December 2020

Proximity-based Triggering of Screen Restrictions to Avoid Eye Strain

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ABSTRACT

Viewing device screens in close proximity can cause eye strain. Some devices use front-facing cameras to detect and recognize faces in order to personalize the user experience (UX) to the user close to the device. However, such personalized operation does not include functionality that depends on the user's proximity to the device screen. Proximity sensing within devices is used to turn the screen off in situations when the device is held against the user's head. Such capacitive proximity sensing operates at distances from the screen that are relatively short. This disclosure describes techniques to change the operation of a device display based on detecting a user's proximity to the device screen with the user's permission. If the user permits, the user getting too close to the device screen can trigger appropriate measures that restrict the screen operation.

KEYWORDS

- Viewing distance
- Reading distance
- Eye strain
- Eye safety
- User proximity
- Proximity detection
- Proximity warning
- Proximity-triggered display restriction
- Viewing mode

BACKGROUND

People often inadvertently read or view content on displays, e.g., television sets, monitors, smartphones, tablets, smart displays, etc. that are located too close to them. Viewing screens from such close proximity can cause eye strain. The issue can affect children in particular as they tend to get very close to the screen when interacting with various devices.

While some devices implement proximity sensing to automatically turn the screen on/off, such a mechanism is typically used to prevent accidental screen touches in situations when the device is held against the user's head, such as when the user is engaged in a phone conversation. Such proximity detection is based on capacitive sensing rather than far-field sensing. As a result, the proximity sensing operates at distances from the screen that are too short compared to the safe viewing distance for a screen.

When users permit, some devices use front-facing cameras to detect and recognize faces to personalize the user experience (UX) to the user close to the device. However, such personalized operation does not include functionality that is based on the user's proximity to the device screen.

DESCRIPTION

This disclosure describes techniques to automatically change the operation of a device display based on detecting a user's proximity to the device screen, determined with the user's permission. If the user permits, the user getting too close to the device screen (e.g., within a range that is deemed unsafe or unsuitable), the device can trigger appropriate restrictive measures, such as turning the screen off, obscuring the displayed content, etc. to mitigate potential eye strain caused by the user viewing the device screen from a close distance.

With user permission, the user's proximity to the device screen can be detected by one or more sensors within the device, such as a user-facing camera, depth sensor, proximity sensor, etc. The sensor information can be used to determine the distance (with some error margin, based on the data available) between the user's face and the device screen. If the distance is deemed to be small enough to potentially lead to eye strain, the device can trigger a response in a variety of ways. These can include, e.g., turning the display off, obscuring the displayed content (e.g., blocking text shown on screen), halting the current interaction (e.g., pausing the video being watched), etc. The triggered action is reversed once the user moves away from the device such that the distance between the user and the screen is greater than the threshold distance for potential eye strain.

