BILATERAL TIME SLICER

BY RAFAEL LOZANO-HEMMER

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GENERAL IMPORTANT INFORMATION

This short section must be read for proper operation.

BILATERAL TIME SLICER (2016)

BY RAFAEL LOZANO-HEMMER

Technique

Custom-software, 4K camera with digitizer, computer.

Description

A biometric tracking system finds an individual's axis of symmetry using facial-detection software. When the axis is found, the computer splits the live camera image into two slices, to be displayed in a vertical orientation. With each new participant, time slices are recorded, then pushed aside. When no one is viewing the artwork, the slices close in and rejoin, creating a procession of past recordings. The piece is inspired by time-lapse sculptures and masks found in ancient traditions—Aztec three-faced mask, the avatars of Vishnu, for example—and modern and contemporary art—Duchamp, Balla, Minujín, Schatz, and Kanemaki, among others. Like in the tradition of the Aztec three-faced mask, the central strip corresponds to the younger, most recent portrait, whereas the farthest ones on the sides represents the oldest portrait.

The piece exists either as a “treatment,” capable of featuring any size and aspect ratio screen. For example, the piece was installed in Miami using a 180 x 160 cm Barco Residential LED digital canvas that visually connected the piece to the form factor of a door. The treatment can be made much wider, to fit a specific architecture, for example, or it can be broken into an array of multiple flat screens acting as a video-wall. The piece also exists as a traditional shadowbox on a single, vertically-oriented flat screen, measuring anywhere between 55 and 100 inches (in diagonal).

For the intermix version of this artwork, new faces will be recorded and send to the second computer. This “replica“ computer mixes different recordings. It only keeps the 10 newest recordings, and deletes the others. It is possible to set a selection of curated recordings, which will not be deleted.

Operation

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

1. Connect the computer, the camera, and the display to electrical power. Use the supplied power cables.

2. If the camera was turned off or if it lost power during the night (which depleted its batteries), then you will need to turn it ON manually.

3. Turn the display ON before the computer starts up.

4. Ensure that the light that illuminates the viewer is on.

5. Usually, we set up the computer to automatically turn ON (at 8 AM) and OFF (at 2 AM) via the macOS power scheduler.

6. The app **faceSplitting** will start automatically once the computer is finished booting up.

Maintenance

Make sure the display has no fingerprints or other smudges. We recommend cleaning the piece every two months at least.

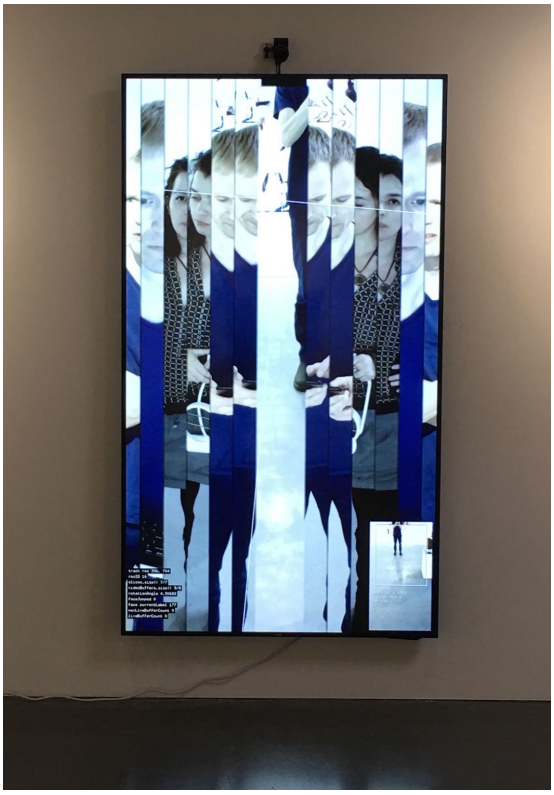
Over time, the camera's orientation might shift due to a loose camera mount. Ensure that the camera is straight and facing forwards, perpendicular to the display.

Placement Instructions

When using a 75-inch display, and the bottom should be 7.5 inches off the ground.

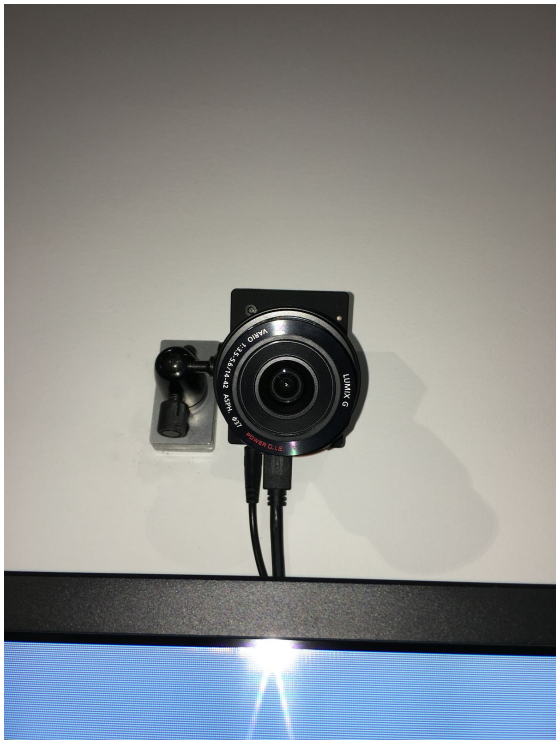
Use a slim display mount to minimize the space behind the display. Consult the following images for examples of displays.

