

## Thermal Scanning Kiosk Installation and Setup Guide

This Guide is intended to provide instructions to assemble the thermal evaluation kiosk, adjust the camera, how to use and basic troubleshooting. The initial build includes the use of power tools and manually assembling the kiosk. Assembly can take 30 to 60 minutes per kiosk.

We recommend two people for the assembly process.


Safety glasses should be worn during assembly.

This Guide is intended to supplement the readme file. Please read that file first.

### 1. SUGGESTED TOOLS

- 1.1 Drill (Corded or Cordless)
- 1.2 3/16 Allen key
- 1.3 1/2-inch wrench
- 1.4 1/8-inch drill bit
- 1.5 3/32 drill bit
- 1.6 5mm wrench
- 1.7 Phillips screwdriver #2

### 2. VESA TRIPOD ASSEMBLY

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| 2.1 Tighten the tripod VESA mount rotational joint with the 3/16 Allen key and half inch wrench |  |
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2.2 Drill VESA Gasket holes (4) with a 1/8 inch drill bit

**NOTE: HP monitors do not require this gasket so no drilling is required**



2.3 Place VESA gasket on the back of the monitor, set VESA sleeve on top and use the M4 Philip head screws provided in the VESA sleeve kit.

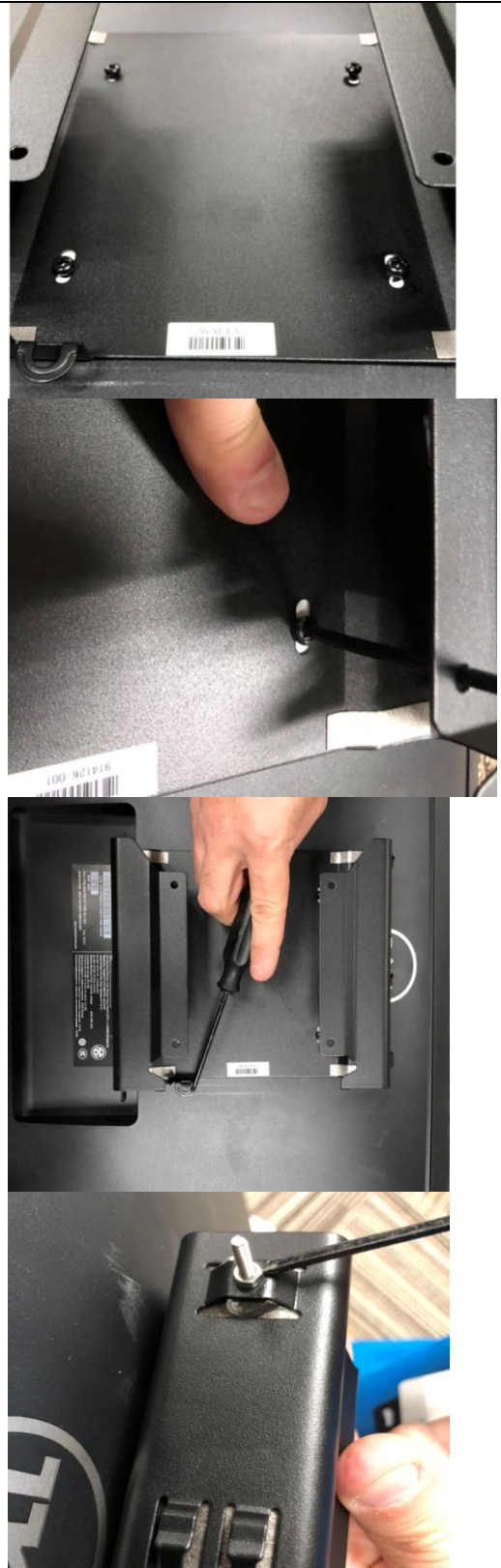
2.3.1 Hand tighten screws then use Phillips screwdriver to tighten

**NOTE: the screwdriver may not fit through the access holes above the screws. You may need to use a smaller screwdriver.**

