

FLATSUN

BY RAFAEL LOZANO-HEMMER



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GENERAL IMPORTANT INFORMATION

This short section must be read for proper operation.

FLASTUN (2011)

BY RAFAEL LOZANO-HEMMER

Technique

Custom built LED screen, computerised surveillance tracking system, fluid dynamic algorithms (Navier Stokes, fractal flames, reaction diffusion and Perlin noise).

Description

A circular display that simulates the turbulence at the surface of the Sun using mathematical equations. The piece reacts to the presence of the public by varying the speed and type of animation displayed. If no one is in front of the piece the turbulence slows down and eventually turns off. As the built-in camera detects people more solar flares are generated and the fake Sun shows more perturbation and activity. At 140 cm diameter, Flatsun is exactly a billion times smaller than the real Sun.

Operation

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

1. Connect the computer, the video controller and the display to electrical power. Use the supplied power cables.
2. There are 3 different ways to control this artwork: with an electrical timer, 24/7 or with a sequencing system on the computer.
 - a. Using an electrical timer: an electrical timer controls the display, the video controller and the USB extender (optional). The computer is set to run 24/7, with a reboot (controlled thru Windows task scheduler) right after the electrical timer turns ON. **Allows different turn ON turn OFF times** depending on the day of week: weekend could mean the piece is OFF, etc.
 - b. The computer controls the timing: a custom made USB relay controlled by the computer feeds power to the video controller, the display and optionally the USB extender. Windows is set to shut down at some point during the day (Windows task scheduler). The computer, thru BIOS, is set to turn ON at a specific time in the day. This feature doesn't allow leeway for the turn ON / turn OFF times: **365 days a year it would be from X:XX to Z:ZZ**
 - c. Running 24/7. While this option is feasible, we suggest avoiding it in order to extend the life expectancy of the display as the manufacturer sells the display stating that LEDs should be good to go 24/7 at least for 8 years. In such a setup, the computer would be set to automatically restart daily somewhere in a downtime

moment. 3 to 4 devices to be plugged to AC: computer, display, video controller, USB extender (optional).

3. In all cases, except if you're using the timer setup: if the computer is turned OFF and you want to turn it ON, a simple push on the computer power button (0,5 second) would start the computer and after booting into Windows, the software running the being launched with a 15-30 seconds delay. If using an electrical timer, adjustments on the timer might be required.
4. To turn the piece OFF, press the power button on the computer (one second): computer will turn OFF after a few seconds. If you use the 24/7 or the electrical timer solution, ensure that no power is sent to the display, the video controller and the USB extender to extend life expectancy.
5. In all cases, 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.

General Artwork Behaviours

The screen shows a rendering of a sun, composed of 4 different seasons, which each has its own colour, speed of rotation ("lava flow" from left to right), texture, particles/texture speed and camera effects. The seasons are transitioning from one to the other randomly, on a time sequence. People can interact with the artwork by standing in front of it, about 250 cm (99") away from it: their presence will disturb the rendering of the different textures.

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 or the lens can be rotated and go unfocused.

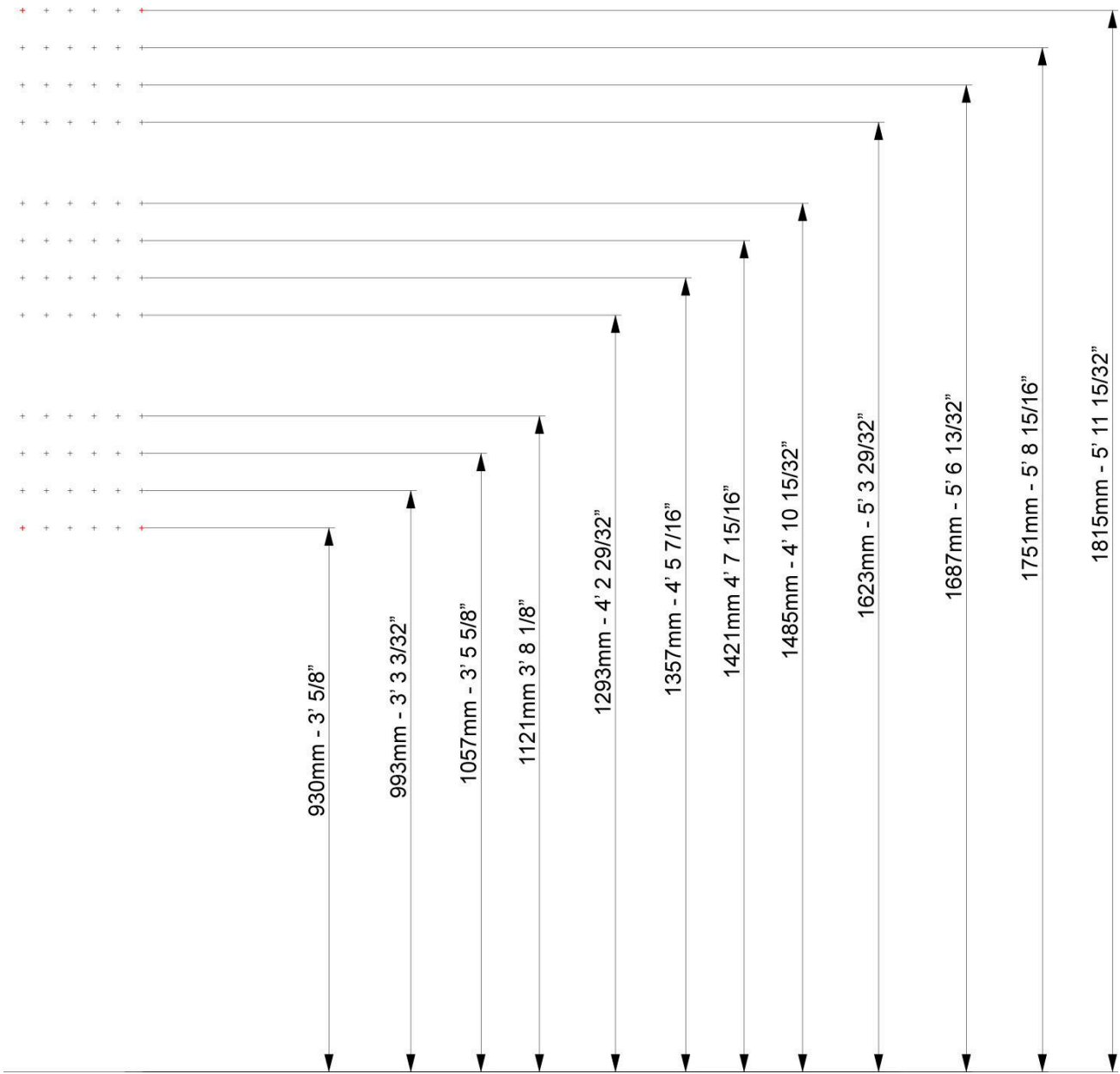
The camera lens shouldn't be cleaned with the same product: please use an air puffer to remove the dust from the lens, if need be.