The camera is mounted using a small-ball joint on top of the display, with its lens centred along the display, as shown in the following images.



75-inch display hanging on wall

98-inch display resting on the ground with back illumination



The ball joint is at 76.5 inches off the ground.

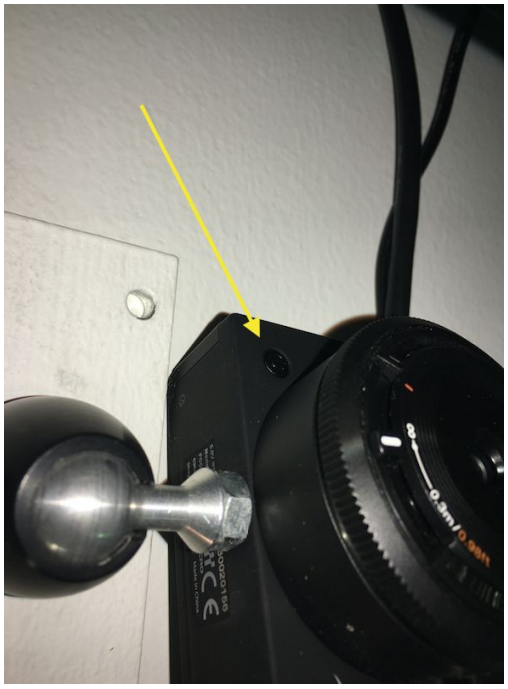
The camera has a power cable and a mini HDMI cable connected. Both should point downwards. You will need to mount the camera via the ball joint with enough space to tilt the camera downwards. It will allow the camera to properly see people.

The computer can be placed either behind the display or far away from the display.

For the latter, you will need to use a HDMI extender for the display signal and one for the Camera feed (see the equipment list.)

Computer with all it's connections

A single power cable should run to the artwork, either from the ground, entering the bottom of the frame, or through a hole from inside the wall.



The camera has a small round black power button that needs to be pressed for three seconds to turn the camera ON or OFF. The side camera display will change to indicate that the camera's state has changed.

The camera’s HDMI cable connects to a “BlackMagic“ thunderbolt adaptor. From there, a thunderbolt cable connects to the computer. This is how the camera's video is streamed to the computer.

Our software also controls the camera's settings. This is done via an extra USB-WiFi dongle connected to the computer’s USB port.

We provide a wireless keyboard with which you can calibrate the artwork and navigate the operating system.

DETAILED TECHNICAL INFORMATION

Normal Software Operation

When the software starts up, either the live video feed will show in fullscreen mode or a black image will be displayed. In both cases, a line of white text can be found at the bottom of the screen. It will inform you that either the camera is being calibrated or that the camera was not detected.

Once the camera is detected, the software will try to connect to it using Wifi to ensure that the camera's exposure, saturation, contrast, and other settings are correct. During this process, the live video feed will go black for a short moment, then come back.

Calibration is now finished.

When a person's face is detected, a white T is drawn horizontally between both eyes. This T will move and rotate as the person's face moves. Additionally, the live video feed will zoom in closer to the person.

When the person aligns themselves with the previous faces (by keeping their eyes and the top of the T parallel to the ground), then the video splits down the middle and each half slides to the left and the right. (You have to align yourself to become part of the system.) These "slices" will push older slices further to the edge of the display and eventually out of the display completely. The older a slice is, the slower its playback speed. The oldest slice will eventually be deleted.

If a person is lost and no new person is present, then the slices slowly move towards the middle and rejoin their left and right halves. The app will cycle through about 5-8 older slices.

If a new person is detected, the app focuses on them and splits their video.

Manual Software Calibration

After the software starts up, the words “initialize camera“ will appear on the display. During this time, the software communicates with the camera over Wifi and adjusts the image settings. Make sure the camera is ON at this time.

Camera in ON state.

Camera in OFF state with battery status showing.

Calibration only works if the camera is connected to Wifi. The macOS should be set up so that the computer connects to the camera via the camera's ad hoc Wifi network. The network name is **ZCAM-Eagle-???** and the password is **87654321**. The connection is maintained through the USB - Wifi dongle and NOT via the computer's built-in Wifi device.

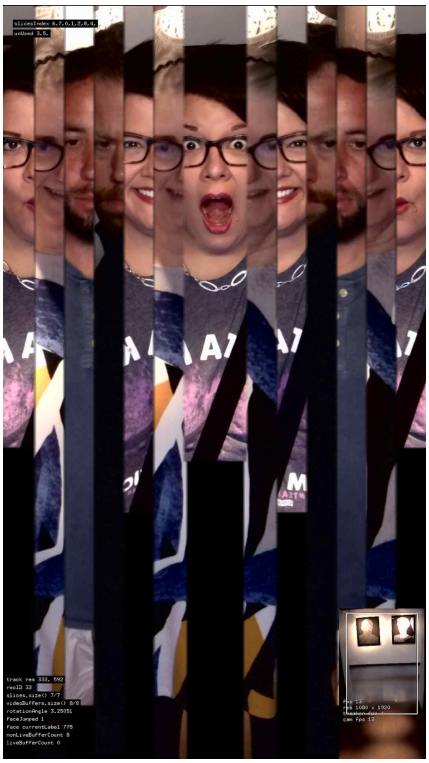
Give the camera time to establish a Wifi connection. This is displayed as a line of text at the bottom of the screen. Once the text disappears, the camera will start its calibration.

