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EYE-STRAIN AND FATIGUE REDUCTION INDICATOR

HP INC

Eye-strain and fatigue reduction indicator

ABSTRACT

A laptop is opened and closed multiple times a day with little regard to the amount of glare that is directed back towards the user's eyes. Often the user opens the laptop and adjusts the display screen throughout the open session. We can inform the user of the optimal viewing angle immediately allowing the user to achieve the best viewing angle at the onset of a usage session. This decreases the effects of glare on the user's eyes over the use of the device therefore reducing eye-strain and overall fatigue.

INTRODUCTION

Utilizing eye tracking technology, we can calculate the current viewing angle of the display relative to the user's eyes. When the display is pointed towards the ceiling the display is more likely to reflect ambient light towards the user's eyes thus causing undo strain and forcing the user to adjust the display multiple times during a session. In contrast, when the display is pointed too low not enough light from the display reaches the user's eyes and can cause squinting or an unneeded increase in the displays' brightness thus draining the battery faster than needed. The optimal angle is one display is projected perpendicular to the user's eye retina. We can convert this to an equation were the angle of the display to the Θ of the display is equal to 90 degrees when the user's eyes are centered on the display, we can assume the camera is top, center of the display and calculate the slight offset of the eye tracking system to the center of the display. We can use this offset as the margin of error, so we do not have to worry about calibrating the system for each configuration offset.

Related Work

While eye tracking has been around for a while it does not seem to be used to provide anti-glare calibration assistance for displays.

Method

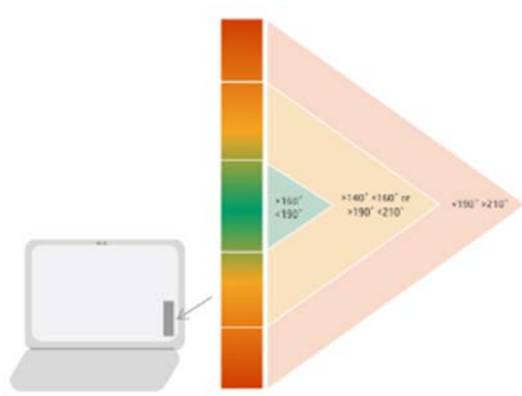
In this paper, we propose that the use of computer vision calibrated to the display dimensions will decrease glare. To do this we must first retrieve the native resolution of the camera. The offset is average delta of the distance between the center of the laptop display to the center of the eye tracking image. For the prototype we used a variance of 10 degrees off the ray-cast tangent line (90 degrees). Next, we get the x and y position of each eye when the head is facing the camera during the windows hello sign in process. By dividing average y position of the eyes by the height of the eye tracking image we get a value indicating how centered the eyes are on the screen. And then multiplying the result by 180 degrees we can calculate Θ.

Result

By using the center eye method, we ensure the maximum value of sin(Θ) is never above 1. Ensuring the user has the least eye strain possible.

Conclusion

By ensuring the maximum viewing angle is never above 90 degrees we ensure the user has the best viewing experience from the moment the user opens the lid.



Disclosed by Christopher Steven, HP Inc.