The metal frame can be cleaned with regular all-purpose cleaner or even with a simple damp cloth. Do not use harsh cleaners or rough sponges.

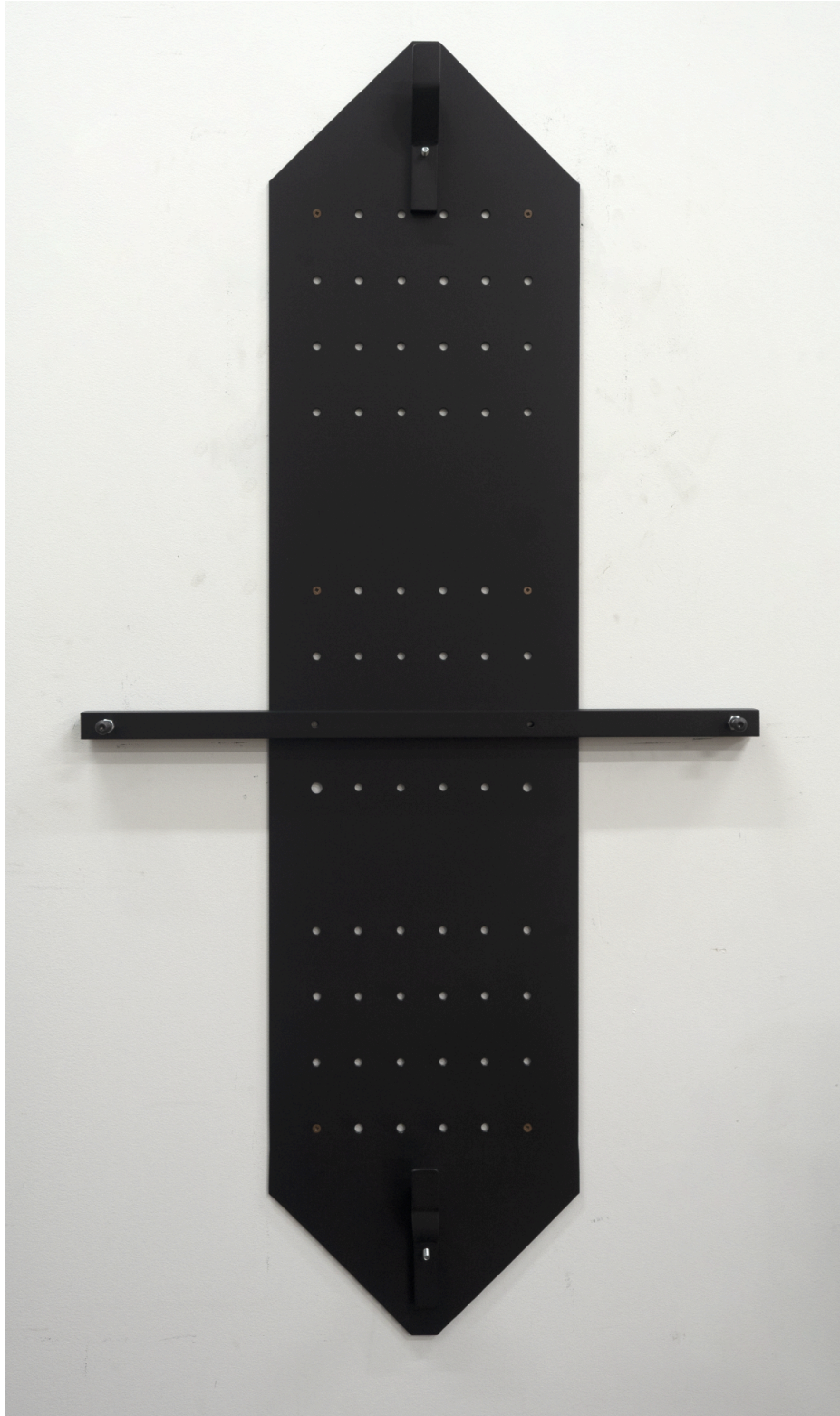
We recommend cleaning the piece at least every two months.