Actual screws



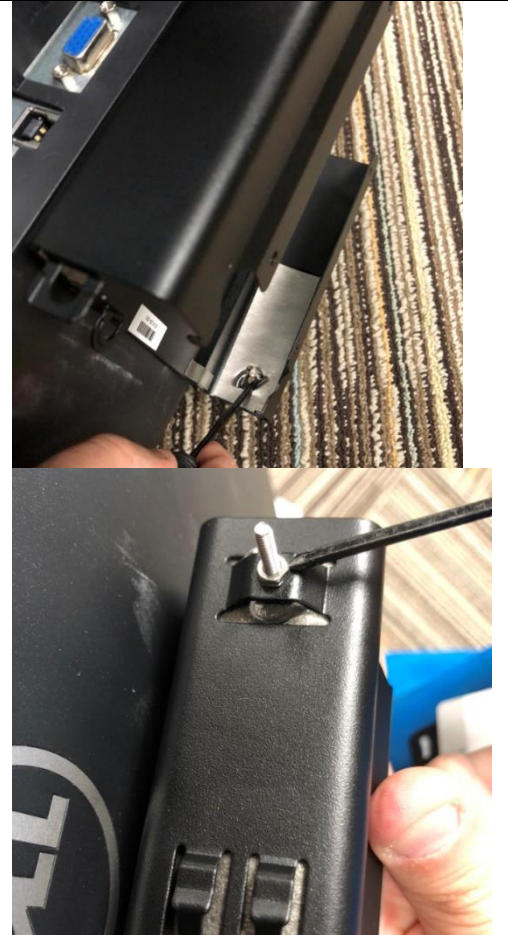
2.3.1.1 Be sure to center the screws in the VESA sleeve



**NOTE:** the mounting screw for the camera bracket is at the top and should be aligned with the top of the monitor.

2.3.2 VESA sleeve lock goes to the bottom right of the monitor (See photo)

2.3.3 Create hole in the tape on the inside of the VESA sleeve (inside side, near raised mounting bracket) and push a M3 14mm screw through it



2.3.3.1 Use an M3 nut (5mm) to secure on the VESA sleeve

2.3.3.2 Note: a 2<sup>nd</sup> nut may be required during the support bracket alignment

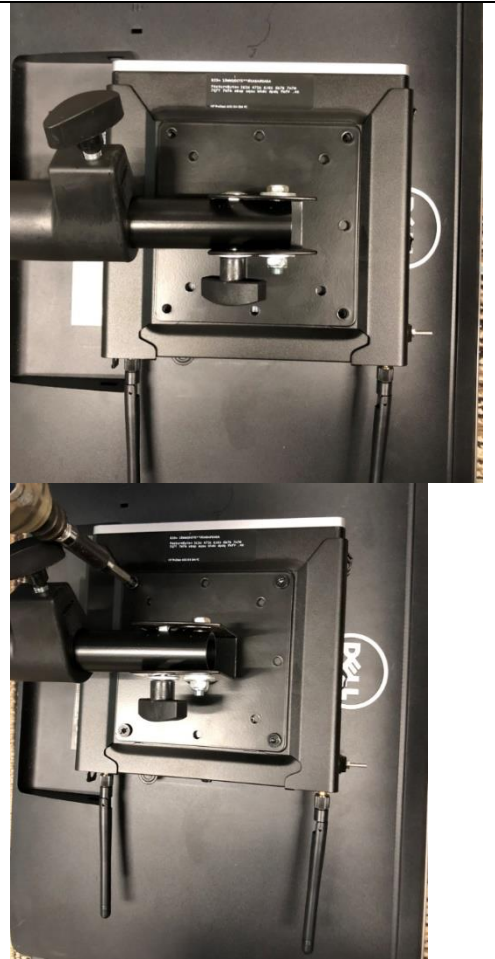
2.4 Slide in the PC to the VESA sleeve

**NOTE: Place a cloth or protective material between the monitor and surface to avoid scratching the monitor.**





- 2.4.1 Align the tripod VESA mount to the VESA sleeve to align the holes with the PC

