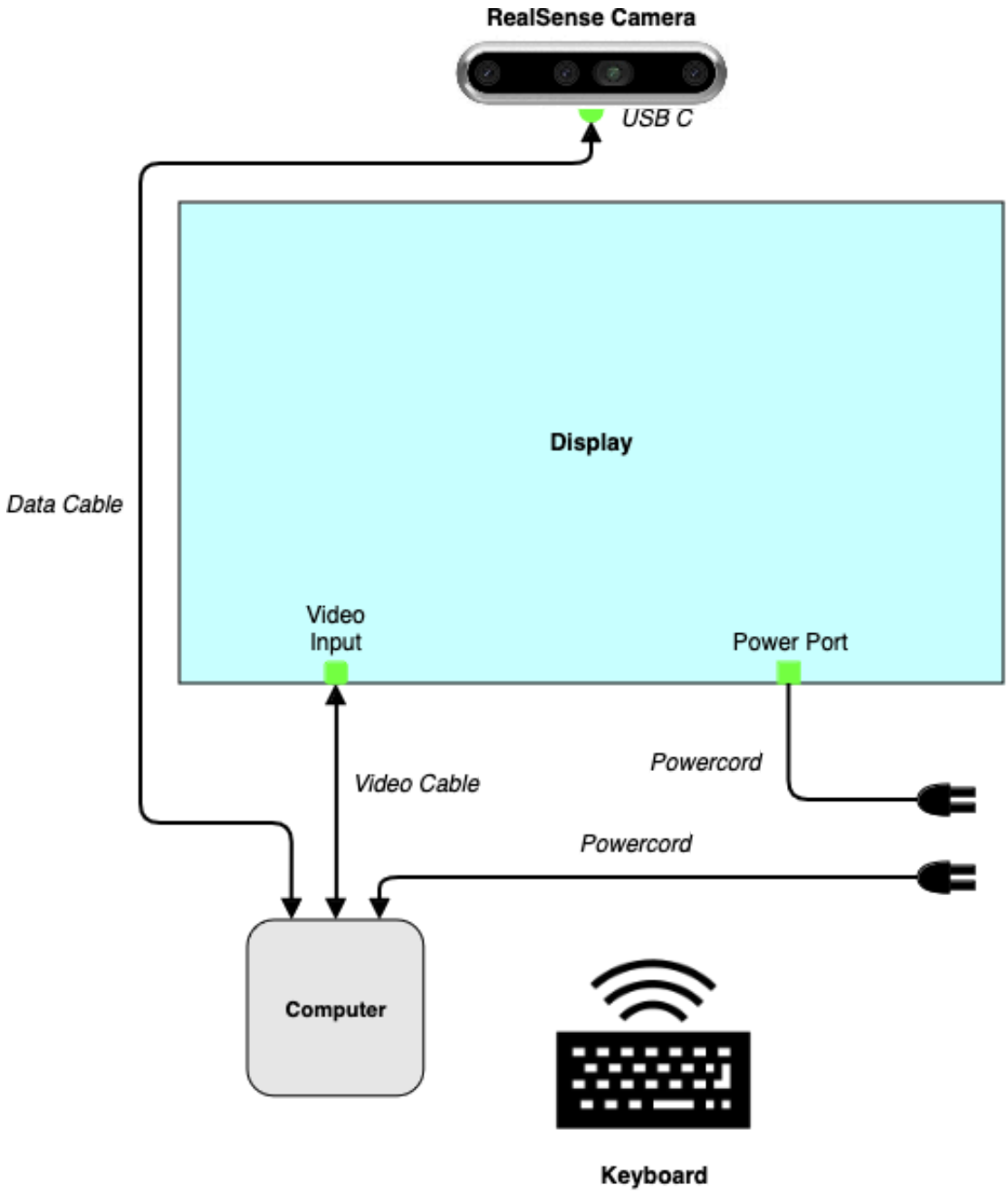
Wiring Diagrams and Connections

In order for the piece to run properly, the computer should be connected according to the following diagrams. The diagram to use will depend on the depth sensor you have with the artwork.