Placement Instructions

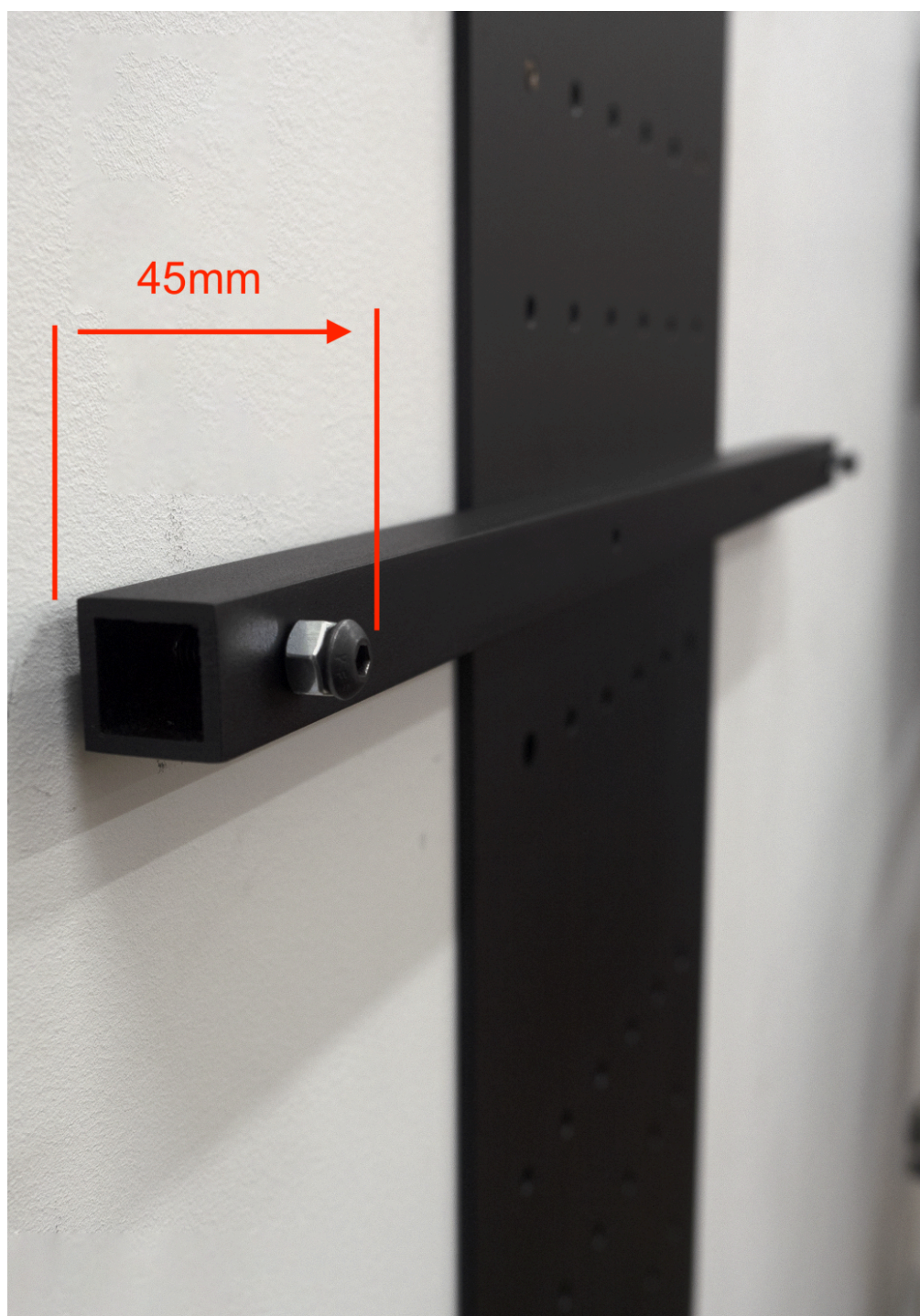
The artwork display should have its vertical centre aligned at 135 cm (53' 1/8") from the floor. The monitor weighs about 150 lbs and we recommend using at least 4 anchor points: the outer corners of the bracket. Depending on the hosting wall structure and composition, you might decide to use more anchor points: this explains why the mounting bracket has plenty of holes to allow different anchor points locations. Here you see the different heights for the different anchor rows.



While installing the bracket on the wall, ensure it is levelled: to do so, place a bubble level on the horizontal bar and rotate the bracket.



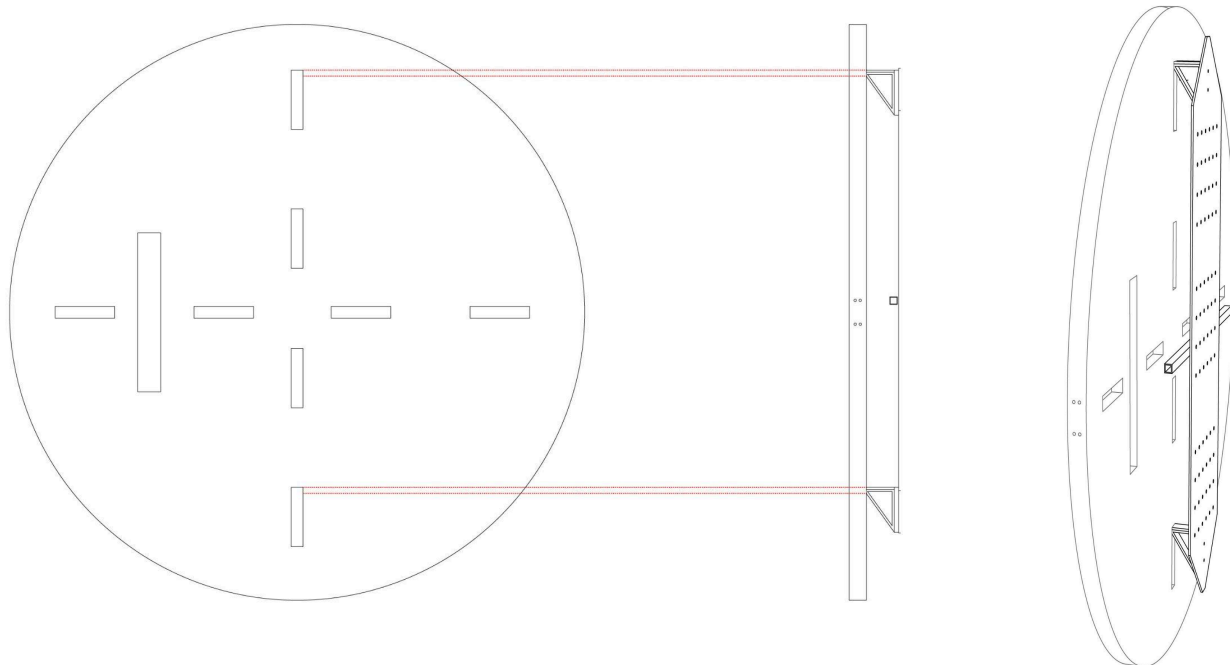
Once the bracket is attached to the wall, adjust the screws of the horizontal bar so the top of their head comes 45 mm (1 25/32") away from the wall and tighten the nuts onto the metal bar to lock screws in place.