The key **t** on keyboard: reveals or hides tracking. It shows the live video at the bottom right corner of the screen. This is useful when mounting the camera.

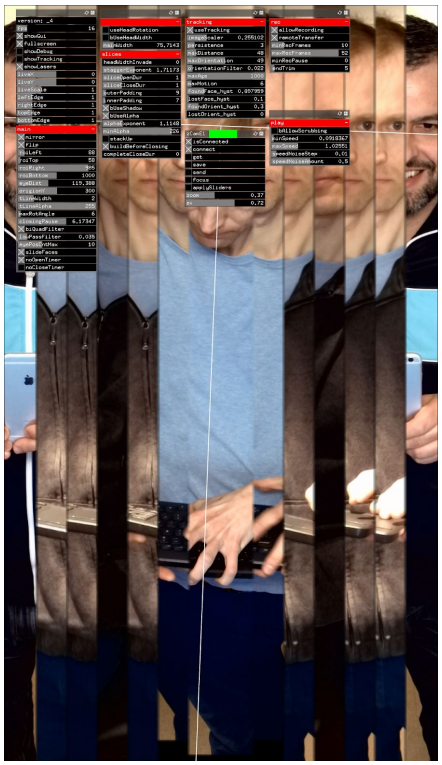
The key **g** on keyboard: graphical user interface pops up. These detailed settings are not really needed.

Display shows live video at start.

Display during normal operation.



Key t was pressed, tracking shown.

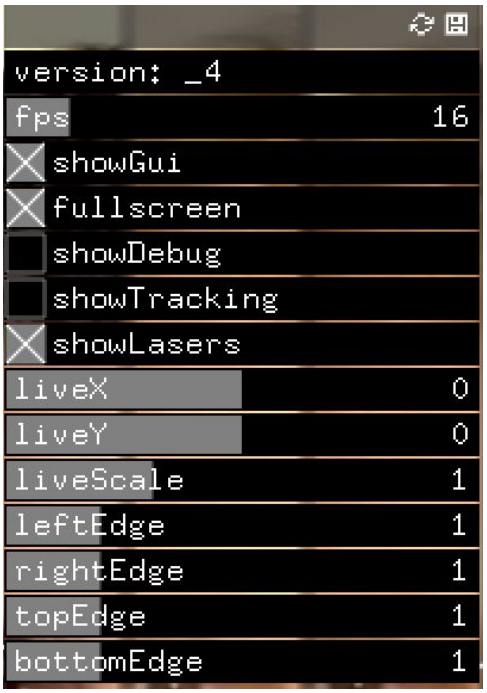


Key g was pressed. Showing the GUI.

Other GUI Elements Used for Setup:

Some of the following GUI (Graphical User Interface) elements will be needed only when we initially set up the artwork.

All GUI elements should adhere to the following specifications. Please do not change them.



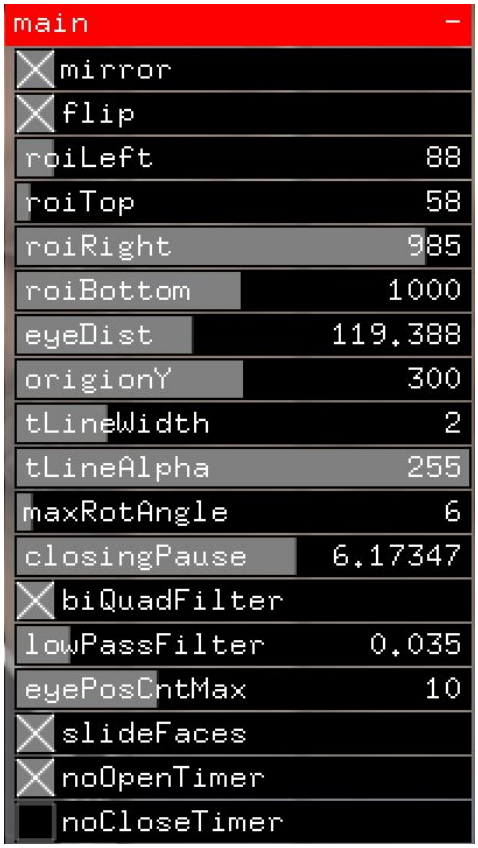
fps: displays how fast the app is running.

showGui: does the same as key g (graphical user interface pops up.)

showLaser: displays the big T lines.

liveX, liveY, liveScale: the position and the size of the live video when apps starts up.

leftEdge, right, top, bottom: draws a small black line around the edge of the display.



mirror,flip: changes video orientation.

roiLeft, roiTop, roiRight, roiBottom: defines the area for face detection and draws a white rectangle in the tracking preview video (when showTracking is selected.)

eyeDist: determines how large people's faces will be when digitally zoomed in.

origionY: the Y position of the zoomed-in people.

tLineWidth: determines the thickness of the big T lines.

tLineAlpha: alpha of the T lines.

maxRotAngle: face rotation beyond this angle will not be recorded.

closingPause: the amount of time between losing a face and the beginning of the closing slices, which moves them towards the middle.

biQuadFilter: enables biquadratic smoothing.

