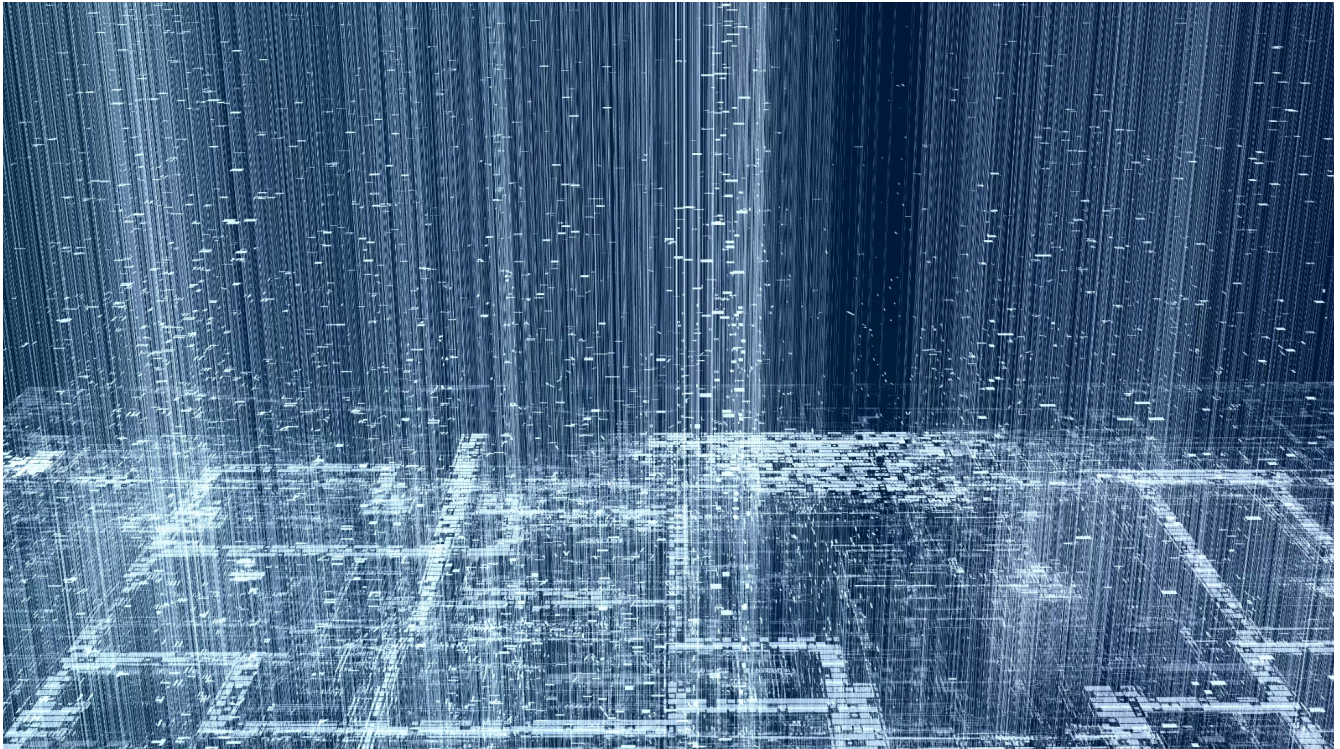


# RECURRENT LLOYD WRIGHT

BY RAFAEL LOZANO-HEMMER



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## **GENERAL IMPORTANT INFORMATION**

This short section must be read for proper operation.

# RECURRENT LLOYD WRIGHT (2024)

BY RAFAEL LOZANO-HEMMER

## Technique

Custom generative code, computer, display, depth sensor.

## Description

Recurrent Lloyd Wright (2024) is a recursive algorithmic animation that draws together the vast corpus of Frank Lloyd Wright's "Usonian" architectural blueprints and evaporates them into a fluid atmosphere. In this piece, the modernist utopian vision of Lloyd Wright's designs drift back and forth, and are endlessly remade. The sense of context and materials at the core of the architect's poetics is dissolved into a virtual and speculative existence. In rendering atmospheric Lloyd Wright's grounded design, "Recurrent Lloyd Wright" is, at once, a commentary on the fate of modernism and a blueprint to imagine future, possible architectonics.