To install the display onto the bracket, we recommend being three people: two on each side doing the heavy lifting and one in the centre (looking at it from above or under), guiding the first two.

The bracket has 2 hooks and the display has 4 slots vertically aligned on its centre, at the back. The hooks need to be inserted into the top and bottom slots. This is where the third person comes handy. Ensure to insert both hooks at the same time and don't apply any pressure to the frame to avoid any tension into the electronics.

In the process, pay attention to avoid pinching any cabling (from the camera or the display). Once the display is on the bracket, ensure it is stable and the hooks are well inserted in the proper slots.

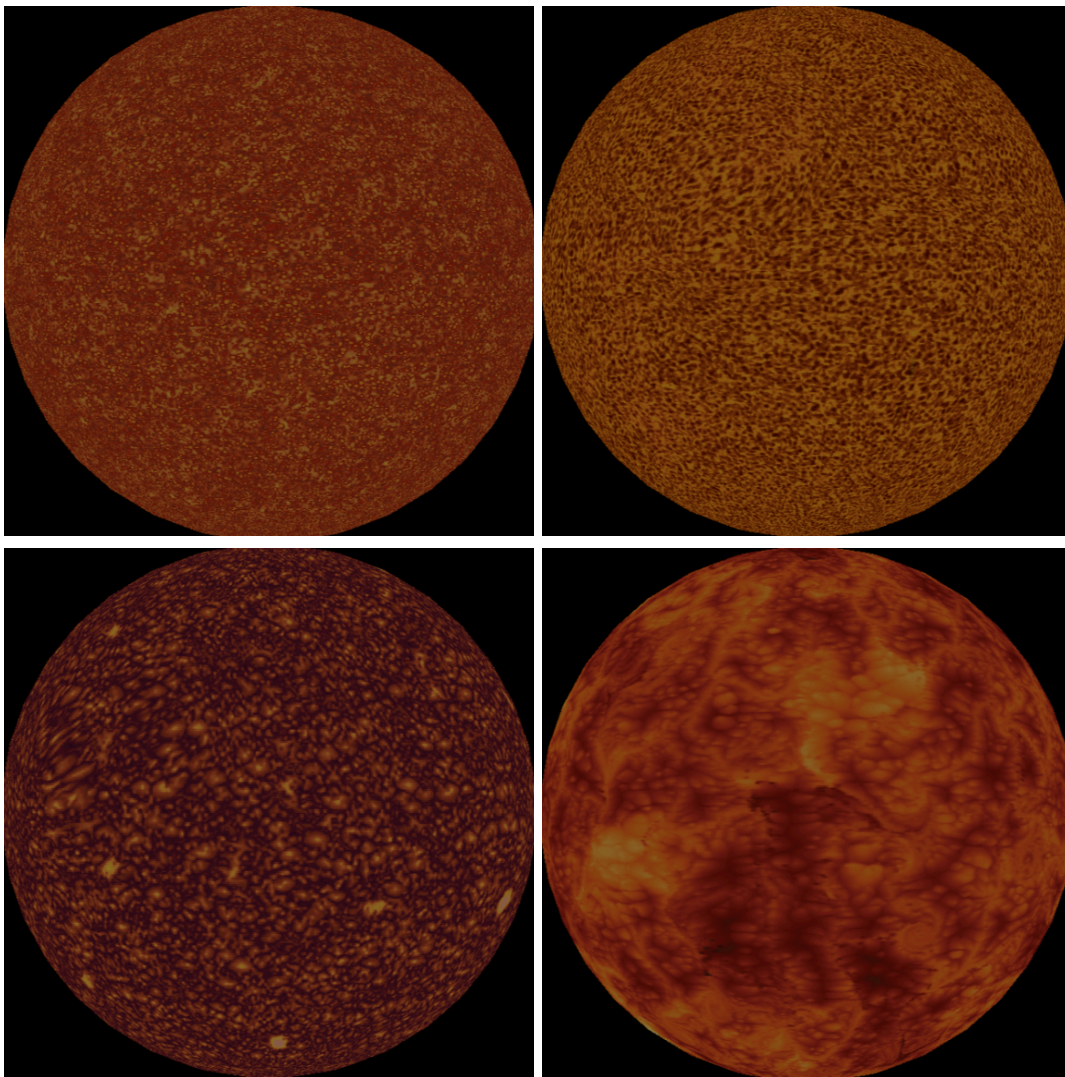


DETAILED TECHNICAL INFORMATION

Normal Software Operation

The artwork's software is set to load from computer startup. At the time of manual's redaction, there are two software main version variations existing: a version 1.60 running on TouchDesigner 2021.15240 and a version 2.xx running on TouchDesigner 2023.11340. Version 1.60 has no settings or options available for modifications while versions 2.00 and over have menus and shortcuts to tune the artwork.