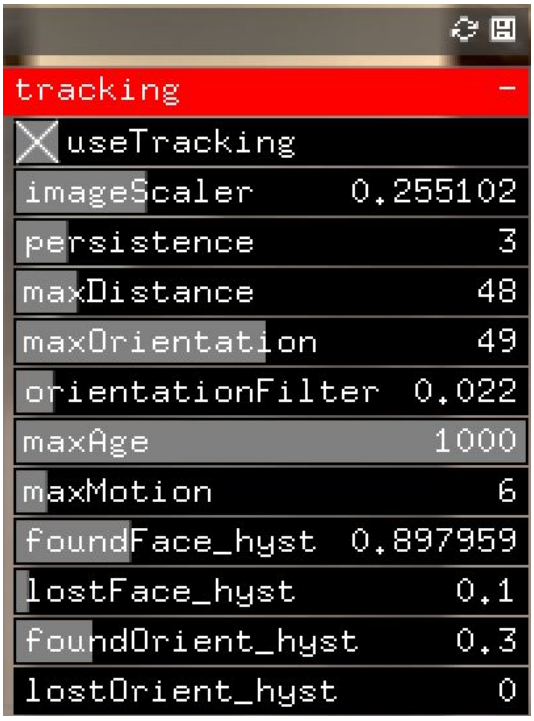
lowPassFilter: determines the amount of biquadratic smoothing.

eyePosCntMax: if biquadratic is not enabled, smoothing is done by averaging the last X readings.

slideFaces: defines whether or not the app slides or jumps to a newly-found face.

noOpenTimer: if selected, a new slice can be split open before the old one is done with its sliding motion.

noCloseTimer: if selected, the app will not wait for the slices to close before allowing for new slices to be opened.



useTracking: enables face detection.

imageScaler: reduces image size before passing it to the tracker. In turn, it defines the minimum size of a face.

persistence: allows for a face to be lost for three frames and still be considered.

maxDistance: determines that a face can't move more than 48 pixels between consecutive frames, otherwise it's a new person.

maxOrientation: limits how much a face is rotated in order to be considered.

orientationFilter: smooths orientation values.

maxAge: if greater than maximum number specified, then the app looks for new face.

maxMotion: only if face motion is below this value will it be considered.

foundFace_hyst: hysteresis time (in seconds) for how long a face needs to be detected before it is considered.

lostFace_hyst: hysteresis time in seconds for how long a face needs to be lost before it is not used.

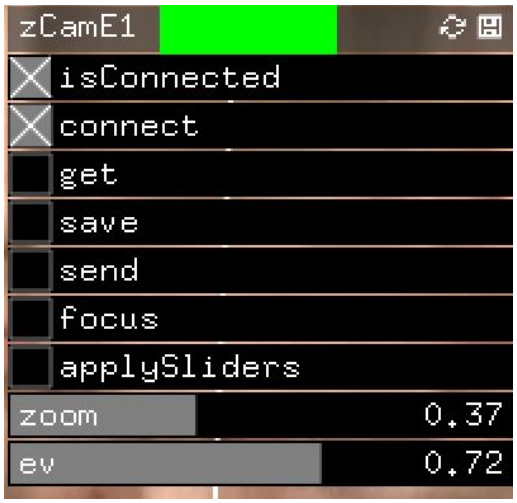
foundOrient_hyst: the limits of face orientation before it is considered.

lostOrient_hyst: the extremity of face orientation before it is considered unusable.

The **zCamE1** GUI communicates with the **Z-Camera** E1 over Wifi. It can query the camera in its current settings, which is done only during the artwork's setup or if lighting conditions are adjusted. Every time the apps starts up, it sends these stored values to the camera.

If the app is successfully connected to the camera via Wifi, a green rectangle is shown, otherwise it will be red and the **isConnected** GUI element is OFF.

If you want to change the camera settings using the iPhone app, you first need to unselect the **connect** GUI element, since only one device can communicate with the camera.



bShow: Wifi connection status.

connect: turns connection on or off.

get: get camera settings.

save: stores these camera settings on computer.

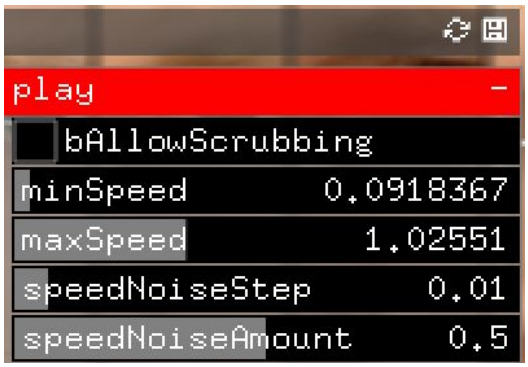
send: sends stored settings to camera.

focus: forces a moment of auto focus.

applySlider: sends zoom and EV values to camera.

zoom: sets zoom on camera.

ev: sets EV (an exposure value offset.)



bAllowScrubbing: picks new start and end points for the palindrome looping.

minSpeed: minimum playback speed.

maxSpeed: maximum playback speed
(**1 ==** is normal.)

speedNoiseStep: not used.

speedNoiseAmount: not used.