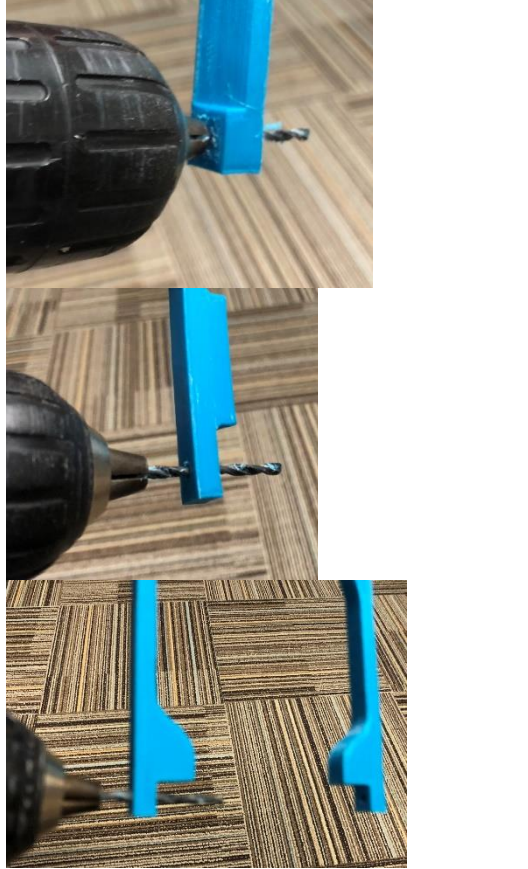



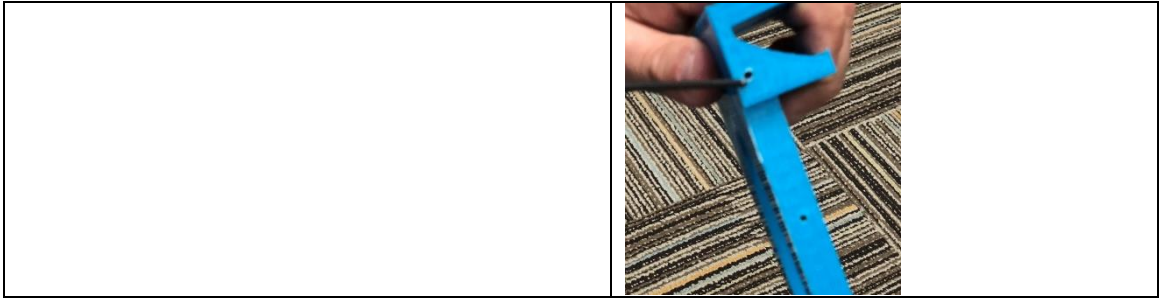
- 2.4.2 Use M4 T15 screws provided in the VESA sleeve kit to connect the tripod and PC as one unit (be careful to not over tighten) **Note: the kit comes with two types and either can be used**

- 2.4.3 Stand up the tripod



### 3. CAMERA BRACKET ASSEMBLY

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| <p>3.1      Predrill the top and back brackets with a 1/8-inch drill bit (both sides, total of 4 holes)</p>      |  Three sequential photographs showing a black power drill with a silver 1/8-inch drill bit being used to predrill holes into blue plastic brackets. The first image shows the drill bit entering the top of a bracket. The second image shows the drill bit being inserted into the back of a bracket. The third image shows the drill bit being inserted into the back of another bracket. |
| <p>3.2      Predrill 5 holes on the camera bracket body with 3/32-inch drill bit and approximately 1/4" deep</p> |  Two sequential photographs showing a person's hands holding a blue camera bracket body. A power drill with a 3/32-inch drill bit is being used to predrill holes into the bracket body. The first image shows the drill bit being inserted into the bracket. The second image shows the drill bit being inserted into another part of the bracket.  |



- 3.3 Attach the top bracket to the bracket body using M3 14mm screws. Pressure is required to self-tap.

