



## Understanding the Integrated Elevated Temperature Detection Camera System

Homeland Safety Systems has been developing an Integrated Elevated Temperature Detection System that will alert when a subject has an elevated temperature higher than a set programmed temperature, such as the generally accepted 98.6° Fahrenheit. Our system utilizes a facial localization algorithm that targets the inner canthus (inner corners of the eyes) to capture the most accurate and closest reading to the body's core temperature. The captures are taken every 200 milliseconds and have an accuracy of  $\pm 0.54^\circ$  Fahrenheit. When set up properly, we recorded an accuracy of  $\pm 0.3^\circ$  Fahrenheit.

While researching temperature detection technologies within the thermal camera market, we found several factors that contribute to the accuracy of the system.

### **Accuracy Tips:**

1. A controlled environment is critical for accurate temperature readings.
  - Temperature fluctuations and changes in air flow can cause discrepancies in readings.
2. Calibration devices are an essential component of any temperature detection system. Thermal cameras need to have a calibration device within 12 feet of the thermal camera for best results in achieving accurate passive temperature readings. The height of the calibration equipment should be set at the height as the average height of the subjects.
  - During our research, subjects more than 12 feet from all thermal cameras tested had temperature discrepancy readings of  $\pm 2.0^\circ$  Fahrenheit. Most of the readings at greater distances were well below the subject's actual core temperature, which would have indicated hypothermia.
  - During testing, we recorded decreased temperature readings of  $\pm 0.5^\circ$  Fahrenheit when the subject's face was two feet below the calibration device.
3. The position of the subject's face is important for capturing an accurate reading. The subject should face the camera straight forward and have as few facial coverings on as possible. Glasses should be removed for a visual of the inner canthus. Hats, bandanas, hair, and other forehead coverings should be moved to leave the forehead unobscured as a secondary source for reading.
  - Our research shows that a subject looking up, down, or away from the camera had a lower temperature reading than when they faced the camera.

### **Best Practice Based on Research:**

Our research shows a calibration device set equal distance from the camera as the subject while in a controlled environment yield the most accurate results. These results are also based on the subjects moving forward and looking directly at the camera as if they were being photographed.



Some manufacturers show videos of subjects walking past their thermal imaging cameras with accurate readings. Our testing and research have determined these to be a false representation of the true capabilities of the cameras and systems. We have been unable to accurately read skin or body temperatures with movement in multiple directions, on subjects with facial coverings, mass movements of subjects, etc. Each of these tests resulted in lower temperature readings of  $\pm 1.56^{\circ}$  Fahrenheit lower than the subject's normal reading.

In conclusion, we will be determining the best possible way to move subjects in and out of facilities we protect and engineering systems to fit those needs. Due to the complexity of these thermal systems and their capabilities, professional installation, programming, and training are required and will be provided by Homeland Safety Systems trained technicians. Our team has extensive knowledge of all thermal imaging devices currently available and our engineers are available for discussions about the best and most efficient way to protect your facility. We look forward to working with you to navigate through this new normal.

For engineering, design, or consultation, please contact us at (888) 909-2261.