Only the intermix version of this artwork records slices so that they can be transmitted to a secondary computer for display purposes. If this is the case, set the GUI elements according to the following:

allowRecording: uses recording feature.

remoteTransfer: allows recorded slices to be transferred to a secondary computer.

minRecFrames: minimum amount of recorded frames per slice sequence. Otherwise, slices will not get transferred.

maxRecFrames: maximum amount of recorded frames a slice sequence can have.

minRecPause: minimum time between recordings.

endTrim: removes the last few frames to avoid showing a face moving away from artwork.

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.

Preliminary Troubleshooting Steps

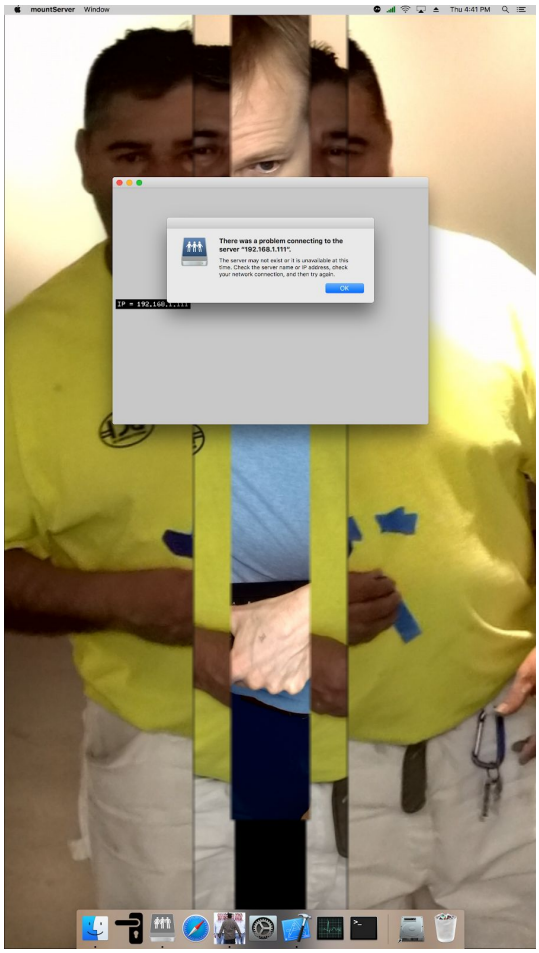
People are too small and we see too much black on the bottom.

Make user interface visible by pressing key **g**, then, in GUI section **main**, adjust **eyeDist** to make all new faces and bodies larger. This will not affect any already recorded slices.

Adjust **origionY** to move faces up or down.

When making faces larger, you might need to also make the middle slice wider, so that the live face is not too hidden. Do this by adjusting **mainWidth** to make this middle slice wider.

For intermix version: does not connect to IP 192.168.1.111.



Make sure the second computer is running and both computers are connected to each other via an ethernet cable or an ethernet switch.

This connection problem might also occur if the second mac mini is not yet running when the first tries to connect to it.

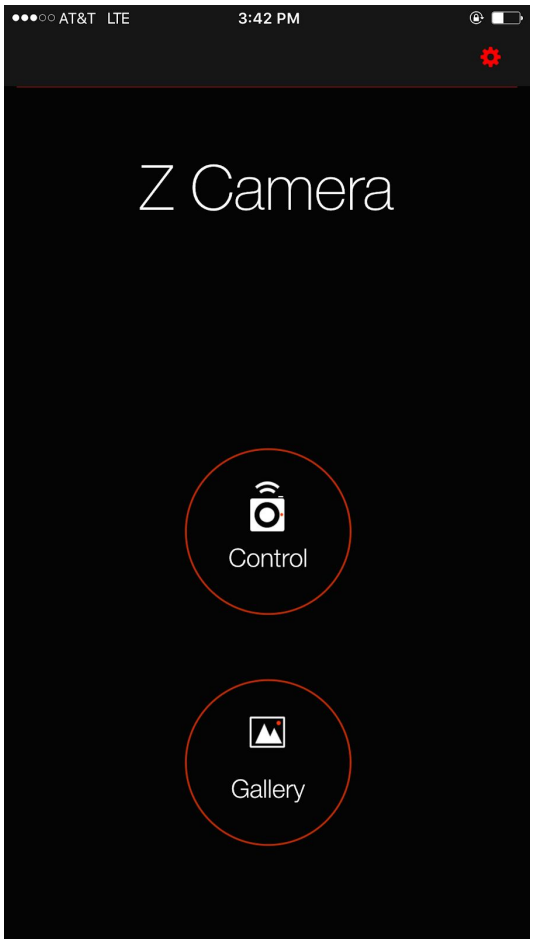
Once all of the above steps are taken, click the “ok“ button on the pop-up message. Then click on the **mountServer** icon (pictured here) in the dock. This app will try to connect to the second computer again.

The colours of the camera image are not balanced.

In the GUI section **zCamE1**, click on **connect** which should deselect this GUI box. This means that the app is not trying to communicate with the camera over Wifi. Only one device can establish communication with the camera at a time.

Now, download the "**Z Camera**" app from your mobile phone app store.