## Operation

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

1. Connect the computer and the display to electrical power with the supplied power cables.
2. To turn the piece **ON**, press the power button of the computer for a second then release it. *Important notes: 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. The display might require to be turned on, for this use it's remote or the button at the back of the display.*
3. To turn the piece **OFF**, press the computer's button all the way down (shouldn't be required for 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 Behaviours**

Blueprints from Frank Lloyd Wright appear as a rolodex before getting deconstructed in flying particles. The perspective of the generative work is affected by the position of the closest person.

## **Interacting with the Artwork**

As a viewer moves from left to right, they can see a different perspective of the generated content. The blueprint will seem to slightly rotate in the opposite direction of a person's position, mimicking a parallax effect.

## **Maintenance**

Please do not clean 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 camera, avoid applying too much pressure onto its surface, otherwise the camera could move on its mounting base and get misaligned.

The camera lens shouldn't be cleaned with the same product: please use an air puffer to remove the dust from the lens, if need be.

We recommend cleaning the piece at least every two months.

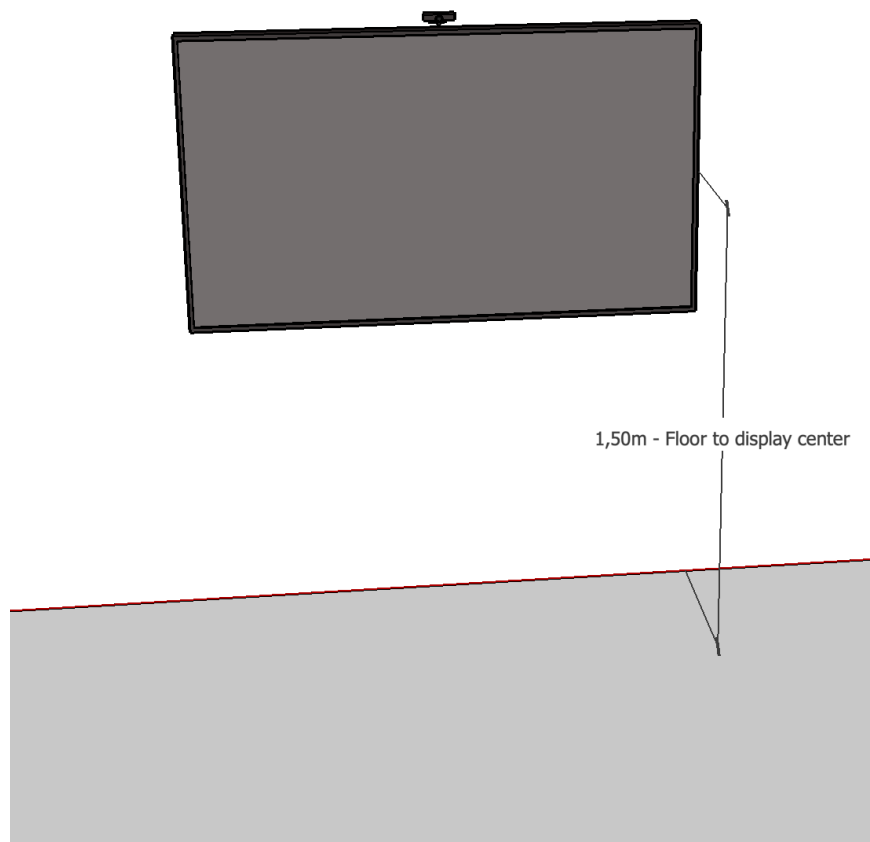
## Placement Instructions

This artwork is made up of 3 main components: the display, the computer and the depth sensor. You should begin by screwing your display mount into the wall, ensuring a stable mount for the weight listing.