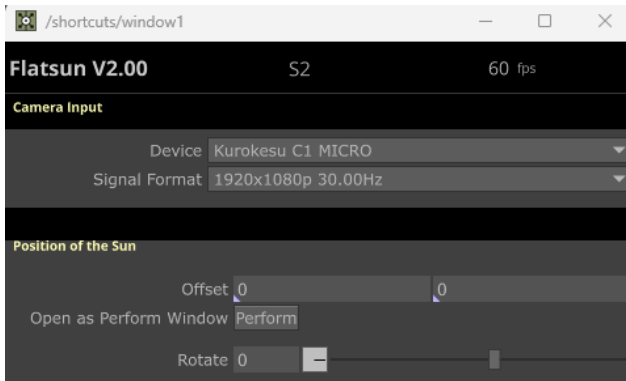
To quit the software, press the Escape key and close the TouchPlayer software. Please note that since the display is circle, you don't see the actual full display from Windows. If you need to work on the computer, a secondary monitor cloning the circle display might come handy in this situation.



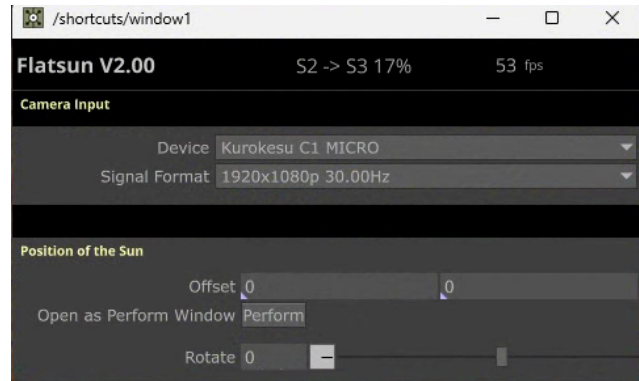
Typical screen displayed (Seasons 1 to 4 in order from top left to bottom right)

Manual Software Calibration

Few controls are available to adjust this software. To pull up the GUI for the piece press the **ALT+G** key at the same time. To exit the menu, simply press on the **X** button on the top right corner of the newly opened window. If settings are changed, press **CTRL+S** to save them to the system.



Menu, while displaying Season 2



Menu, in transition between seasons 2 & 3

Setting	Description
Flatsun Vx.xx	On top left in the window: software version in use.
Season displayed	On top centre in the window: the current season or the transition percentage between 2 seasons, being displayed. S1, S2, S3 or S4 : season on display. Sx -> Sx xx% : transition between 2 seasons
FPS	On top right in the window: the frame rate the software runs at. At the time of writing this manual, S1, S2 and S4 run around 25fps, while S3 runs around 55 fps.
Camera Input - Device	Picks up the camera to be used by software, typically a Kurokesu C1 Micro. If the camera is replaced, it will be needed to select the new unit here.
Camera Input - Signal Format	Resolution used from the camera input, should typically be 1920x1080 @ 30Hz. If 60Hz is available, it could help general performances.
Position of the Sun - Offset	If the display or the video controller are different, the X and Y offsets could be used to move the top left corner point of the software lower and further to the right in the screen. Said values could be negative. This action needs to be combined

Setting	Description
	<p>with a button click on Open as Perform Window, which would confirm the settings.</p> <p>In the first field, increasing the value would push the rendering to the right, while decreasing it would push it to the left.</p> <p>In the second field, decreasing the value would push the rendering to the bottom, while increasing it would push it to the top.</p>
Position of the Sun - Open as Perform Window	Has to be pressed if you modified the Offset values.
Position of the Sun - Rotate	If the display would be hung at an angle, this setting can be used to rotate the sun on the screen. We typically want the "lava flow" to move from the left to the right of the display. Value would be either 0, 45, or -45.

Usable Shortcuts

Pressing any of the following shortcuts will affect the rendering of the software and any changes will be automatically saved in the system for you.

Keyboard Shortcuts	Description
Up arrow	Will increase the brightness of the whole software rendering. Modifications done via this shortcut will be automatically saved.
Down arrow	Will decrease the brightness of the whole software rendering. Modifications done via this shortcut will be automatically saved.
A	Pressing this key will enable or disable the auto transition between the seasons, locking into a season. Helpful for debug purposes or if you want a sole season to be displayed.
1, 2, 3 or 4	<p>Pressing any of these keys will launch a transition to the corresponding season: pressing key 1 will transition from current season to S1 (can be seen in GUI menu explaining previously). The auto transition needs to be turned off to enable these shortcuts.</p> <p>Note the transitions take a bit of time to complete (about 20 seconds): give the system the time to proceed with said request.</p>
S, M, L	<p>Pressing any of these keys will adjust the time a season will be on display prior to transition to another one.</p> <p>S (short): each season would be displayed about 30 seconds</p> <p>M (medium): each season would be displayed about 2 minutes</p> <p>L (long): each season would be displayed about 15 minutes</p>

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 power button, nothing seems to happen.

Do you hear any sound coming from the computer? If so, the computer is running and the display should display the piece shortly.

If not, check that the display and the video controller are powered and the video controller switched On: depending on the setup used (24/7, electrical timer, computer timer) you'll have few to several outlets and devices to check.

The rendered image is compressed or stretched on: the shape is more of an oval than a circle.