3.3.1 Note: the top bracket has an angle that needs to slope towards the front of the bracket body

**NOTE: a newer version of the top bracket will have a small ridge under the top arch. This small ridge goes to the back, away from the monitor.**



- 3.4 Ensure the camera lens cover is closed



- 3.5 Mount the FLIR E8-XT series camera into the bracket, align the back of the top bracket to the front of the rubber flap on the camera





- 3.6 Attach the back bracket (The draft angles to the handle on the camera) to the bracket body to secure the camera in place using M3 4mm screws



- 3.6.1 Pressure will be required to push the camera forward in to the bracket body
  - 3.6.2 Pressure is required while screwing in to self-tap.
  - 3.6.3 You may need to squeeze the bracket body to align the holes with the back bracket
- 3.7 Push the camera forward to ensure the rubber flap is aligned with the top bracket

- 3.7.1 Check alignment from the front to ensure the camera is centered in the bracket





3.8 Slide the camera on the top of the monitor and ensure it is center.

3.8.1 The camera body mass is on the back of the monitor (See photo)

3.8.2 The front of the bracket body has an opening for the monitor camera (See photo)





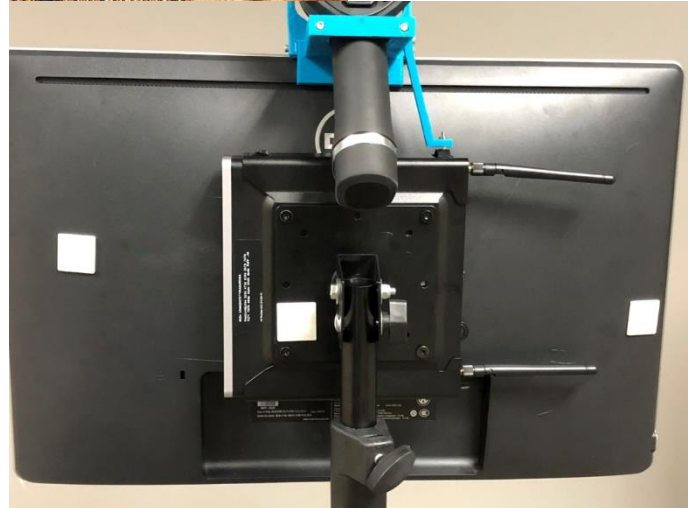
- 3.9 Attach the support bracket to the bracket body and the VESA sleeve
- 3.9.1 Using the remaining small metal nut, attach the bottom of the bracket to the screw previously installed on the VESA sleeve and tighten
  - 3.9.2 Note: a second nut may be required under the bracket for proper alignment
  - 3.9.3 Use one of the supplied small screws to secure the top of the support bracket to the bracket base. Pressure is required to self tap.

- 3.9.3.1.1 Center the screw in the slot on the top support (See photo)

**NOTE:** This slot will be used later to align the camera in "Section 6.4.1"

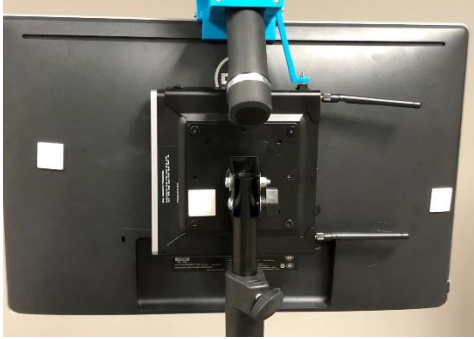












## 4. CABLE MANAGEMENT

THE GOAL IS TO SECURE THE WIRES AND POWER SUPPLIES TO REDUCE THE TRIPPING HAZARD

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| <p>4.1 Attach 1X1 mounting bases on the back of the monitor and VESA sleeve (See photo)</p>  |    |
| <p>4.2 Configure display port cable per the photo, approximately 6 inches on one end and one foot on the other end.</p> <p>Using zip ties after connecting all wires can help.</p> |   |
| <p>4.2.1 Attach to the monitor and PC as displayed in the photo. Use the second display port down on the PC</p>  |  |

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| <p>4.2.2 Secure the cable to a 1X1 mounting base with a zip tie</p>  |    |
| <p>4.2.3 Ensure the wireless antenna is not behind the cable. Antennas are intended to be free so as to be vertical when the monitor is tilted</p>                                     |   |
| <p>4.3 Install the HP Desktop PC and Dell Monitor power supplies (See photos)</p> <p>The monitor is tilted in this picture to show the bottom and where the power supply connects.</p> | <br> |

4.3.1 Using the Velcro strap to secure power cords to the tripod base

**4.3.1.1 NOTE: The power wires go to the right of the vertical adjustable height wing nut**



4.3.2 Leave enough slack for the monitor to tilt



4.3.3 Zip tie power cords and note the lower antenna is behind the PC power plug (See photo)





- 4.3.1 Use two 8-inch zip ties to secure power cords to tripod base




Take note of section 4.3.6 as you zip tie the power wires to the tripod.