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 held by a wall mount bracket, making it almost sit on the display, like shown below. Ensure the depth sensor is secure.

While setting your display on the mount, ensure you have access to the power cable and video ports, then connect these to your computer.

There should be enough free space in front of the display for people to move around fluidly. You should not install the frame too close to a perpendicular wall or another element: otherwise, the wall will be impacting the camera view and the interaction zone. You should keep at least 100cm (40") free on both sides of the artwork and at least 200cm (79") free in front of the artwork.

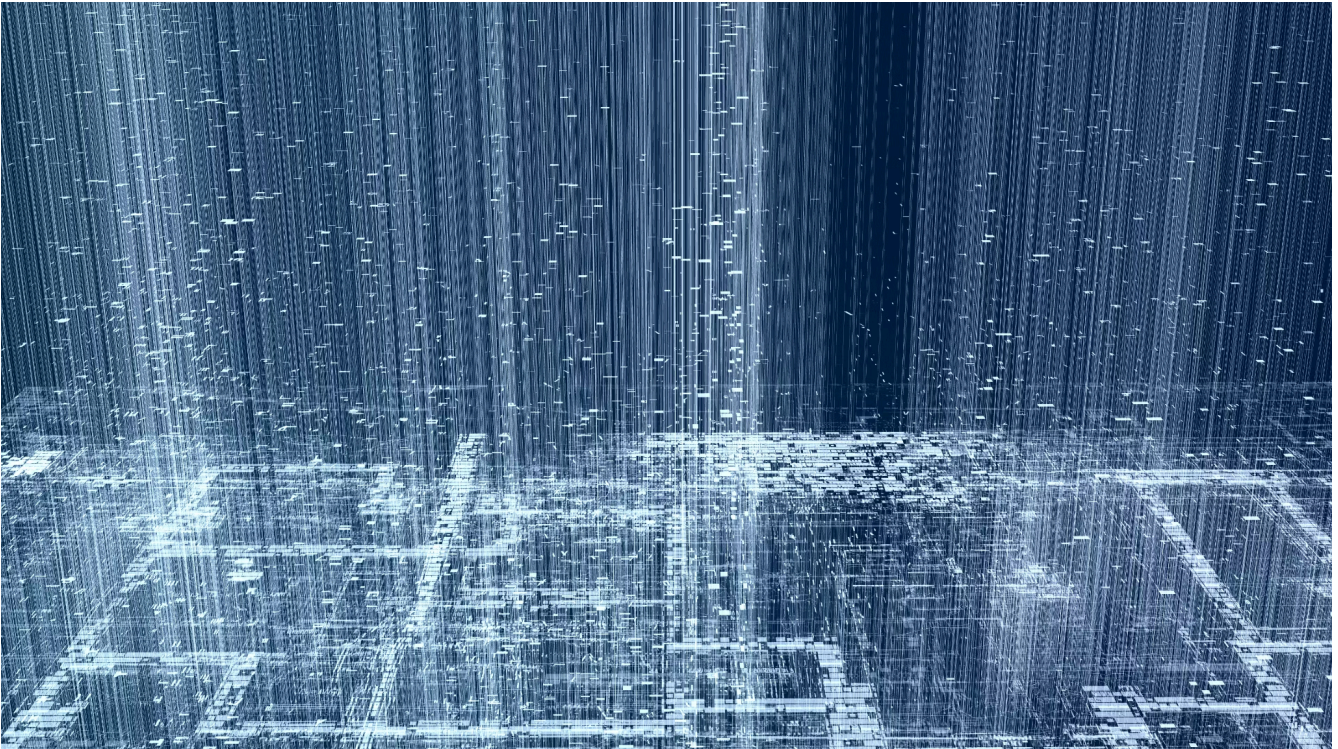


## **DETAILED TECHNICAL INFORMATION**

## Normal Software Operation

At the time of writing this manual, the software operating on the computer is coded under TouchDesigner's platform, version 2023.11880. Such software was initially released and tested on a Windows 10 computer, using an NVIDIA RTX 3060, 16GB of RAM and 512 GB of storage.