This might be a communication issue between the computer and the display: ensure the computer is connected to the display. Inspect all video connections and if your edition has a video controller, ensure it is powered on. After trying these steps, if the image is still deformed, try restarting the artwork.

Looks like there is never any camera interaction.

First of all, not all the seasons are reacting to the camera's input and the reaction is quite subtle. But if you're sure that all seasons aren't reacting, ensure the following: camera's cable is well connected in camera body, the USB connection is well connected either into the USB port of computer or USB extension. Also ensure the extension (classic USB or over network cable) is well connected to the computer. If using a USB over network cable, ensure the extender is powered, if needs be.

If after that you still have the impression the camera doesn't feed anything to artwork software, you can ensure the camera works well by looking at the feed from a software that can display a USB camera video feed or a website doing the same, avoiding the hassle of installing a third party software. If you have a proper video feed there: you should have one in the software, so depending on the displayed season, you should notice some interaction.

The "lava flow" doesn't go from left to right.

There is a rotation setting within the software that allows you to adjust the rotation of the flow, it might have been wrongly set. Alternatively, the display orientation might be wrong, especially if the menu is shown upside down. For that, go to

The orientation of the sun's rotation should go from left to right. If it isn't the case, there are 2 potential issues: the display settings got modified in Windows or software settings got corrupted.

Quit the software, you should be in Windows Desktop. Look at the orientation of the Flatsun shortcut: if the shortcut is upside down (name / text being oriented towards the top of the display while the icon is towards the floor), we'll change the Display rotation. Right click in Desktop, click on Display settings: it will prompt a "Display Settings" window. In this window, you'll retrieve the Orientation, first note what is your original configuration, then pick the opposite of what you currently have (Landscape vs. Landscape (flipped), Portrait vs. Portrait (flipped)). You might even want to try the other options (Landscape vs Portrait). Final result should give you an icon displayed in the circular screen where its name is readable and positioned under the icon image.

If changing the display orientation didn't fix it, revert the Windows Display settings to your original value, then head to desktop, double click on the Flatsun icon. After a few seconds, the software will be back up and running. Access the menu (Alt+G), locate the Rotate value and adjust it to either -45, 0 or 45. This should give you the ability to rotate the sun and ensure a proper animation's rotation going from left to right. Close this setting page by clicking on the window's X button.

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

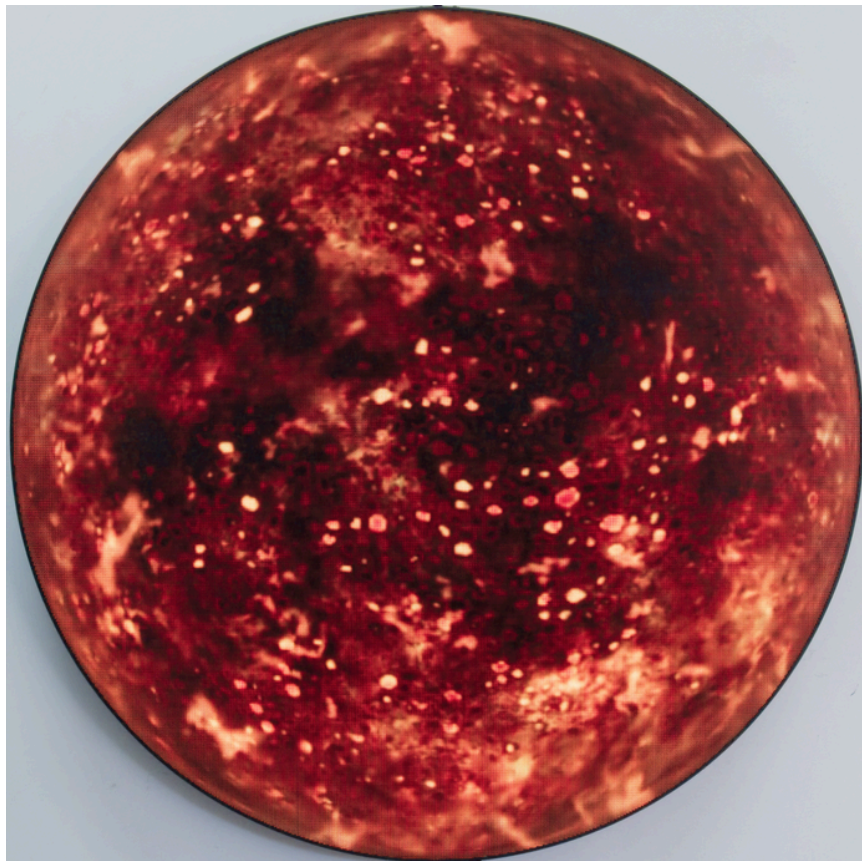
This artwork requires the following components:

Component	Description
Computer	Computer running on Windows 10 LTSC OS at least, with a NVidia graphics card (at least RTX 3060).
Camera	A USB camera with a micro lens having a viewing angle of 82.5 degrees, installed at a certain angle on top of display, allowing people 2m away from display to be in the field of view but at the same time avoiding being disturbed by action happening further at the back.
Camera bracket	Screwed onto the display, the bracket holds the camera in place, at the desired angle for best results.
Data cable	Typically is a USB cable that interconnects the computer and camera.
Video signal cables	Connects the computer to the video controller (usually it is a DVI-HDMI cable) and the video controller to the display (network cable).
Video controller	Device receiving the video feed from the computer and outputting it to the display.
Display	A LED round display.
Keyboard	While not required for normal use of the artwork, it allows you to calibrate the system prior to exhibition.
AC relay or electrical timer	Device allowing giving or not electrical power to display and video controller depending on time or state of computer.
USB 2.0 over Cat5 extender	Optional: useful if USB cable length needs to be extended.

