

INVENTION DISCLOSURE

1. **Invention Title.**

Video Screen Illumination Based on Where the Fovea are Directed

2. **Invention Summary.**

The area of a video or computer screen being looked at by the viewer is given more backlighting than the rest of the screen. That is, the area of the screen being focused onto the fovea part of the retina is given increased backlighting. This saves energy, improves readability, and increases battery life. The camera in the device processes where the viewer is gazing to increase illumination only in that area. Training can be done for the camera's software.

3. **Invention Description.**

a. **Describe the invention in detail.**

Problem:

Illuminating video screens uses a lot of energy. This energy draw becomes particularly onerous when a device, such as a tablet or laptop, runs on batteries. Dimming the display when the device is on battery power is frequently used as a solution to maintain battery life. This is a poor solution in a brightly-illuminated room. Additionally, if the eye is not in perfect focus, dim light makes viewing more difficult.

Solution:

Use dim backlighting for the display, but brighten the screen area where the eyes are focused. (from web)" The fovea defines the center of the retina, and is the region of highest visual acuity. The fovea is directed towards whatever object you wish to study most closely - this sentence, at the moment. In the fovea there are almost exclusively cones, and they are at their highest density." Thus increased light projected onto the fovea portion of the retina helps vision.

Many of these video viewing devices already have cameras built-in. There exists software to track the position of the eye. This software is used, for example, in advertising to evaluate human response to an image.

A solution is to elevate the illumination for the area of the screen where the fovea is directed, and use less illumination energy for the remainder of the screen. Where the fovea is directed is determined by the software tracking eye movement.

Multiple viewers can be viewing the same screen.

The idea works for LEDs backlighting LCDs, projection devices, or OLED (optical LEDs).

In concert with how a human eye functions, color may be used mostly in the viewed area, with illumination used more on the periphery of the field of vision.

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Training algorithm may be implemented to improve eye tracking

When you blink, close your eyes, look away, or walk away several approaches are possible. For blinks, no change, for others cases, stop highlighting one area. For walking away, another energy savings idea is to turn off back illumination completely.

It will be obvious to a non-tracked observer what a tracked person is looking at by illumination area. Teachers can use this to help students learn to read.

This idea can also be used as an aid for the visually impaired. Also for the visually impaired, the touch-screen function can be used. That is, just above the touch point, the image is made brighter to improve visual acuity. Call it "Pseudo-Braille".

The area being viewed is highlighted, so it can also be used with other clues to take action. For example, viewed hypertext can be selected by pressing a button, double blinking rapidly, or making a voice command that causes the hypertext to be selected. Alternately, the text selection can bring up a dictionary definition, translation, or other action.

Other facial clues, besides eyes, can be used to communicate with the processor via the camera. For example, raising your eyebrows, dropping your jaw, or moving your nose (or tongue) can cause the processor to take action. This camera recognition would be an alternative to voice recognition.

This illumination idea also can work with 3-D viewing.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?

I have trouble seeing my laptop screen when it is in a power (battery) saving mode in a bright conference room. Necessity is the mother of invention.

c. Briefly outline the potential commercial value and customers of the invention.

Large. Laptop/tablet/TV market is one, education market is another, aids for the visually impaired is another.

4. HOW is this invention different from existing products, processes, systems?

Prior art: To make backlit LCD scenes "blacker" a reverse process is used, where the backlight is turned off or down. (From Consumer Reports Website)" Sony and Samsung make these displays. Local dimming divides the screen into 128 segments that can be lighted or dimmed independently, minimizing light leaking into dark parts of an image. Manufacturers say LED backlight improves black levels as well as contrast and enables more even brightness, a wider range of colors, longer life, and better energy efficiency"