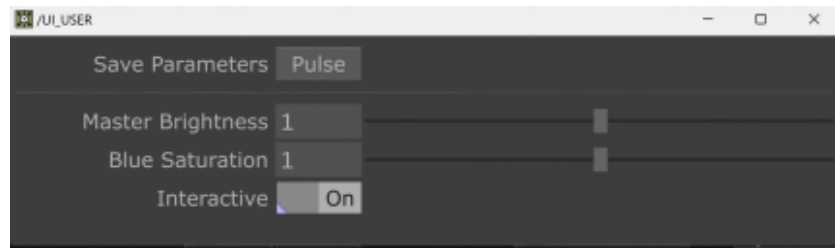
The artwork is set to automatically start when the computer is powered on and is set to reboot daily, at night. We do recommend turning off the artwork when you don't plan to look at it for a longer period, to extend the lifetime of the components..



This is how the artwork should look like.



The general artwork's settings are displayed within the User GUI which can be displayed by pressing the **ALT+U** keys. These settings control the general brightness and saturation of the background.



Setting	Description
Save Parameters	Click to save change parameters to the system.
Master Brightness	Adjusts the brightness of the piece. <b>Default value is 1.</b>
Blue Saturation	Makes the background more or less saturated. <b>Default value is 1.</b>
Interactive	React to visitors or not. <b>On by default</b>

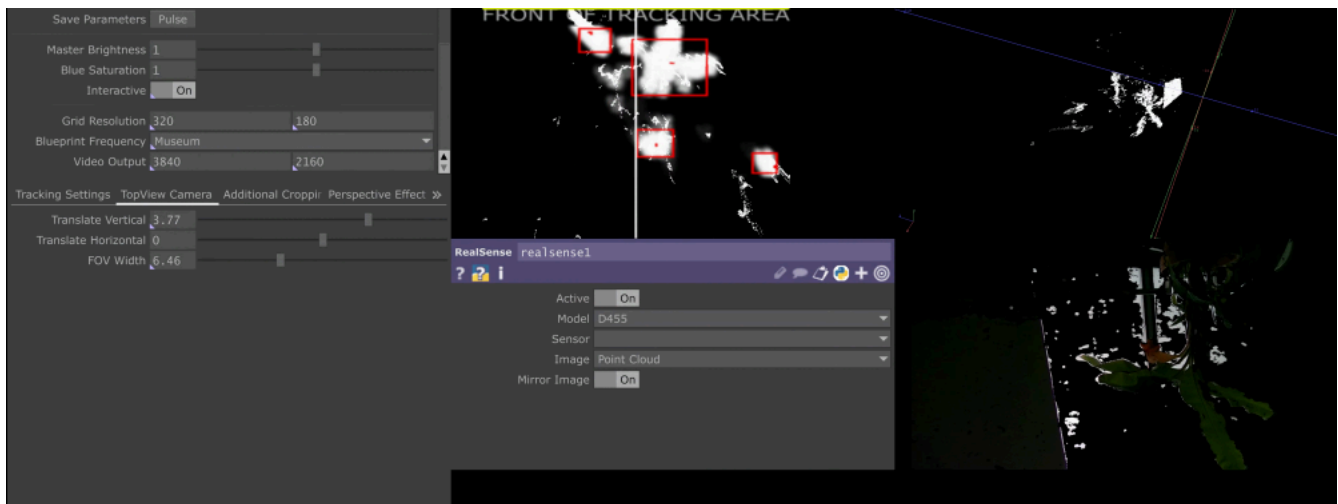
## Manual Software Calibration

Some variables related to the behavior of the artwork are adjustable through an interactive GUI. Press the **ALT+G** keys to pull up the advanced GUI for debugging purposes.

Any changes can be applied and saved permanently by pressing the **CTRL+S** keys or by clicking on the **Pulse** button beside the **Save Parameters** label.