- 4.3.2 Ensure the power cords come off the opposite side of the leg where the tripod base thumb screw is located

- 4.3.3 Arrange the power bricks at the base of the tripod and secure to the tripod leg using the Dell strap.  
**NOTE: You may need to use a couple zip ties to secure the power supplies.**



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| <p>4.4      Configure the USB A to USB B cable per the photo with approximately 6 inches on the A side and one foot on the B side</p>                 |    |
| <p>4.4.1    Attach the USB A side to the second USB port away from the PC power button</p>  |  |
| <p>4.4.2    Attach the USB B side to the USB B port on the bottom of the monitor</p> <p>The USB B end is square-shaped and the USB A end is flat.</p> |   |
| <p>4.5      Secure USB 3.0 hub to the 1X1 mounting base on the left side (Rear) of the monitor</p>  |  |

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| <p>4.5.1 Zip tie the spooled cable to the USB cable installed in Step 4</p>  |   |
| <p>4.5.2 Plug the USB A into the first USB port next to the PC power button</p>  |   |
| <p>4.6 Configure the Micro USB to USB A cable (See photo) with 20 inches on the Micro USB end and 10 inches on the USB A end</p> <p>NOTE: This cable is packaged with the FLIR camera.</p> |  |

- 4.6.1 Attach the micro USB end to the FLIR camera top (under the camera flap)



- 4.6.2 Secure both USB cable loops to the VESA sleeve 1X1 mounting base

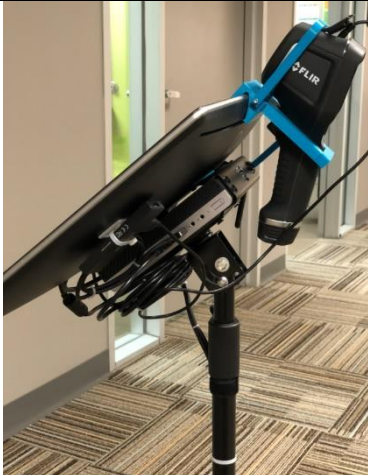

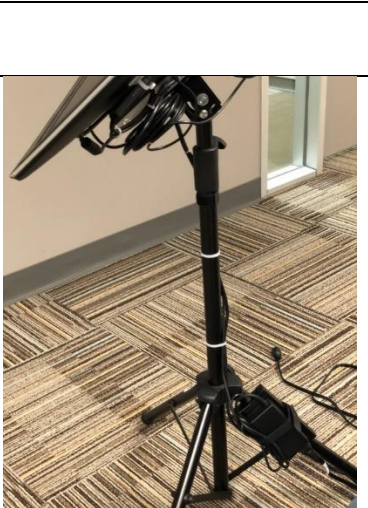
- 4.6.3 Attach the USB A end to the USB 3.0 hub









- 4.7 Trim zip ties





## 5. OPERATION

|   |  |
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| <p>5.1 Adjust tripod tilt to a 45 degree angle</p>  |    |
| <p>5.2 Lower the top tube all the way down and secure with thumb knob</p> <p><b>NOTE: This can be adjusted higher to help when evaluating taller individuals</b></p>  |   |
| <p>5.3 Align the monitor to be center on the two front legs to reduce tripping hazard</p> <p><b>NOTE: lower the top all the way to the bottom and extended the legs all the way out</b></p> <p><b>Extend the legs as far as you can to help stabilize the tripod. Take note the power supplies are connected and will need room.</b></p> <p><b>Be sure to tighten all thumb knobs on the top and bottom</b></p> |  |

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| 5.4 | Plug in the HP and Dell power cords into a surge protector   |    |
| 5.5 | Check the monitor camera alignment to ensure it is in the center of the bracket base opening (front of monitor)  |    |
| 5.6 | Open the lens cover using the lens cover slide at the bottom of the FLIR camera<br><br><b>NOTE: you can use the small allen key to open the lens cover</b> |   |
| 5.7 | Power on the FLIR camera by depressing the power button located on the back-bottom right of the camera   |  |