Connect with your mobile phone to the Wifi network "**ZCAM-Eagle-???**". This network is produced by the **Z-Camera E1.**

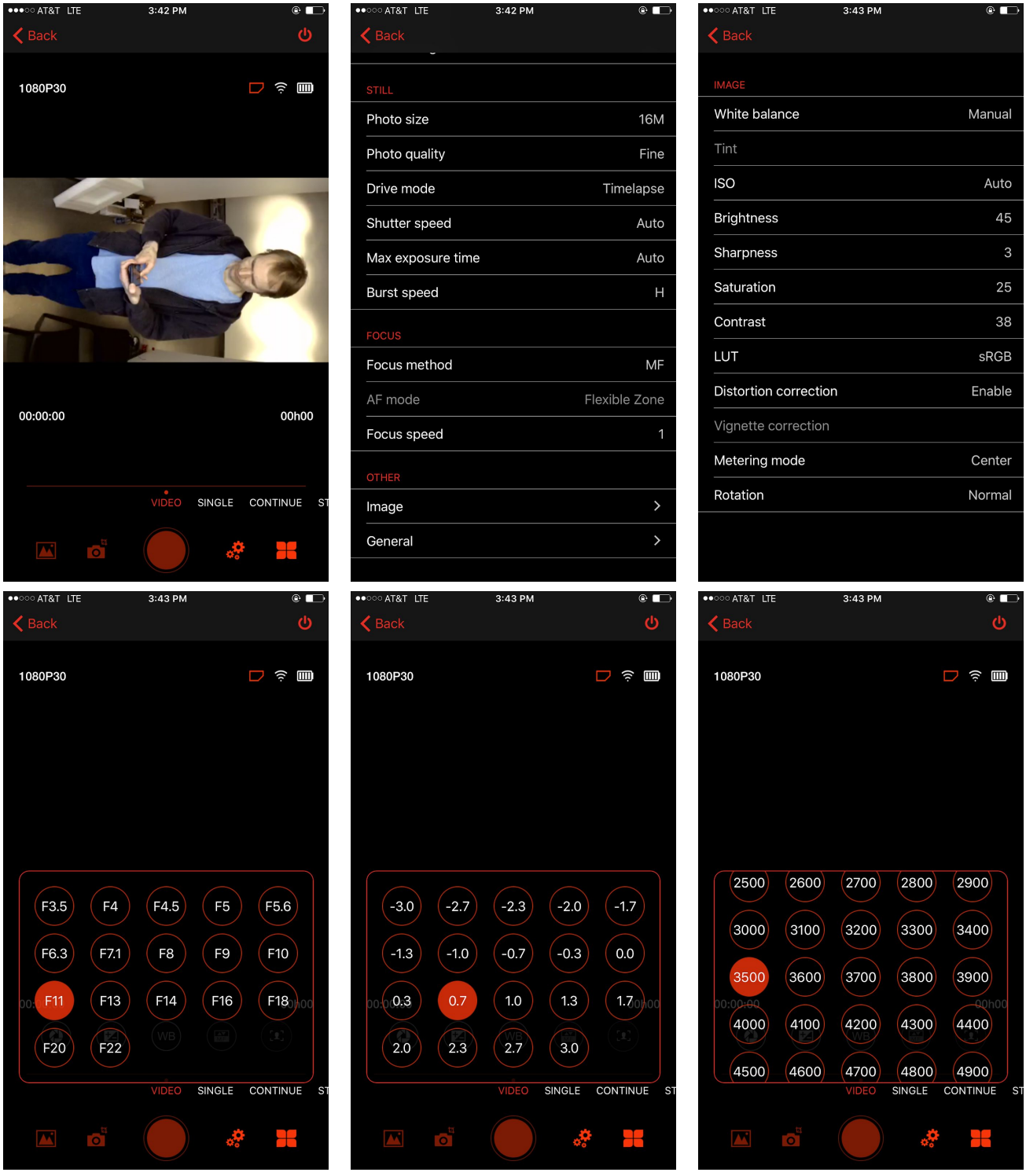


Run the "**Z Camera**" app tab "Connect".

Now, you can navigate the different sections to adjust F-Stop, EV, White Balance, Contrast, Saturation, etc.

Exit the mobile app. Go back to the artwork app and select the **connect** GUI element. The **isConnected** GUI element should auto-select and the rectangle on top should turn from red to green.

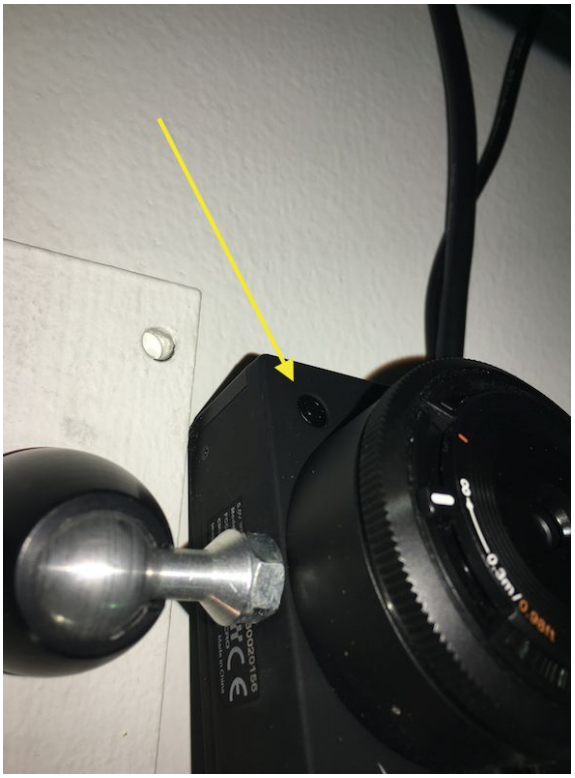
Click on the **get** button. After a couple of seconds, press the save button to store these new settings onto the computer.



