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EXTERNAL LED LIGHTING DEVICE CALIBRATION/ SYNCHRONIZATION

HP INC

External LED Lighting Device Calibration/Synchronization

Abstract: A computer gaming system measures color and ambient lighting conditions with at least one sensor and pushes color and/or brightness settings to all connected devices in the system.

This disclosure relates to the field of gaming computer systems.

A technique is disclosed that allows a gaming user to use the front of their display or measured color and ambient lighting environment measurement from any device to push color and/or brightness settings to all connected devices.

Today, a gamer typically has many different devices connected to a host machine. These typically include a mouse, keyboard, headset, monitor, and sometimes even external devices. Multiple software and hardware toggles must be used to match lighting among these devices. ALS and color measurements are used on the phone and other devices to adjust brightness and color of screens and overall backlights. However, when multiple source devices are connected, they cannot easily synchronize all devices because of differences in each device and the lack of environment data.

According to the present disclosure, the different devices are maintained similar in color and brightness based on collection of the environment data from connected or external devices using color and brightness ambient measurement. Modified settings are then applied to accommodate for position placement of each device, the external light cast from each device, and the preference of the user position. This eliminates the need to use toggles to match lighting and allows for true syncing. Color and lighting measurement and calibration means eliminates adjustment of the settings of devices since they will follow the environment, which is more convenient for the user. All their connected devices change at once in response to changes in environment lighting and color.

In one example, a user has a connected keyboard and mouse and speaker system in which an ambient light sensor is integrated into the display to adjust display lighting to be consistent with external ambient lighting levels. Using the ambient light sensor on the display, the relative ambient light condition is stored. The ambient lighting level is then pushed to all connected devices via serial or wireless connection to the display USB Hub. Each connected device then considers its preset position in relation to the device and its maximum capable output brightness. Next, using the lowest common denominator capability among devices, all connected devices will adjust their external lighting output limits to match the least-capable connected device. All connected devices will then follow the received ambient light level to adjust their current output brightness as the ambient lighting conditions change. In this way, all devices maintain a relatively similar light level at different lighting conditions.

If the user desires one device to always be a factor of brightness higher than other devices, he or she can preset an offset via software to calibrate a device to a higher maximum luminance than the least-capable device.

In situations where the color needs to be matched across devices, an external color measurement or integrated color measurement device is used to sync the colors of connected peripherals. A similar setup as described above includes a color sensor on the display that is used for ambient backlighting calibration, such as to calibrate a bias light

for the display. In this way, when the sensor measures external lighting color and changes the bias light appropriately to bias the display, the base color is pushed to external devices. Each external device has a known range of output color to which it can match. Based on the smallest possible color range of the connected devices, the output color of the bias light shifts, and each device then calibrates their color range to that of the least capable device, to match output color across all devices.

Any ambient light/color sensor can be leveraged, even on the display, to synchronize colors and adjust overall system or battle station brightness/color. In some examples, an external color sensing device is used to measure the emitted light from each device to create calibration techniques for it.

The disclosed technique advantageously allows a user to make their connected devices match color and brightness more easily. Color and ambient light compensation are achieved across all devices without the user having to manually set the colors of external lighting across multiple devices. Devices without external lighting sensors can correct brightness based on connected sensors from other devices by exposing controls via connection to the monitor. Devices can be automatically color matched based on the color and intensity of the ambient environment lighting. All of this provides users a better ecosystem lighting solution than is possible today, and does so across devices of different brands or which have unknown characteristics

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