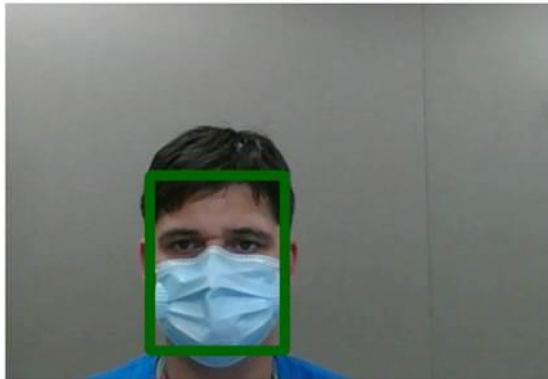


|   |  |
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| <p>5.7.1 The camera screen will show the front area once booting completes</p>  |    |
| <p>5.8 Press the PC power button and the computer will boot up</p>  |  |
| <p><b>5.8.1 NOTE: You may need to adjust the monitor input for the correct HDMI port you used</b></p> <p><b>You can cycle the input on the monitor until the desktop is displayed</b></p> |   |
| <p>5.8.2 It may take up to 10 seconds for the FLIR camera to be recognized once the software starts</p>   | <p>Touchless Thermal Scanning Kiosk</p> <p>Connecting to Web Camera</p> <div data-bbox="1101 1247 1365 1444"> <p><b>Notice:</b></p> <p>This kiosk will only work with a FLIR E8 or E9-XT Thermal Camera.</p> <p>The use of this kiosk with an approved FLIR device is intended for use only as a skin temperature measuring tool and is not a medically approved body temperature measurement device or a medical diagnostic tool.</p> <p>The use of this kiosk is not a method for the determination or diagnosis of a medical condition such as having COVID-19 or any other disease. It does not determine if the user has a fever. This kiosk works by comparing thermal readings from a current user with a running average of readings from prior users. If the current user's readings are a certain amount away from the average of prior users, the current user is presented with a display indicating that further evaluation is required. Transitions should be made for measuring such as user's revealed body temperature with a device such as a non-contact infrared thermometer or a clinical grade contact thermometer.</p> </div> <p><b>WE'RE ALL IN THIS TOGETHER</b></p> <p>Be Positive. Be Kind. Be Human.</p> |
| <p>5.9 Position the kiosk to avoid bright lights in the background (See photo)</p>  |  |
| <p>5.9.1 Bright lights can cause a glow behind the user and impact the scan</p>   |  |
| <p>5.10 User approaches the kiosk within 3 to 5 feet</p>  |  |

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|--|---|
| <p>5.10.1 Scan starts once the blue box is around the user face</p>  |   |
| <p>5.10.2 User should remove hat and glasses</p> <p>5.10.3 If facial detection fails, user may try lowering their mask below their nose and/or moving slightly closer to the kiosk</p> |  |

## 6. CAMERA AND SOFTWARE ALIGNMENT MODE

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| <p>6.1 Attach a mouse to the USB hub being careful not to disrupt the camera USB connection</p> |  |
| <p>6.2 Click the shaded rectangle in the upper right corner to enable debug mode</p>            |  |



|   |  |   |
|---|--|---|
| Touchless Thermal Screening Kiosk   |  | Click for Debug Mode  |
| Passed 94.97/94.21 (+4)   |  | OCV Confidence: 0.22 X Offset: 50 Y Offset: 55 Width: 470 Height: 325 Angle Distance: 35 Save |
|  |  |             |
| WE'RE ALL IN THIS TOGETHER<br>Be Positive. Be Kind. Be Human.                     |  |   |
| 6.3   | Check that the thermal image box (right image) is aligned to the user's eyes and forehead. |   |
| 6.4   | Large alignment issues may indicate the FLIR camera is not aligned to the monitor camera   |   |
| 6.4.1   | Check the camera and bracket base for coarse alignment and adjust as needed                |           |
| 6.5   | Small adjustments can be made using the X and Y adjustments in debug mode                  |   |