Message “wait 1 minute for Wifi connection” does not disappear.

The “ascending green bars” icon on the desktop menu bar shows the connection via Wifi to the camera. Click on the bar icon and select the “**ZCAM-Eagle-???**“ network.

A message might appear at the bottom of the app saying "camera Wifi connection is not working." You will be asked to wait a couple of minutes. This text should disappear once connection is established.



If the Wifi keeps on disconnecting, or not connecting at all, or if the screen is black (which means the camera is sending only a black image) then check the connectivity and/or restart the camera and the software. In order to shutdown and restart the camera, hold the button above the camera lens (top left) for three seconds.

The camera image has noise coming from it.

The mini HDMI cable connected to the camera might be loose and needs to be pushed in a bit more.

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:

Computer, Apple Mac Mini, i7, 3 Ghz, 16GB RAM, Intel Iris 1536 MB

Computer, Apple Mac Mini, i7, 3 Ghz, 16GB RAM, Intel Iris 1536 MB

Vari-focal lens (Panasonic Lumix G Vario 14-42mm f/3.5-5.6 H-FS1442AKA)

Blackmagic Design UltraStudio Mini Recorder, MFR # BDLKULSDZMINREC

Magewell USB Capture HDMI Gen 2 P/N 32060 (USB alternative to Mini Recorder)

Thunderbolt Cable

If a longer thunderbolt cable is required, we recommend using this Thunderbolt Optical Cable (10m; brand: Corning; MFR # COR-AOC-MMS4CVP010M20)

High-Speed HDMI to HDMI Mini Cable

Camera swivel mount

Illumination, BB&S Lighting Pipeline Free LED Light (2 feet; 4300K)

USB Wifi dongle, Adafruit Industries LLC, (part# 1030)

Logitech wireless RF keyboard

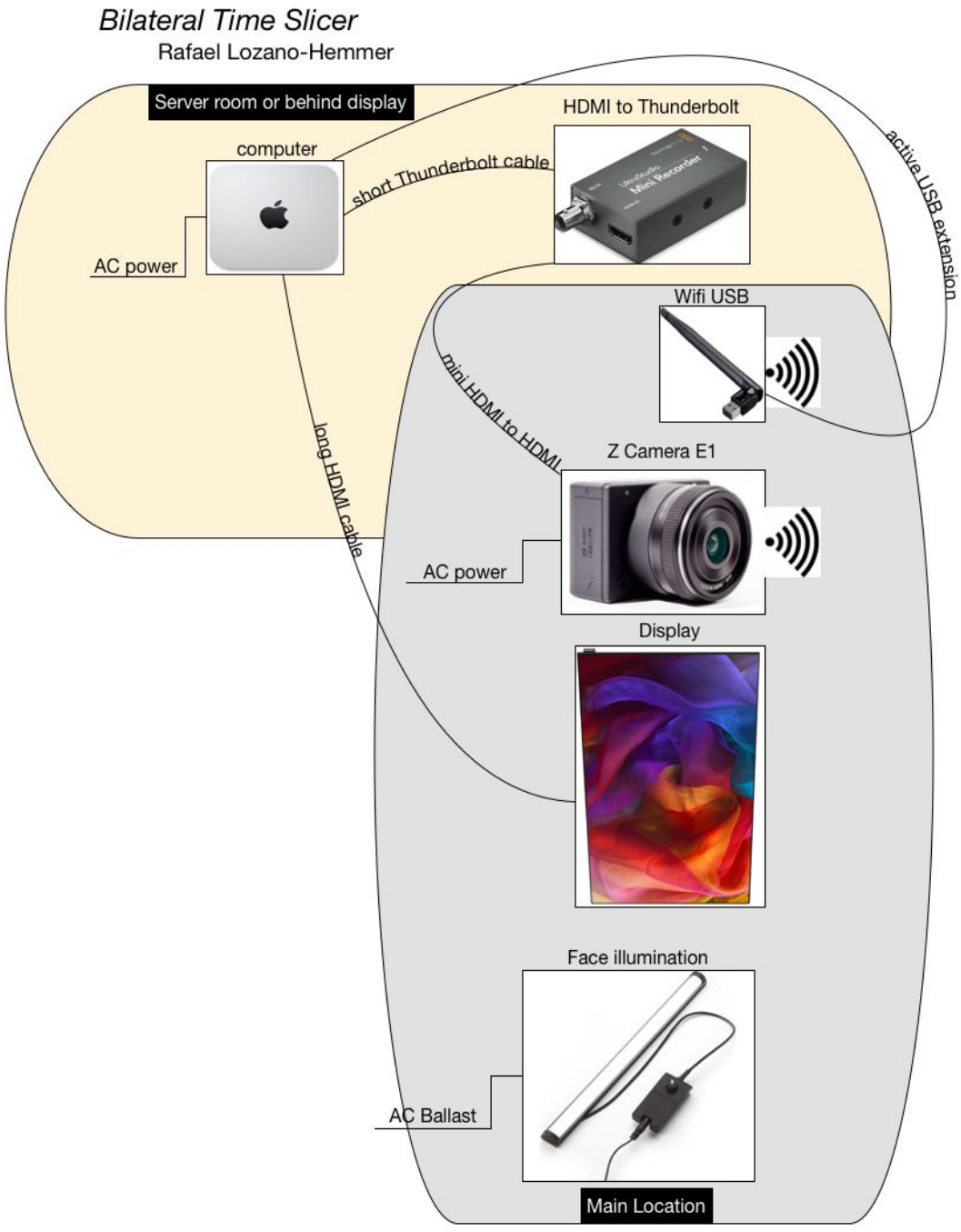
Ultra slim Samsung display mount, (part # WMN2000B)