Microsoft Kinect One's version



Intel RealSense's version



APPENDIX II - TECHNICAL DATA SHEETS

Microsoft Kinect One

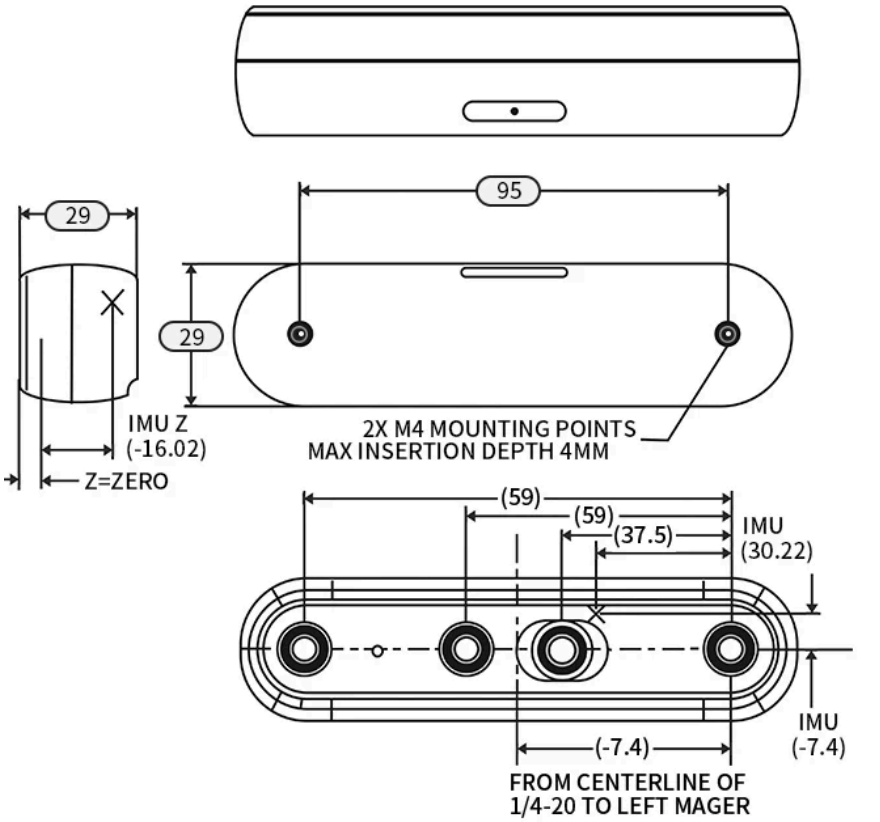
The Microsoft Kinect One sensor is the original depth sensor model that was used in this version of the artwork. This stereoscopic depth camera detects the elements in space in front of the display and can return the distance of such elements from the sensor. The original artwork softwares require that exact device to be used, while migrated versions could rely on different sensors: here are the minimal specs to match or improve for an easier migration process.

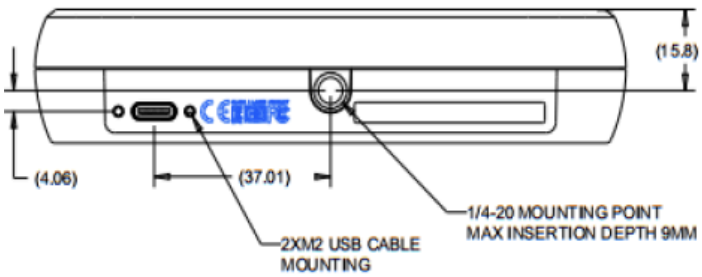
Specification	Details
Color Camera Resolution	1920 x 1080 @ 30fps
Depth Camera Resolution	512 x 424
Tracking range	+/- 50 cm to 450 cm
Depth Field of View	70 degrees (horizontal) X 60 degrees (vertical)
USB Standard	3.0
Mounting Point	¼-20 UNC thread
Dimensions (W x H x D)	249 x 67 x 66 mm

Intel RealSense D455 Camera

The Intel RealSense D455 sensor is another model that can be used in this version of the artwork. This stereoscopic depth camera detects the elements in space in front of the display and can return the distance of such elements from the sensor. The artwork software will require that exact device to be used. Future versions might rely on different sensors: here are the minimal specs to match or improve for an easier migration process.

Specification	Details
Resolution	Up to 1280 x 720, up to 90 fps
Tracking range	60 cm to 600 cm
Depth Field of View	87 degrees (horizontal) X 58 degrees (vertical)
USB Standard	3.0
Mounting Point	¼-20 UNC thread
Dimensions (W x H x D)	124 x 29 x 26 mm


95
29
29
IMU Z
(-16.02)
Z=ZERO
2X M4 MOUNTING POINTS
MAX INSERTION DEPTH 4MM
(59)
(59)
(37.5)
IMU
(30.22)
IMU
(-7.4)
(-7.4)
FROM CENTERLINE OF
1/4-20 TO LEFT MAGER
124


(15.8)
(4.06)
(37.01)
1/4-20 MOUNTING POINT
MAX INSERTION DEPTH 9MM
2XM2 USB CABLE
MOUNTING