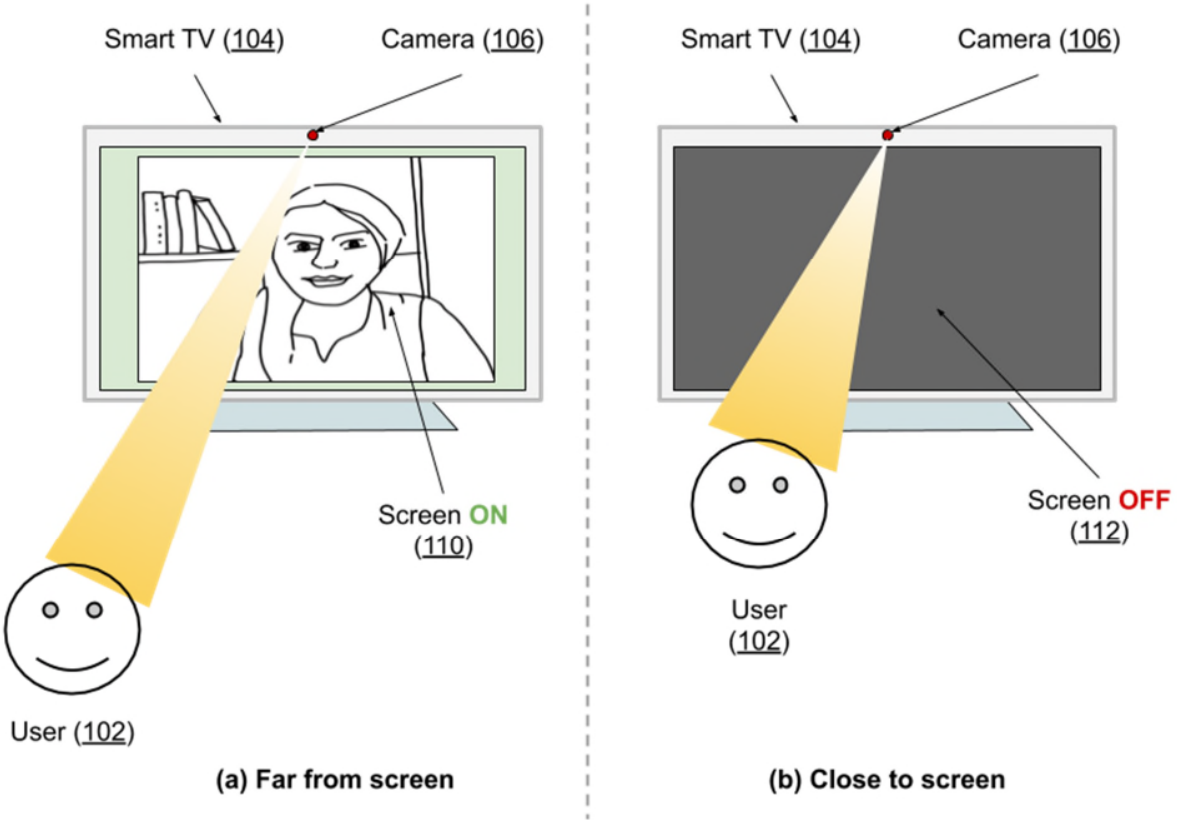

Fig. 1: Triggering screen restrictions when the user is too close to the screen

Fig. 1 shows an example of operational implementation of the techniques described in this disclosure. Fig. 1(a) shows a user (102) that is watching video content on a smart TV (104). With user permission, the camera (106) (or other sensors, if available) of the smart TV is used to determine that the user is adequately far from the TV such that viewing the TV does not cause eye strain. The TV screen is kept on (110) and content is shown as normal.

As Fig. 1(b) shows, when the user moves closer to the TV to be within a distance deemed to be too close for viewing without eye strain, screen restrictions are triggered, e.g., the screen is turned off (112). Other suitable actions such as displaying feedback, blurring the content, pausing the content, etc. can be taken, e.g., prior to turning the screen off or performing other restrictive actions. Feedback or actions can include, e.g., a flashing message warning that the viewing user is too close to the device screen, progressive dimming of the screen with increasing proximity of the user to the screen, etc. Detection of user distance and triggering the resultant action is configurable by the user. The user is provided with options to select the sensors that may be used for distance detection (e.g., camera, depth sensor, etc.). The user can also turn off the feature entirely.

The described techniques can be implemented for any device that includes a screen and has proximity sensing capabilities, such as smartphones, television set, tablets, smart displays, etc. The distance from the device screen at which screen restrictions are triggered can vary based on the type of device and/or size of the device screen. For example, the distance for comfortable viewing without straining the eyes can be 2 feet for a television but 1 foot for a tablet. The threshold values of the distances at which the screen restrictions are triggered can be set by the developers, based on eye strain related information. Detection of distance and triggering of alerts or screen restrictions is performed locally on the device.

If users permit, screen restrictions are triggered automatically whenever any user is in the proximity of the device screen. Alternatively, users can choose to enable screen restrictions based on one or more criteria including but not limited to: device type, time of day, user type, specific devices, for specific users, etc. For instance, parents can choose to turn screen restrictions on whenever a device is being operated by children.

Implementation of distance-based screen restrictions can help users to avoid eye strain caused by viewing device screens at close distances. Moreover, over time, the feedback mechanisms and screen restrictions can help users learn how to maintain an appropriate viewing distance from a device screen. Such learning can be particularly beneficial for helping children develop healthy device-viewing habits from a young age and mitigate the parental stress of ensuring that children maintain a safe viewing distance when using various devices. The techniques can also be similarly beneficial in an educational environment where teachers supervise the device use of students. Overall, the techniques enhance the user experience by promoting wellbeing while using devices.

Further to the descriptions above, a user is provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection or use of user information (e.g., a user's devices, a user's preferences), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

CONCLUSION

This disclosure describes techniques to change the operation of a device display based on detecting a user's proximity to the device screen with the user's permission. If the user permits, the user getting too close to the device screen can trigger appropriate measures that restrict the screen operation until the user moves out of the proximate zone of potential eye strain. The techniques can be augmented with user permission to provide advanced feedback prior to triggering the restrictive action. Implementation of the techniques with user permission can help users avoid eye strain caused by viewing device screens at close distances. Moreover, over time, the feedback mechanisms and screen restrictions described above can help users learn how to maintain an appropriate viewing distance from a device screen. The techniques can enhance the user experience (UX) by promoting digital wellbeing while using devices.