### Advanced GUI - Main section

On the left side of the GUI, you will retrieve the different settings, most of them organized under different tabs. At the center, you get a visual representation of the camera data, transformed for blob tracking. Finally, on the right, you get a visual representation of the camera raw data input.



Settings	Description
<b>Version</b>	Shows current version of the artwork.
<b>Save Parameters</b>	Click to save changed parameters to the system.
<b>Master Brightness</b>	Adjusts the brightness of the piece. <b>Default value is 1.</b>
<b>Blue Saturation</b>	Makes the background more or less saturated. <b>Default value is 1.</b>

Settings	Description
Interactive	React to visitors or not. <b>On by default.</b>
Grid Resolution	Size of particles. <b>Default values are 320 x 180.</b>
Blueprint Frequency	Speed of animation. From the slowest to the fastest animation, you will retrieve: Domestic, Museum, Artfair. <b>Default value is Museum.</b>
Video Output	Final Resolution used for rendering. <b>Default value is 3840 x 2160.</b>

### Advanced GUI - Tracking Settings

These settings adjust the depth sensor rendering in the virtual 3D space: adjusting the camera angle, filtering out data outside the desired interactive area.

Settings	Description
Default Parameters	Click to set all parameters back to default.
Sensor Angle (x)	Corrects the vertical rotation of the sensor, which refers to the sensor's angle in comparison to the ground. <b>Default is -20.</b>
Sensor Angle (y)	Corrects the horizontal rotation of the sensor, which refers to the sensor's angle in comparison to the horizon line (level). Typically it wouldn't be more than 2-3 degrees correction. <b>Default is 0.</b>
Sensor Angle (z)	Correction of the Z-Axis rotation of the sensor. <b>Default is 0</b> , but could be slightly adjusted, especially if the wall is slightly crooked.
Min Height	Filters values below a certain threshold: generates a limit plane prior which we don't consider point cloud data for tracking. <b>Typically a negative value, around -1.</b>
Max Height	Filters values above a certain threshold: generates a limit plane acting as a ceiling past which we don't consider point cloud data for tracking. <b>Typically a positive value.</b>
Min Depth	Generates a front wall closer to the display prior which we don't consider point cloud data for tracking.

Settings	Description
Max Depth	Generates a back wall further away in front of the display from which we don't consider point cloud data for tracking.
Point Size	Changes the render of the topview camera, this can affect the blobtracking.
Resolution	Resolution of tracking. <b>Default is 1280 x 720.</b>

### Advanced GUI - Top View Camera Settings

These settings let you align the point cloud data captured by the depth sensor onto the virtual 3D space (visual representation on the right side).

Settings	Description
Translate Vertical	Moves the virtual camera vertically in software.
Translate Horizontal	Moves the virtual camera horizontally in software.
FOV Width	Zooms in or out the camera view to cover more or less wide.

### Advanced GUI - Additional Cropping

This is where you refine the final tracking zone. While the minimum and maximum height and depth should have been set up in the Tracking Settings, the cropping section allows to restrain the left and right sides of the tracking zone. Adjusting these values affects blob tracking representation at the center of the menu. Adjusting these makes sure the center of the tracking zone is centered with the screen, represented by the vertical line.

Settings	Description
Crop Left	Crops region of tracking on the left side of the screen.
Crop Right	Crops region of tracking on the right side of the screen.
Crop Top	Crops region of tracking closer to the sensor. (Equivalent to Min Depth). <b>Usually this remains unmodified.</b>
Crop Bottom	Crops region of tracking closer to the floor. (Equivalent to Max Depth). <b>Usually this remains unmodified.</b>

## Advanced GUI - Perspective Effect

These settings adjust how the floorplan view will adjust itself to the presence of a viewer in front of the display, namely the vanishing line between the viewer, the particles and the floorplan.