|   |   |
|---|---|
| 6.5.1   | Plug in a USB keyboard to an available USB port on the PC being careful not to disrupt the other connections  |
| 6.5.2   | Small horizontal offset is adjusted by changing the X setting. In this example, by changing the X setting from 90 to 82   |
| <p><b>Touchless Thermal Screening Kiosk</b></p> <p><b>Passed 94.97/94.21 (+4)</b></p>  <p style="text-align: center;"><b>WE'RE ALL IN THIS TOGETHER</b><br/> <b>Be Positive. Be Kind. Be Human.</b></p> |   |
| 6.6   | <p>Debug mode can be used to see the temperature reading over average. (See photo). This is to be used for debugging purposes only. Do not display these numbers or use debugging mode during operation.</p>  |
| 6.7   | Exit debug mode by clicking "Save" to save any changes and then clicking the shaded rectangle in the upper right corner. Remove the keyboard and mouse prior to operation.  |

## 7. TROUBLESHOOTING

- 7.1 Users are not scanning properly
  - 7.1.1 Ensure hot objects are not in the background (vehicles, plant equipment, lobby monitors, reflective surfaces, bright lights, etc.).
  - 7.1.2 Add an LED lighting source to the scanning area facing the subject. This will ensure their facial contours are being recognized as the area of interest, which then trigger the thermal scan.
  - 7.1.3 Review the section on Environmental Considerations in the readme file for more suggestions.
- 7.2 The thermal camera screen is frozen
  - 7.2.1 Cycle the camera on/off button.
  - 7.2.2 If cycling the power on/off button does not work, remove the battery from the camera, put the battery back into the camera and power on the camera. Restart the kiosk computer (turn off the power strip and turn back on) once the thermal camera is powered back on.
- 7.3 The kiosk computer shut down due to a power outage
  - 7.3.1 Once site power is restored, power off the thermal camera. Turn the power strip off to the kiosk. Turn the thermal camera on and wait for the camera to boot up. Turn the power strip back on and press the power button on the computer.
- 7.4 The scanning software does not launch
  - 7.3.2 The software can be manually launched by navigating to C:\Program Files\Kiosk and executing "ThermallmagingKiosk.exe".
- 7.5 The kiosk has stopped scanning
  - 7.3.3 Reboot the system (monitor and computer) to reset. This may be done by unplugging both power cords.

## 8. TERMS OF USE

By using this kiosk design and its associated software, you agree to the following:

- This kiosk design and its associated software may only be used for initial evaluation of multiple users entering a facility or other area.
- This kiosk design and its associated software can only be used to examine one user at a time .
- This kiosk design and its associated software will not be used to determine, diagnose or treat any disease or condition, including COVID-19.
- This kiosk design and its associated software will not be used to determine if a user has a fever.

- This kiosk design and its associated software will not be used to provide a user with their temperature, or any number related to their temperature.
- This kiosk design and its associated software must notify a user when an elevated thermal measurement is determined and, if such a determination is made, that additional evaluation is required.
- This kiosk design and its associated software can only be used in an environment where further evaluation is available using an appropriate method, such as measurement with a non-contact infrared thermometer or a clinical grade contact thermometer.
- This kiosk design and its associated software cannot be used for a commercial purpose. This includes manufacturing a kiosk for a third party; marketing or selling a kiosk; requesting compensation for the use of a kiosk; renting or leasing a kiosk; and the like. This does not preclude you using the kiosk design and its associated software for internal use with employees, visitors, customers, students, and the like who may enter your facility.
- FLIR requires that the use of this App with a FLIR EST Camera or approved FLIR Device is intended for use only as a skin temperature measuring tool, and is not a medically-approved body temperature measurement device or a medical diagnostic tool.

This kiosk relies on a third-party thermal infrared camera to provide readings to the software. An appropriate camera must be selected and any instructions for the camera followed for proper functioning of the kiosk. FLIR has indicated that its E8 camera is generally suitable for skin temperature screening applications.

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## 9. LICENSE

The software described in this paper is offered under licenses at <https://github.com/generalmotors/thermal-scanning-kiosk/LICENSE>.



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Designs for the 3D-printed camera bracket and 3D-printed gasket described in this documentation are licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/).

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