Application Brief

The Value of a High-Speed, High-Resolution Light Sensor

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Introduction

Light sensors sensitive to the visible region are often used for tamper detection, day vs night detection, LED or display brightness adjustments. Like in Figure 1, the light sensor measures the ambient light intensity that is used to alert a system if there is a change in light detected or adjust the brightness of an LED or display. The use of a light sensor improves the overall user-experience and product performance and TI's light sensors offers the advantage of a high speed and high resolution. This application brief explains the advantages of a high speed, high resolution light sensor in display, camera, and automotive applications.

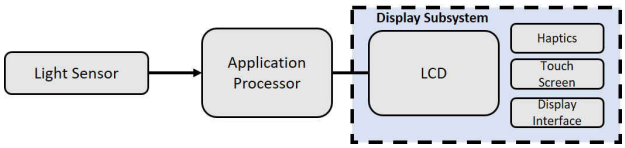

Figure 1. Display Application System Block Diagram Example

Display Applications

With display applications, light sensors are used for mainly three reasons: power management control, extend the life of LEDs driving the display that minimizes aging and enhanced user experience. For the best user experience, many applications with displays use light sensors to help perform display brightness control. The best user experience consists of the display being lit comfortably so it is easy to see and not a strain on the eyes. Based on the surrounding light in the environment, a light sensor is used to set the display brightness and optimize power consumption. Since the light sensor is used to update the display brightness, if the sensor speed is too slow, the display can remain bright when the environment gets dark or vice versa resulting in a poor user experience. In scenarios like stepping indoors on a sunny day, a high speed light sensor enables a quick response to change the brightness of your display.

A light sensor's resolution, which determines the minimum lux level that can be detected, is also important to display applications and brightness control. Frequently, the light sensor is placed behind a dark material for ascetics reasons and the light that reaches the sensor is attenuated. The use of a high resolution light sensor allows for great performance even behind extremely dark material.

Camera Applications

With camera applications, exposure is a critical element that controls how much light reaches the camera sensor, thus, determining how light or dark the tones in your image are. A light sensor is used to measure the amount of light in the environment that indicates the proper exposure value. Typically, when selecting a light sensor for a camera application, Near-IR light rejection and low-power draw are of most importance. However, a high-speed light sensor the correct exposure even before the camera wakes up and captures the first frame. In addition, when there is a change in the ambient lighting, a high-speed light sensor helps resolve to the correct exposure as soon as possible, which limits the number of frames lost to either over or under exposure. A light sensor with high resolution helps achieve a more accurate camera exposure settings and can be used behind darker glass, which adds to system design flexibility. A fast and accurate camera exposure improves the overall product performance for camera applications.

Automotive Applications

With many displays within automobiles, such as head-up displays, cluster displays, and center information displays, the value of a high-speed and high-resolution light sensor is similar to other display applications. However, with automotive applications, there is are increased safety considerations. With quick changes in environmental light levels such as driving in and out of tunnels, the need for a faster reaction to a change in brightness becomes more critical. A bright display in low light conditions can be distracting and a strain on the eyes while a dim display in bright conditions are harder to see and more hazardous. A high speed light sensor helps achieve a fast reaction to those quick environmental changes.

A light sensor with high resolution helps achieve finer control of the display brightness, especially under darker conditions. A more dynamic display adjustment can increase the user experience and ensure that the display is viewable under all lighting conditions. Also, with a high resolution light sensor, the light sensor can be placed deeper in the cluster unit or behind darker cover material for aesthetics.

Conclusion

For most applications with displays, cameras, or in the automotive space, a light sensor with high speed and high resolution provides great value. Whether it enhances the user experience, improves system performance, or limits hazardous scenarios, implementing a light sensor with high speed and high resolution is a simple way to achieve optimal results.

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