Settings	Description
<b>Factor Multiplier</b>	Makes the virtual camera go further away or less when following someone. Increasing this value will amplify the angle of the vanishing line, while decreasing it would diminish the angle. <b>Default value is 1.</b>
<b>Lag Smoothness</b>	Smooths the tracking animation speed. Increasing the value would make the tracking slower, decreasing it would make it faster. <b>Default is 25.</b>

## Advanced GUI - RealSense

These settings are mostly used as a debugging tool, do not play with these unless necessary.

Settings	Description
<b>Active</b>	Makes the camera active when toggled ON. Toggling it OFF then ON could help reset the camera. <b>Default is ON.</b>
<b>Model</b>	Picks the RealSense camera model to use. <b>Default model is D455</b> , but other models of Realsense could technically be used.
<b>Sensor</b>	When this setting remains empty, the system will pick up any first RealSense sensor connected. <b>That said, we advise to ensure the field shows the RealSense sensor ID to be used.</b>
<b>Image</b>	Capture mode of the Realsense. <b>Should remain as Point Cloud.</b>
<b>Mirror Image</b>	Horizontally flips the realsense image. As we want to create a mirror view, this should be kept <b>ON by default.</b>

## Preliminary Troubleshooting Steps

### After plugging the cables in, if nothing seems to happen.

Ensure your PC and display are up and running. Check that your display's selected input is set to the display's video port where your video cable connects into.

### If the artwork does not show up, or displays in an unusual way.

You can connect a keyboard and mouse to the PC. hit the **ESC** key to stop the artwork. You can navigate to the windows 'start' icon, on the power button icon, select 'restart' and let your computer turn off then on again. It should come on and start the artwork again. If it does not come back on, inspect all cable connections and secure them. If it still does not come back on, you may need technical support from our team.

### The artwork shows sign of stutters

You can connect a keyboard and mouse to the PC. hit the **ESC** key to minimize the artwork. Navigate to the Desktop and **Right-Click**. Click on **Show more options** to reveal the **NVIDIA Control Panel**. On the left sidebar, head to **Display - Change Resolution** and make sure the settings of the connected display are set to 3840 x 2160, or your display's resolution, and 60HZ. Also head to **3D Settings - Configure Surround, PhysX** and ensure the Processor in use is the NVidia graphic card.

Apply settings, close NVIDIA's control panel and then reboot the computer.

### The tracking is not working

Ensure the USB connection behind the camera is plugged correctly. Unplug and replug is a good way to test this. Ensure the USB connection behind the PC is also plugged correctly. The realsense camera requires a USB 3.0 connection (these ports are usually **BLUE** colored).

## **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, OSX), the procedure to set the computer online will vary. Please look online for tutorials, if necessary.

## 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  
4462 rue Saint-Denis  
Montréal, Québec, Canada  
H2J 2L1  
Tel 1-514-597-0917  
info@antimodular.com  
www.antimodular.com