Images of components, for consultation:



Computer, Windows OS



Display



USB Camera



USB 2.0 over Cat5 extender - Black Box
IC280A-R2

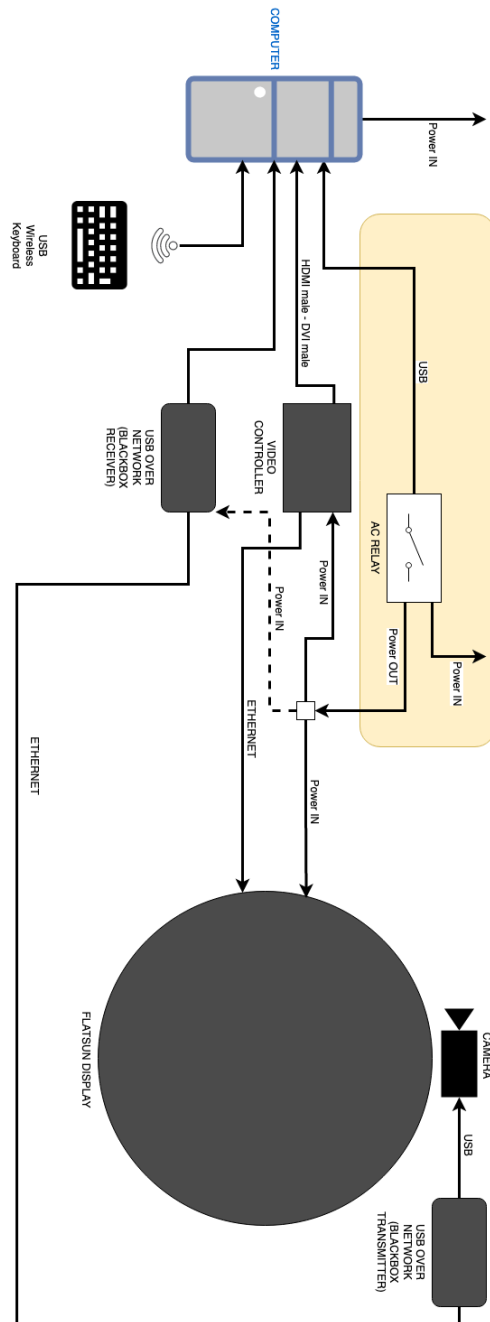


Logitech wireless RF keyboard



Video controller

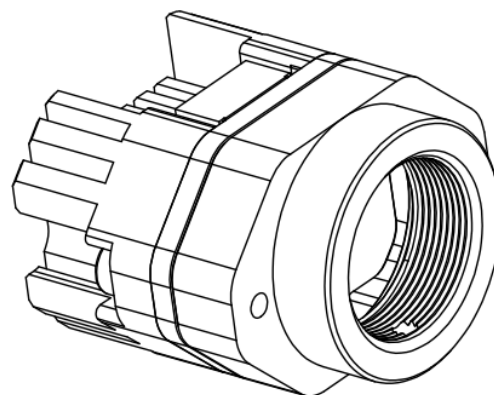
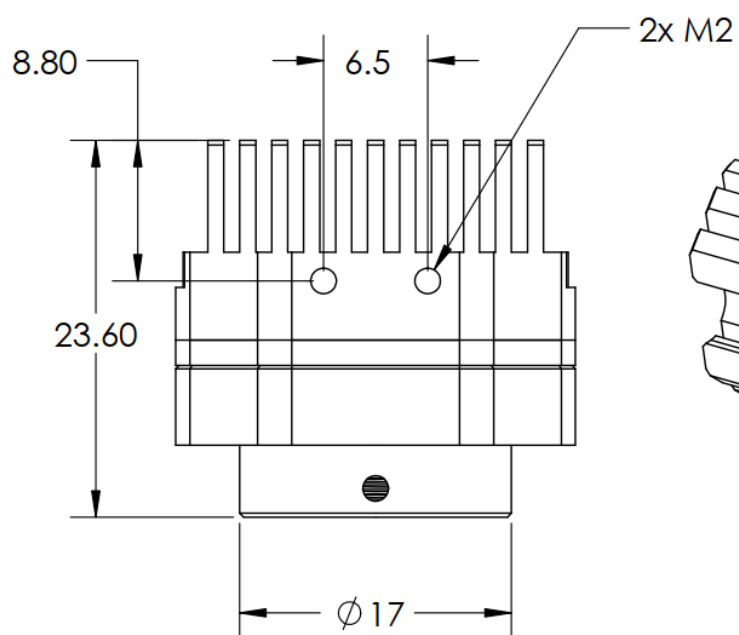
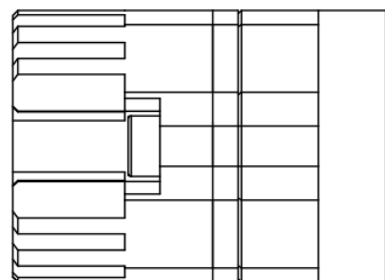
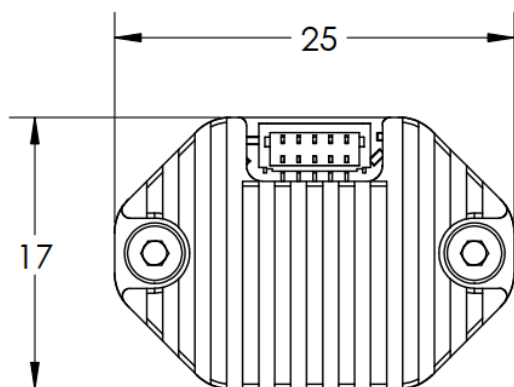
Here are the two possible connection diagrams based on the need to extend or not the distance between the display/camera set from the computer..