If the HDMI signal needs to be extended or duplicated, the following devices have been tested for optimal performance:

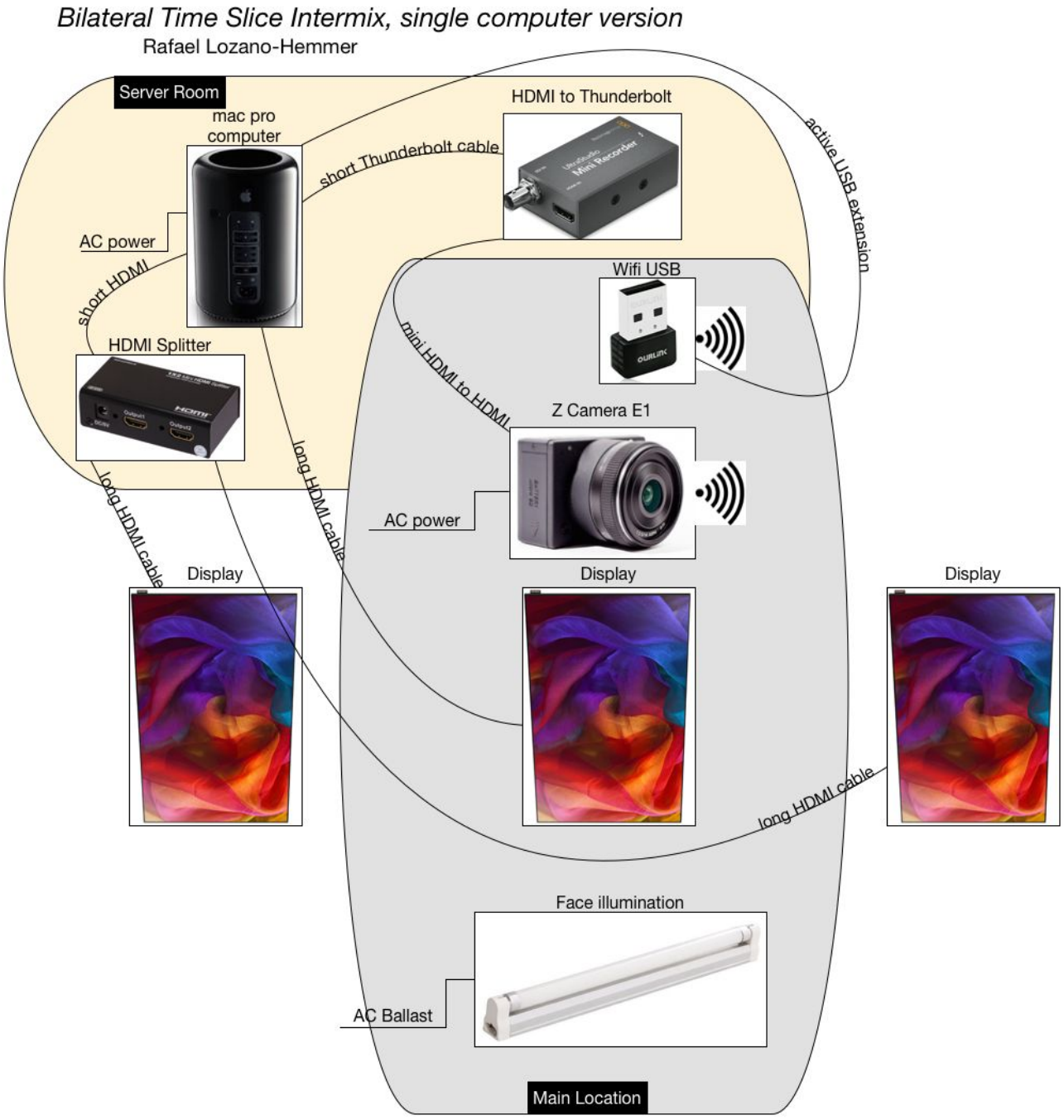
HDMI signal splitter (AVShop HDMI Splitter - 2-way);
HDMI extender for camera signal (Hall Research UH-1BTX);
HDMI extender for display signal (Star Tech ST121HDBTE, 70m max).

Wiring Diagrams and Connections

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



Computer with all it's connections

Intermix Version:

If the primary and the intermix app are being displayed on the same computer, then the software can run on a single macPro or better computer. Otherwise, two networked Mac minis can be used.