## **APPENDIX I - INSTALLATION**

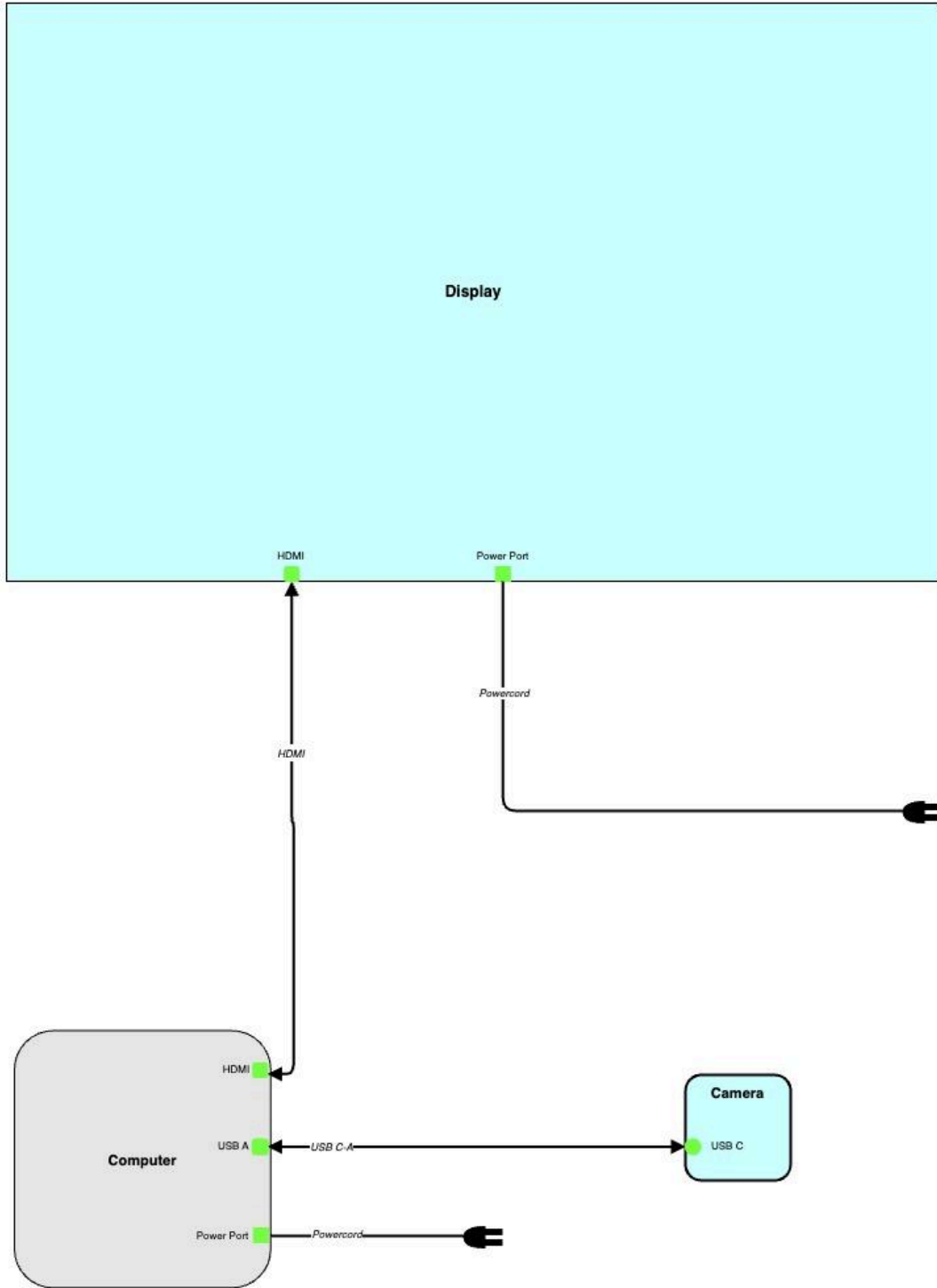
## Description of Components

This artwork requires the following components:

Component	Description
<b>Display</b>	A 4K display of at least 75" of diagonal. Ideally the monitor would be as matte (non-reflective) as possible, as slim as possible with bevels as small as possible.
<b>Video signal cable</b>	Connects the computer to the display. Usually it is an HDMI Ultra High Speed cable.
<b>Computer</b>	PC running on at least Windows 11, with an NVidia graphics card (at least RTX 4060) and one USB 3.0 port.
<b>Data cable</b>	A USB-C cable (USB-C connector in the sensor port, USB-C or USB-A on the computer port) carries the data between the computer and the depth sensor.
<b>Sensor</b>	A depth camera to track visitors in front of the piece. A Realsense D455 from Intel is ideal.
<b>Keyboard</b>	While not required for normal use of the artwork, it allows you to calibrate the system based on your actual location.

## Wiring Diagrams

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



## **APPENDIX II - TECHNICAL DATASHEETS**

## Depth Sensor

The Intel RealSense D455 sensor, a 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 this 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. A technical drawing can be found on the next page.



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, USB-C Connector
Mounting Point	1/4-20 UNC thread
Dimensions (W x H x D)	124 x 29 x 26 mm

