Adaptive Computer Display for Preventing Computer Vision Syndrome

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Abstract:

Computer screens are cauisng damage to human eyes increasingly day-by-day.Exhaustive use of computers is causing various diseases including Computer Vision Syndrome. Computer Vision Syndrome can cause eye-strain, headaches,blurry vision, dried eyes,shoulder-neck pain,etc[2].In this paper we are proposing a system that tries to reduce the impact of Computer Vision Syndrome on human eyes.This system tries to reduce the impact of CVS by dealing with light that is emmitted through electronic displays.

Keywords: Computer Vision.,Computer Vision Syndrome , Eye Blinks.

I. Introduction:

In this paper we are proposing implementation of a system that will prevemt computer users from the impacts of Computer Vision Syndrome. The complete solution or the complete prevention from Computer Vision Syndrome is not possible. Our System does not prevent the the disease completely put it helps reducing the symptoms of the computer vision syndrome.This system is implemented using basic hardware requirements.Our system requires only webcam as an extra hardware. This requirement can be eliminated if the user uses a laptop with built-in web cam. Average adult human being blinks every 4 seconds[1].For successfull prevention of the CVS along with our system users need to follow 20-20-20 rule[4].

II. System Architecture:

In this system we are using very basic hardware requirements such as webcam. The webcam continuously scannig the human face infront of it. In the detected face eye detection is done.After detecting the eyes,our system then tries to detect the eyeblinks.

Number of eye blinks are recorded and are compared with the threshold values after certain time interval (5 to 10 minutes).If the number of eyeblinks during this time is in considerable range of the threshold value then we can conclude that blinking rate is normal but if the user rate is considerably below the threshold value then the display brightness is reduced accordingly.

This system can be implemented using canny-edge detection algorithm for eye blink detection[1] and eye aspect ratio algorithm(EAR)[2] also performs the same task but employs different methodologies.In our system we are using EAR algorithm. EAR algorithm uses facial landmarks for eye blink detection which are provided with a pre-compiled file.

After detecting the blinking rate from the user , this rate is forwarded to the brightness control unit of the system. The brightness control unit checks if the brightness needs to be adjusted or not.If the brightness needs to be adjusted then this unit decreases the brightness of the screen.

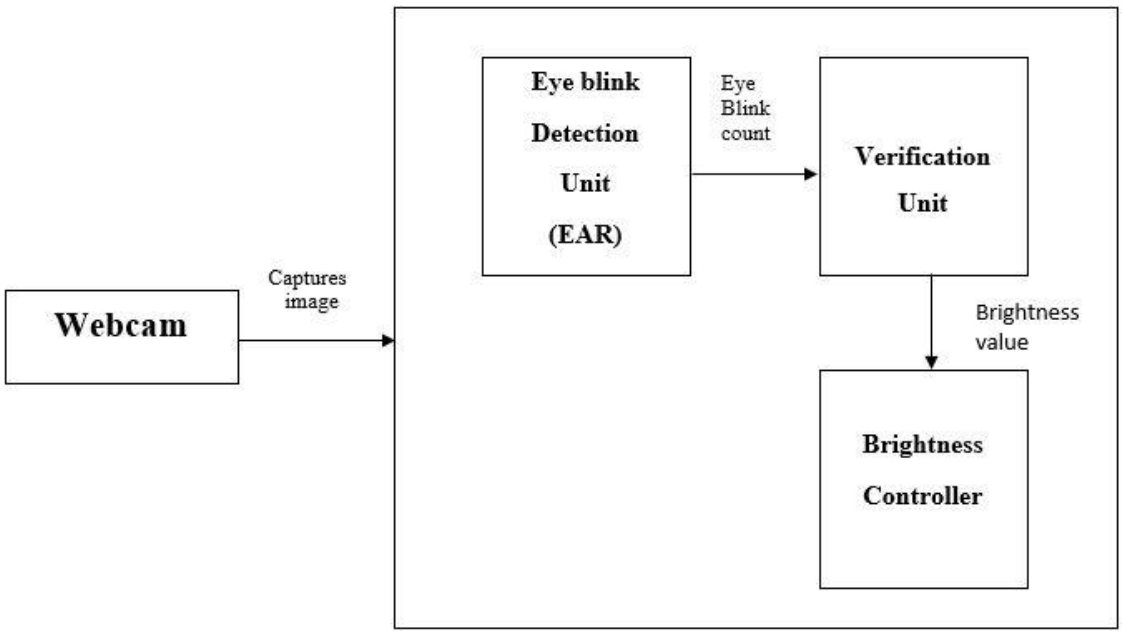

Fig. System Architecture

III.Conclusion:

By using this system users will not be able to totally avoid the effects of computer vision syndrome but they can reduce the impact on their eyes.This system also adjusts the screen brightness without any human intervention hence it is totally automated process.

IV. Future Scope:

In Future iterations, we can try to implement this system for wide range of devices such as mobile phones, smart TVs,Tablets etc.This system performs poorly in lightning constraint environments so we can try to improve the low light performance of the system. We can improve the performance of the system for the users wear spectacles. The head orientation can also be taken into account for eye detection in future iterations of the product. Current version only adjusts the screen brightness but in future versions we can adjust different light settings like adjusting or preventing blue light from the display or other environment oriented light settings

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