APPENDIX II - TECHNICAL DATA SHEETS

Kurokesu C1 Micro M12

Specification	Detail
Pixels	2304H x 1536V
Sensor size	5.07mm x 3.38mm
Shutter	Electronic Rolling Shutter
Sensor pixel size	2.2µm x 2.2µm
Frame rates	<ul style="list-style-type: none">• H.264 & MJPG – 30fps in all modes• YUV 4:2:2 (YUYV) – 1920x1080 @ 5fps, 1280x720 @ 10fps, 640x480 @ 30fps
Output frame sizes	1920x1080, 1280x720, 640x480, 640x360, 320x240, 320x180. All progressive.
Manual control	Exposure, White balance (2800°K – 9300°K), Gain, Gamma, Backlight compensation, Sharpness, Contrast, Saturation, Hue, Brightness, Anti-flicker frequency
Rated power	2W max: 350mA @ 5V – h.264, 290mA @ 5V – MJPEG / YUYV
Supported OS	Windows, OSX, Linux, Android
Sensor	Onsemi AR0330
Weight	12g
Dimensions	25x17x28.8mm
Ingress protection	IP40
Lens mount	M12-mount
Operational temperature	-50 ... +65°C

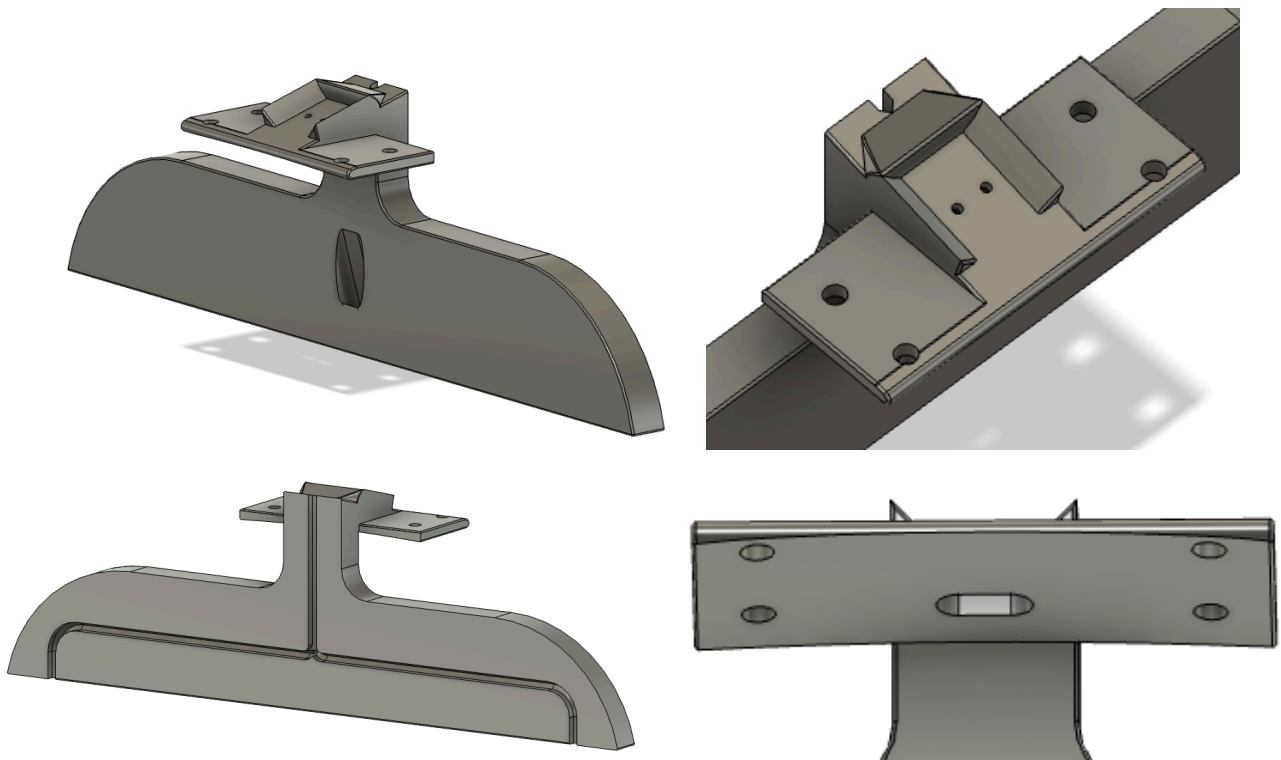


Camera Bracket

A custom made bracket to attach the camera to the display has been 3D printed in PLA plastic. The bracket adapts itself to the curve of the display and is attached to the display via 4 screws replacing usual display's screws, near top centre.

The bracket has 2 grooves on its back face and one of them is used to guide the camera data cable away from the display's centre. A hollow shaft drives across the body of the bracket, allowing a thin screwdriver to pass through and screw a camera to the bracket.

The camera, once installed on the bracket on top of the display, sits at an angle of 15 degrees down, pointing at the desired target, 250cm (99") away from the display.



DesignLED P2.5mm circular LED display - 1440mm diameter

Specification	Detail
Pixel pitch	2.5mm
LED type/brand	SMD 3 in 1
Brightness(nits)	600
Screen area (sqm)	1.629
Resolution	331,776p
Viewing angle (H/V)	140° / 140°
Controller	NovaStar MCTRL300
Refresh rate	1920-3840Hz
Color depth	16bit
Processing	1920 x 1080
IP rating	IP30, indoor only
Scan	Static
Average power consumptions / sqm	250W
Max power consumptions / sqm	625W
Working temperature	0 - 40°C